Environmental Impact Assessment (EIA) and Environmental Management Programme (EMP) for the proposed relocation of three Eskom 400KV power lines that traverse Khwezela Colliery in Mpumalanga – Public Review

Report Prepared for

Eskom

Report Number 512575/DEIR

DEA Reference Number 14/12/16/3/3/2/999

Report Prepared by

srk consulting

July 2017

Environmental Impact Assessment (EIA) and Environmental Management Programme (EMP) for the proposed relocation of three Eskom 400KV power lines that traverse Khwezela Colliery in Mpumalanga – Public Review

Eskom

Megawatt Park
Maxwell Drive
Sunninghill
Sandton

SRK Consulting (South Africa) (Pty) Ltd
265 Oxford Rd
Illovo 2196
Johannesburg
South Africa

e-mail: johannesburg@srk.co.za
website: www.srk.co.za

Tel: +27 (0) 11 441 1111
Fax: +27 (0) 11 880 8086

SRK Project Number 512575/DEIR

July 2017

Compiled by:

Natasha Anamuthoo
Senior Environmental Scientist

Email: nanamuthoo@srk.co.za

Peer Reviewed by:

Darryll Kilian
Partner

Authors:

Natasha Anamuthoo, Beth Candy

Executive Summary

Introduction and Background

SRK Consulting (South Africa) (Pty) Ltd (SRK) has been appointed by Anglo Operations (Pty) Ltd (AOL) on behalf of Eskom Holdings SOC Ltd (Eskom) to undertake the Environmental Authorisation (EA) process required in terms of the NEMA and the amended EIA Regulations, 2017. Eskom proposes to relocate a section of the three 400 kV power lines that traverse Anglo Operations Limited Khwezela Colliery (formerly known as Landau Colliery Mining Right area) due to the instability caused by the sinkholes this could result in disruption of power supply to the National Grid. The project is located immediately west of the N12 freeway near eMalahleni in the Mpumalanga Province, within the Nkangala District Municipality and eMalahleni Local Municipality.

SRK has been appointed as independent assessors to carry out the specialist work needed for the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) and to conduct the public participation process required in terms of the National Environmental Management Act (NEMA, Act No. 107 of 1998) and the regulations of April 2014.

Parallel to this environmental application Anglo is undertaking a Section 102 application and associated environmental authorisation for the reclamation of the Material Residue Deposit (MRD) with the Department of Mineral Resources. The proposed new power line route intersects with the Landau MRD 3, which is located off the N12 on the farm Klipfontein 322 JS, portion 27 and 28.

Scope of this report

This report describes the proposed activity and its context, details the stakeholder engagement process, and presents the results of the EIA Phase. The EIA/ EMP Report has been prepared in accordance with Section 22 of the amended EIA Regulations, 2017. The report consists of the following sections:

- Section 1: Introduction
- Section 2: Governance Framework and Environmental Process
- Section 3: Outlines the approach to the environmental process.
- Section 4: Project Description
- Section 5: Description of the biophysical and social environment
- Section 6: Stakeholder Engagement
- Section 7: Environmental and Social Impacts
- Section 8: Environmental Management Plan
- Section 9: Assumptions and Limitations
- Section 10: Conclusions and Recommendations

Governance Framework

There are a number of regulatory requirements at local, provincial and national level with which the proposed project must conform. Some of the key environmental legal requirements include the following:

- Constitution of the Republic of South Africa, (Act No. 108 of 1996)
- National Environmental Management Act 107 of 1998, as amended (NEMA)
- EIA Regulations 2014, promulgated in terms of NEMA
- National Water Act 36 of 1998 (NWA)
- National Environmental Management: Waste (Act 59 of 2008) (NEM:WA)
- National Heritage Resources Act 25 of 1999 (NHRA)

- National Environmental Management: Biodiversity Act 10 of 2004 (NEM:BA)
- Spatial Planning and Land Use Management Act 16 of 2013
- Relevant energy sector strategic documents
- Eskom corporate policies and programmes
- Eskom Safety, Health, Environment and Quality (SHEQ) Policy – 2015 (32-727)

Project Description and Motivation

The current power line route is at risk as it extends across historic shallow underground mining operations contributing to the formation of sinkholes. In the event of tower structures collapsing due to the instability caused by the sinkholes this could result in disruption in continued power supply to the National Grid. In addition, Eskom cannot gain access to these areas to maintain the power lines, necessitating rerouting of the power line. Eskom and AOL have partnered and jointly employed resources to address this concern.

The towers that are currently at risk are the following:

- Duvha – Apollo 400kV line: tower 42 to tower 51
- Duvha – Kusile 400kV line: tower 42 to 51
- Duvha – Vulcan No 2: tower 42 to 51

In order to prevent power disruption Eskom proposed to reroute the three 400kV power lines.

Project Alternatives

AOL together with Eskom explored four options aiming to avoid areas with high potential for sinkhole development as well as prevent the sterilization of resources. After the analysis was undertaken Option 1 was the preferred option.

The current power line route is at risk as it extends across historically shallow underground mining operations. Sinkholes have developed at Khwezela Colliery due to the shallow historical workings. In the event of tower structures collapsing due to the instability caused by the sinkholes this could result in disruption in continued power supply to the National Grid. As a result, no No Go alternatives have been considered for this project.

Project Phases

The entire life cycle for a new transmission line includes the following primary phases:

Feasibility phase

The feasibility phase of the provide will include:

- Selecting a suitable corridor for the route of the proposed transmission line and execution of an EIA process. Servitude negotiations are also initiated during this phase; and
- Eskom and environmental specialists (e.g. ecologist, heritage) conduct a walk-down survey to determine the exact locations of the towers, based on sensitive environmental features and technical criteria.

Planning and design phase

This phase, which is only undertaken should environmental authorisation be obtained, includes the following:

- Aerial survey of the route;
- Selection of the most appropriate structures; and
- Preparation of relevant planning documentation, including technical and design documentation.

Construction phase

During the implementation of the project, the construction activities related to the installation of the necessary infrastructure and equipment is undertaken.

Operational phase

This includes operational activities associated with the maintenance and control of the power lines.

Decommissioning

This phase will include measures for complying with regulatory requirements, rehabilitation and managing environmental impacts of the decommissioning of the existing power lines.

Biophysical and Socio- economic Environment

This section of the report describes the biophysical trends of the project environment, prior to commencement of the proposed relocation of the power lines.

Topography

The natural topography of the area has generally been disturbed by mining activities in the region.

Geology

The eMalahleni area is underlain by the Karoo supergroup. The Karoo Supergroup comprises mainly a sedimentary succession of sandstone, siltstone, shale, mudstone, coal, diamictite and tillite. The Karoo Supergroup is lithostratigraphically subdivided into the Dwyka, Ecca and Beaufort groups, succeeded by the Molteno, Elliot and Clarens formations and the Drakensburg Formation.

Climate

The area lies in the summer rainfall region (Eastern Highveld) of Southern Africa, with cold and dry winters, and warm and wet summers. Temperatures range from 9°C to 32°C in summer and from 6°C to 22°C in winter.

Soils and land use

A soil survey was conducted on 10 and 11 April 2017. The majority of the power line study area traverses through an area considered to be heavily modified, and comprising of modified old cultivated lands and remnants of natural land areas, according to the Mpumalanga Terrestrial Biodiversity Sector Plan. The proposed power line development area traverses through a plinthic catena; with the Glencoe soil form identified as the dominant soil type, comprising approximately 38% of the proposed study area. The remainder of the study area comprises of Hutton/Clovelly identified on gently sloping and higher landscape positions, Avalon/Bainsvlei, Westleigh, and Katspruit soil forms on depressed and/or valley bottom position. Extensively disturbed soils with no recognizable diagnostic soil morphological characteristics were also identified within the surveyed area; these soils were classified as the Witbank soil form, corresponds to anthrosols in the international soil classification terminology. The study area falls into Climate Capability Class 4 at best, with a moderately restricted growing season for arable crops. The identified soils were classified into five land capability classes within the study area, as presented in Section 5. below. The identified land capability limitations for the identified soils are discussed in Section 5.

Surface water

The study area is located within the Olifants River Catchment (Primary Catchment B). The main tributary is the Naauwpoortspruit (Noupoort), which discharges directly into the upper reaches of the Witbank Dam.

Groundwater

A hydrocensus of boreholes on and surrounding area was conducted in 2013, during which all private groundwater users were surveyed within a 1 km radius. During the hydrocensus, all available details of boreholes and borehole-owners were collected (AquiSceince, 2014). This information was used to identify the Interested and Affected Parties which may be impacted upon by the mining activities, specifically relating to impacts on water quantity and quality.

Air Quality

Key sources of particulate pollution are likely to be mining and industrial operations. Sources north-west of the project area are dominant contributors of pollution in the study area, based on available meteorological data. Although apportionment of dust deposition to mining and transport sources close to the site was without reasonable doubt, the sources of suspended particulate matter may have extended further than the immediate industrial and mining operations, up to a distance of 10 km.

Biodiversity

A site visit was undertaken during March 2017 in order to confirm the assumptions made during consultation of the maps and to determine the ecological status of the power line development. A thorough 'walk through' on foot was undertaken in order to identify the occurrence of the dominant floral species and habitat diversities. The area falls within the Grassland Biome and more specifically the Mesic Grassland. Approximately 43 species of the 164 mammal species recorded for Mpumalanga, could occur within the study area.

Wetlands

A field survey was undertaken on 12 and 26 April 2017 during which the wetland boundaries were verified in the field and the required data for the ecological assessments was collected. Within the study area three different hydro-geomorphic (HGM) wetland types were identified, namely:

- Hillslope seepage wetland
- Channelled valley bottom wetland
- Unchannelled valley bottom wetland.

In addition to the wetlands, a number of artificial features supporting wetland vegetation were also identified and mapped. These included a number of shallow diggings or excavations in which water collects following rainfall, various farm dams that have been constructed within natural wetland systems, small areas of wetness associated with stormwater discharges from Clewer, as well as water infrastructures associated with mining such as the toe dam at the Landau Mine Residue Deposit. The wetlands within the study area covers approximately 558 hectares, or 26 % of the study area (study area covers 2132 ha). A total of 12 wetland crossings have been identified along the proposed power line relocation route. The wetlands affected by these 12 crossings form the wetland units that are the focus of this assessment.

Socio-economic

The project is located within the Emalahleni Local Municipality (ELM). The ELM had the largest population size of 435,217 persons in 2007. The municipality is also the most populated in the district with a population density of 162.54 persons per square meter. The provision of educational services to a population, in the ELM is higher compared to most municipalities in Mpumalanga province. Employment opportunities are favourable in the ELM, roughly 61% for males and 38% for females, were employed in 2007. The majority of households have access to safe water either through pipes to within the dwelling, or access it from a point outside the dwelling. In 2001, over two thirds (75%)

of households in the municipality either had a flushed toilet or pit latrine without ventilation. Electricity was the leading source of energy for all uses; however, it declined somewhat between 2001 and 2007 in the ELM.

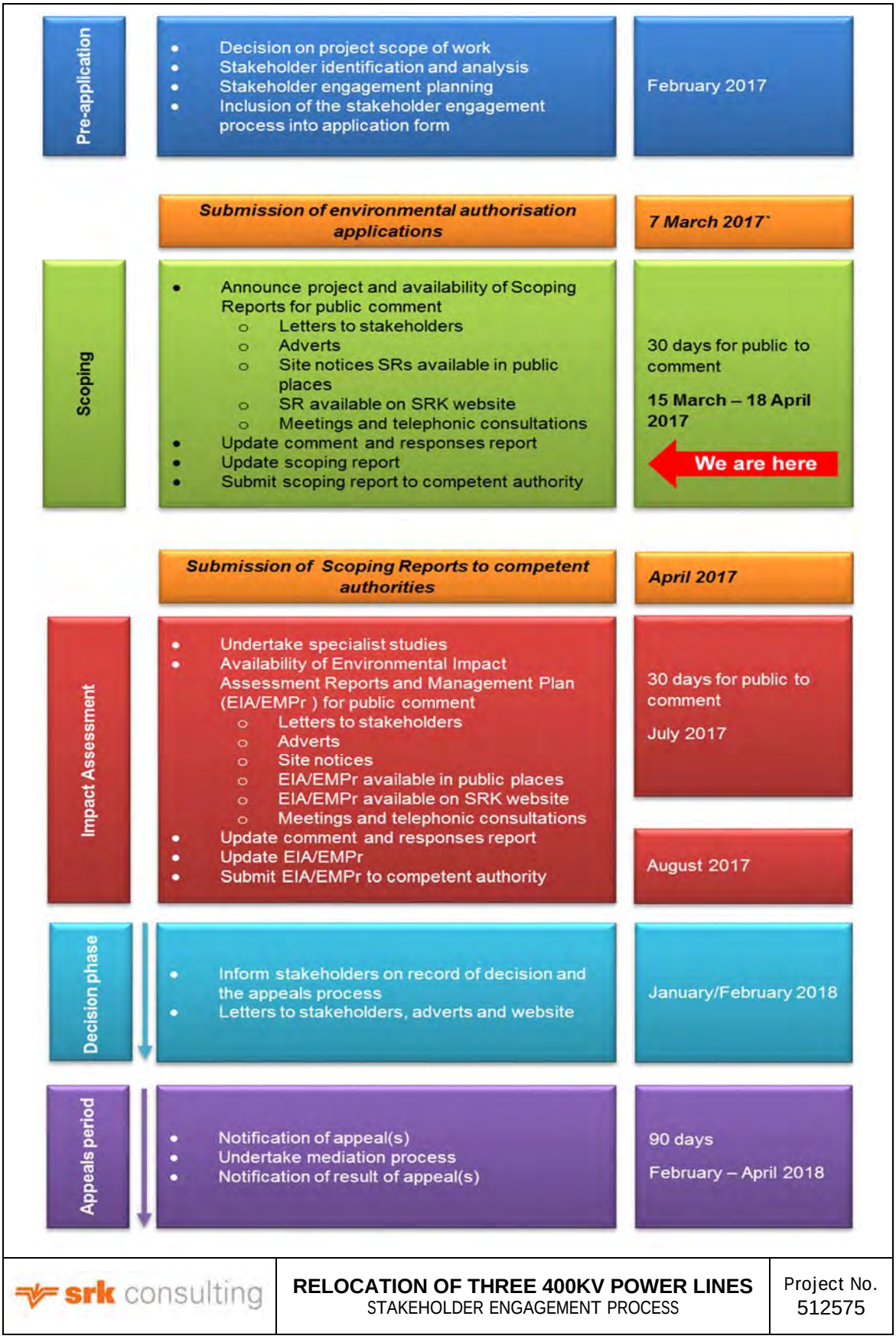
Three households directly adjacent to Clewer have been identified in the proposed power line servitude. The three households can be described as informal subsistence households.

Relocation of these households will be required prior to the commencement of construction. A Resettlement Action Plan is being undertaken to assess the relocation of the households. As part of the RAP livelihood restoration will be assessed. The relocation process is separate to this EIA process.

Stakeholder Engagement

The objectives of stakeholder engagement are outlined in the figure below. During the pre-application consultation, stakeholders were identified and recorded in a stakeholder register with their contact details. The project was introduced during meetings with authorities, the eMalahleni Local Municipality (8 March 2017), ward councillors (10 March 2017) and lessees (24 March 2017) on AOL land. Their input in the stakeholder process was gathered during these meetings. The Scoping Report was made available for public comment between 15 March and 18 April 2017 and identified stakeholders were notified of this by sending a background information letter via email to all stakeholders on the register. Notifications were also sent via sms and an advertisement was placed in the Witbank News, indicating the public venues where the Scoping Report was accessible to stakeholders. In addition, site notices were erected in public venues and along the power line route.

A public meeting to introduce the project, discuss the scoping report and provide stakeholders with the opportunity to raise issues of concern, or comment was scheduled for 7 April 2017 at Matimba Hall at Khwezela Colliery. The public meeting was widely advertised through site notices, letters, radio and newspaper adverts, as well as through loud hailing in communities and the distribution of an information flyer. Bus transportation was arranged at a number of pick-up points to facilitate stakeholder attendance at the public meeting. The public meeting had to be cancelled on 7 April 2017 (at 12:00), due to unforeseen circumstances, as there was planned protest action by the eMalahleni community at AOL's Greenside and Khwezela Collieries. It was decided by AOL Project Management to cancel the public meeting for the safety of employees and the public at large. Stakeholders were notified of the cancellation of the public meeting via email, telephonic communication, sms and the placement of cancellation notices at the Matimba Hall.


Pre-application
Decision on project scope of work
Stakeholder identification and analysis
Stakeholder engagement planning
Inclusion of the stakeholder engagement process into application form
February 2017
Submission of environmental authorisation applications
7 March 2017`
Scoping
Announce project and availability of Scoping Reports for public comment
Letters to stakeholders
Adverts
Site notices SRs available in public places
SR available on SRK website
Meetings and telephonic consultations
Update comment and responses report
Update scoping report
Submit scoping report to competent authority
30 days for public to comment
15 March – 18 April 2017
We are here
Submission of Scoping Reports to competent authorities
April 2017
Impact Assessment
Undertake specialist studies
Availability of Environmental Impact Assessment Reports and Management Plan (EIA/EMPr) for public comment
Letters to stakeholders
Adverts
Site notices
EIA/EMPr available in public places
EIA/EMPr available on SRK website
Meetings and telephonic consultations
Update comment and responses report
Update EIA/EMPr
Submit EIA/EMPr to competent authority
30 days for public to comment
July 2017
August 2017
Decision phase
Inform stakeholders on record of decision and the appeals process
Letters to stakeholders, adverts and website
January/February 2018
Appeals period
Notification of appeal(s)
Undertake mediation process
Notification of result of appeal(s)
90 days
February – April 2018
srk consulting
RELOCATION OF THREE 400KV POWER LINES
STAKEHOLDER ENGAGEMENT PROCESS
Project No.
512575

The following engagement activities were conducted as part of the impact assessment phase:

- A letter informing stakeholders of the availability of the EIA Reports for public comment was distributed on 21 July 2017 to identified stakeholders in English via email communication. Stakeholders were informed that the EIA Reports are available for a public comment period of 30 days from **Monday, 24 July to Wednesday, 24 August 2017**. The letter was also available in isiZulu and in Afrikaans upon request. Copies of this letter and comment sheet are attached as **Appendix C 9.**
- Availability of the EIA Reports and the public meeting on Friday 11 August 2017 will be advertised in the Witbank News in Afrikaans, English and isiZulu on Thursday, 27 July 2017 (adverts are attached in **Appendix C 12**), including the public venues where the reports will be available for public viewing. The public venues were as follows:
  - eMalahleni Public Library
  - Landau Recreation Club
  - Clewer Post Office
  - Greenside Colliery
  - North and South Union Offices
  - eMalahleni Local Municipality (reception and spatial planning).
- A meeting with the Emahlahleni Local Municipality (including councillors) and with landowners and lessee's will be held on Wednesday 26 July 2017 at 10:30 and 13:00 respectively.
- A public meeting is scheduled for Friday 11 August 2017 at 13:00 at the Witbank Golf Club. The public meeting will be advertised, in addition to newspaper advertisements, as follows:
  - Loud hailing to announce the date of the public meeting and to inform communities that bus transportation will be provided to stakeholder to attend the public meeting will take place on Saturday 5 August 2017 in the following areas:
    - Clewer
    - Tasbet Park 2,3
    - Masakhane
    - Mgewane
  - A thousand copies of a flyer (in isiZulu) providing the date of the public meeting and the pick-up points where bus transport will be available to the public meeting will be distributed to communities during the loud hailing process. A copy of the flyer (in English and isiZulu is attached as **Appendix C 10**). The pick-up points announced in the flyer are as follows:
    - In front of Clewer Shopping Centre
    - Ngwane grounds
    - Filcor Total Garage in Tasbet Park
    - Greenside Colliery Security Gate
    - Masakhane Garage
  - Notification of the public meeting will also be broadcasted on the Emahlaheni FM Radio station in isiZulu at the following times:
    - Monday 7 August 2017 (at peak time between 6 and 9am)
    - Tuesday 8 August 2017 (at peak time between 3 and 6pm). A copy of the text in English and isiZulu of the radio advert is attached as **Appendix C 11**.

Potential Environmental and Social Impacts

The impacts of a project are mostly linked to the sensitivity of the receiving environment and proximity of receptors, the extent or footprint and nature of the development, potential risks in an emergency situation and stakeholders' perceptions. The impact assessment confirmed that the certain proposed activities (without mitigation) are expected to have impacts of high significance rating in relation to social and biodiversity.

The key impacts that relate to the proposed power line relocation project and are rated as having a high significance, are included in Table 7.5 and Table 7.18. Section 7 describes all impacts identified in detail for each phase of the project and includes mitigation measures to reduce the significant ratings

Environmental Management Plan

The purpose of the EIA/ EMP is to ensure that social and environmental impacts, risks and liabilities identified during the process are effectively managed during the construction, operations and closure of the project. The EIA/ EMP specifies the mitigation and management measures to which Eskom is committed, and shows how the Project should mobilise organisational capacity and resources to implement these measures. The ESMP also shows how mitigation and management measures will be scheduled. Table 8-4 to 8-6 below summarise the proposed mitigation and management measures for the impacts identified in this EIA through the specialist work undertaken to date.

The tables are organised by project phase for the project covering pre-construction/construction, operation and decommissioning/ closure phases, and are clustered according to biophysical and socioeconomic aspect and impacts. These tables represent the recommendations arising from the specialist studies undertaken to date for the EIA/EMP. The EMP has been extracted into a separate document for easy of reference for the construction phase.

Conclusion

No fatal flaws in the Eskom power line project have been identified thus far through the EIA process. However, several environmental and social impacts are envisaged from construction phase through to maintenance and operation and decommission, which require careful mitigation and monitoring. It is the opinion of the EAP that all major impacts have been identified and have been assigned appropriate management measures. Most HIGH negative impacts with mitigation, are reduced to a MEDIUM or LOW significance, and can be managed accordingly.

The relocation of power line has a positive social impact as the disruption to National power supply will be prevented with the construction of the new route.

It is recommended by the EAP that the proposed power line project should be authorised, on the condition that the environmental and social management commitments included in this EIA/EMP are adhered to, the project description remains as per the description provided in this document and considering the positive social impacts associated with the project. The relocation of the power line route is dependant on the MRD reclamation project, to provide sufficient space for Eskom to relocate three 400kV power lines. Therefore a positive decision on the MRD reclamation environmental authorisation is required in order to commence construction of the power line.

Table of Contents

List of Tables

List of Figures

Disclaimer

The opinions expressed in this Report have been based on the information supplied to SRK Consulting (South Africa) (Pty) Ltd (SRK) by Eskom Holdings SOC Ltd (Eskom). The opinions in this Report are provided in response to a specific request from Eskom to do so. SRK has exercised all due care in reviewing the supplied information. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of SRK's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report, about which SRK had no prior knowledge nor had the opportunity to evaluate.

1 Introduction and background

SRK Consulting (South Africa) (Pty) Ltd (SRK) has been appointed by Anglo Operations (Pty) Ltd (AOL) on behalf of Eskom Holdings SOC Ltd (Eskom) to undertake the Environmental Authorisation (EA) process required in terms of the NEMA and the amended Environmental Impact Assessment (EIA) Regulations, 2014. Eskom proposes to relocate three 400 kV power lines that traverse AOL Khwezela Colliery (formerly known as Landau Colliery Mining Right area). The project is located immediately west of the N12 freeway near eMalahleni in the Mpumalanga Province, within the Nkangala District Municipality and eMalahleni Local Municipality. The current power line route is at risk as it extends across historic shallow underground mining operations contributing to the formation of sinkholes. In the event of tower structures collapsing due to the instability caused by the sinkholes this could result in disruption of power supply to the National Grid. In addition, Eskom cannot gain access to these areas to maintain the power lines, necessitating rerouting of the power line (Figure 1-1). Eskom and AOL have partnered and jointly employed resources to address this concern.

The towers that are currently at risk are the following:

- Duvha – Apollo 400kV line: tower 42 to tower 51
- Duvha – Kusile 400kV line: tower 42 to 51
- Duvha – Vulcan No 2: tower 42 to 51.

In order to prevent power disruption Eskom proposed to reroute the three 400kV power lines.

An EIA authorisation application is required in terms of the National Environmental Management Act 107 of 1998, as amended (NEMA), and the Environmental Impact Assessment (EIA) Regulations, 2014 (and amended in 7 April 2017) for the Eskom 400kV relocation project, which is submitted to the Department of Environment Affairs (DEA) for review and approval. A Scoping and Environmental Impact Reporting (S&EIR, also referred to as an EIA) process was required to support an application for environmental authorisation.

Parallel to this environmental application, AOL is undertaking a Section 102 application and associated environmental authorisation for the reclamation of the Material Residue Deposit (MRD) with the Department of Mineral Resources (DMR). The proposed new power line route intersects with the Landau MRD 3, which is located off the N12 on the farm Klipfontein 322 JS, portion 27 and 28.

The Draft Scoping Report was submitted to interested and affected parties (I&APs), relevant authorities and the DEA on the 15th of March 2017 for comment. Comments on the Draft Scoping Report were received from the DEA on 19 April 2017. The Draft Scoping Report was thereafter updated with these and other comments from I&AP s, and the Final Scoping Report was submitted to DEA for approval on 21 April 2017. Comments on the Final Scoping report were received from the DEA on 29 May 2017. This report is the Environmental Impact Assessment and Environmental Management Programme (hereafter referred to as the EIA/ EMP).

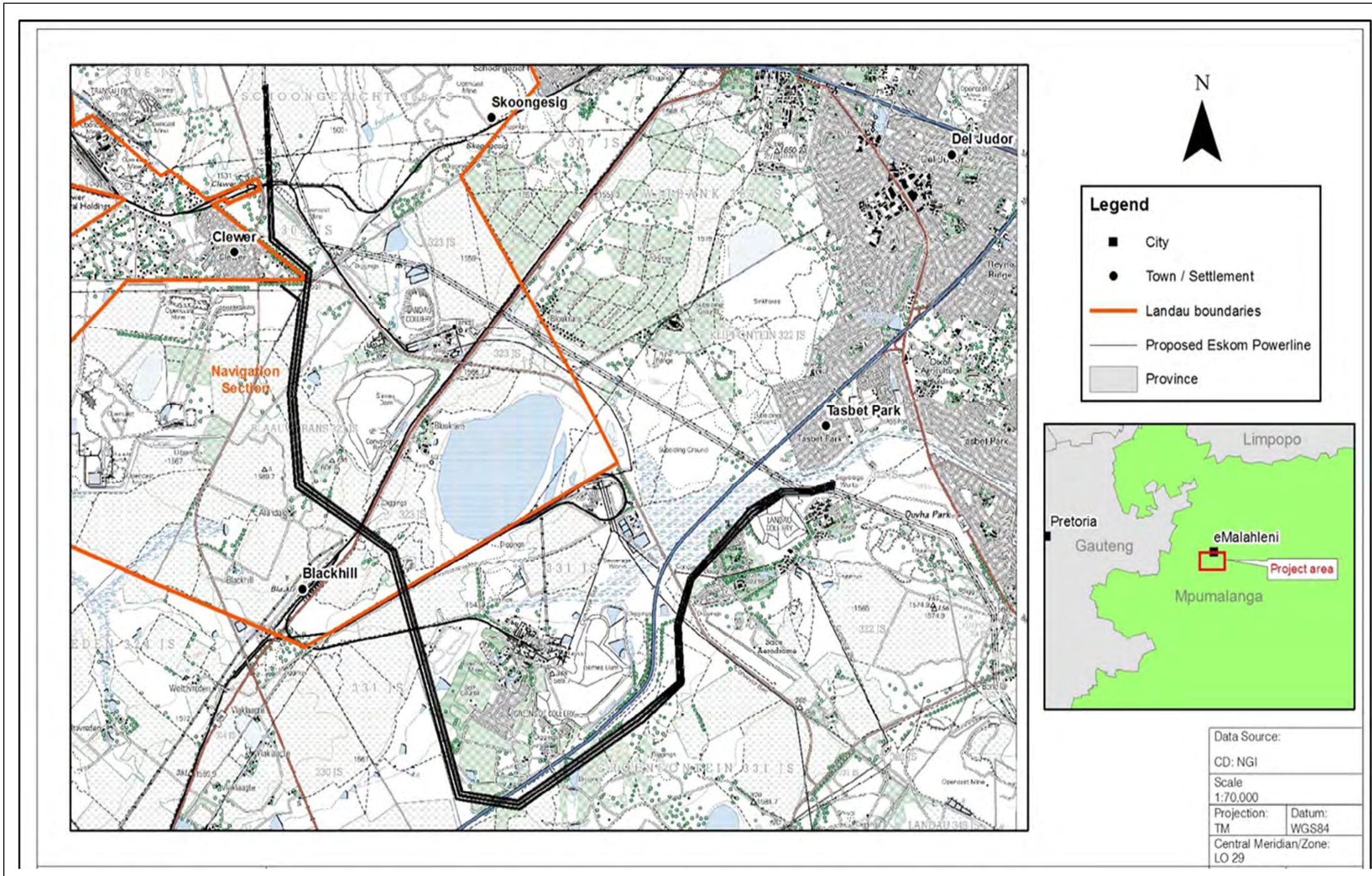


Figure 1-1: Locality Map of the Proposed Relocation of the three-400kV Power lines

1.1 Landowner and farm boundaries

AOL is the owner of the land which the power lines transverse. The power lines cut through a number of farms (Table 1-1).

Table 1-1: Farm names and portion number where the power lines transverse

Farm names and portion numbers	Klipfontein 322 JS portion 28 Klipfontein 322 JS portion 27 Klipfontein 322 JS portion 209 Groenfontein 331 JS portion RE Groenfontein 331 JS portion 3 Groenfontein 331 JS portion 11 Groenfontein 331 JS portion 2 Blaauwkrans 323 JS portion 29 Blaauwkrans 323 JS portion 1 Blaauwkrans 323 JS portion 2 Blaauwkrans 323 JS portion 3 Blaauwkrans 323 JS portion 23 Schoongezicht 308 JS portion RE Schoongezicht 308 JS portion 65 Elandsfontein 309 JS portion 2

1.2 Structure of the report

This report describes the proposed activity and its context, details the stakeholder engagement process, and presents the results of the EIA Phase. The EIA/ EMP Report has been prepared in accordance with Section 22 of the amended EIA Regulations, 2014. The report consists of the following sections:

Section 1: Introduction

Provides an introduction and background to the proposed project and outlines the purpose of this document and the assumptions and limitations applicable to the study.

Section 2: Governance Framework and Environmental Process

Provides a brief summary and interpretation of the relevant legislation as well as pertinent strategic planning documents.

Section 3: Outlines the approach to the environmental process

Describes the environmental authorisation process followed to date in terms of the project and information on the various legislative frameworks under which the application is compiled, and details of the process followed.

Section 4: Project Description

Describes the location and current status of the site and provides a brief summary of the surrounding land uses as well as background to and a motivation for the project.

Section 5: Description of the biophysical and social environment

Briefly describes the biophysical and socio-economic characteristics of the affected environment that will be considered in the assessment of potential project impacts.

Section 6: Stakeholder Engagement

Details the stakeholder engagement activities conducted during the Scoping Phase and EIA Phase of the project.

Section 7: Environmental and Social Impacts

Identifies the potential impacts associated with the project that will require investigation during the Impact Assessment Phase.

Section 8: Environmental Management Plan

Provides mitigation / management measures to be implemented in order to mitigate potential negative impacts and enhance potential positive impacts that may be associated with the proposed project.

Section 9: Assumptions and Limitations

Provides list of assumptions and limitations related to the ESIA as well as each of the specialist studies.

Section 10: Conclusions and Recommendations

Summarises the key findings of the EIA Phase. Provides the commitment of Eskom to comply with the relevant legislation applicable to the proposed project. Provides the declaration of the EAP who compiled this EIA/EMP Report. Provides a summary of the document and the concluding remarks of the EAP.

1.3 Methodology applied to compile the EIA/EMP

1.3.1 Objectives and approach

The objectives of the EIA/ EMP for the proposed relocation of three 400kV power lines were to:

- gain comprehensive understanding of the baseline environment at the sites proposed for development
- determine and assess the impacts to environmental attributes, receptors and resources in the
- vicinity of the proposed development
- identify potential weaknesses associated with the proposed project
- consider and assess project alternatives in terms of sensitive environmental attributes and potential high significant environmental impacts
- develop environmental management measures to mitigate negative impacts and enhance positive impacts
- engage with stakeholders to provide feedback on the results of the impact assessment, associated specialist studies and discuss how issues and concerns raised during the Scoping Phase were addressed through the EIA process
- provide sufficient information to the authorities to inform the environmental authorisation decision.

The EIA/EMP is undertaken to ensure that the environmental and social consequences of the project are fully understood and impacts are adequately managed. The EIA/EMP covers all phases of the proposed project; the construction, operation and closure phases. The report has been prepared to meet legal requirements contained in the South African laws and regulations.

1.4 Specialist studies

Table 1-2 provides a list of the various specialist studies that were conducted for the proposed relocation of three 400kV power lines.

Table 1-2: Specialist Team

Specialist Field	Company	Specialist Name
Biodiversity: Terrestrial Ecological Assessment	Scientific Aquatic Services CC	Emile van der Westhuizen
Civil Geotechnical Desktop Assessment (Phase 1)	SRK Consulting (South Africa)	Paul Aucamp
Mining Geotechnical Desktop Assessment (Phase 1)	SRK Consulting (South Africa)	William Joughin
Heritage Impact Assessment	Archaetnos Culture and Cultural	Anton van Vollenhoven
Soils and Land Capability Assessment	Scientific Aquatic Services CC	Sinethemba Mchunu
Wetlands Assessment	Wetland Consulting Services	Dieter Kassier
Water Use Licence (General Authorisation)	SRK Consulting (South Africa)	Avril Owens

1.5 Company profile and independence

SRK Global is the overarching company of the SRK Group companies and is the global investment vehicle for employee shareholders.

SRK Group Consulting Practices (CPs) now employ approximately 1300 staff operating from 48 established offices on six continents.

SRK Consulting employs leading specialists in the fields in which it offers services. It's seamless integration of services and global base has raised its reputation in technical advice, feasibility studies, due diligence and confidential internal reviews.

Among SRK's 1500 clients are many of the world's major and medium sized mining companies, exploration companies, banks, construction companies and government bodies.

Established in 1974, SRK has over the years grown into a large consulting practice with a broad client base worldwide. Whilst the Group operated initially as specialist consultants in the geotechnical field, the growth of the Group has led to diversification into related engineering fields of mining, civil, mechanical and electrical mineral processing, hydrology and environmental.

The Group's independence is ensured by the fact that it is strictly a consultancy organisation, not holding equity in any project and with ownership primarily by staff. This permits its consultants to provide clients with conflict-free and objective support on crucial issues.

SRK has a demonstrated record of accomplishment of undertaking independent assessments of resources and reserves, project evaluations and audits, listing reports and independent feasibility studies to bankable standards on behalf of exploration companies, mining companies and financial institutions worldwide

1.6 Details of the core team and environmental assessment practitioner (EAP)

SRK believe that an experienced and multi-disciplined team is required to fulfil the requirements of the scope of work up to and including the finalised report, the following personnel will be made available for this project.

Darryll Kilian (MA HDE (UCT), CEAPSA) – Partner: Darryll Kilian is an experienced and professionally certified environmental assessment practitioner with over 26 years of experience. Darryll Kilian has a Masters in Environmental and Geographical Science from the University of Cape Town in South Africa. Darryll is a Principal Environmental Consultant and Partner of SRK Consulting

(South Africa), and presently heads the Environmental Department in SRK Johannesburg. He has worked on a wide range of environmental and social projects throughout Africa. He regularly participates in due diligence audits and reviews for companies and lenders projects. He serves as project partner and reviewer on large environmental and social impact assessments including in the mining sector.

Beth Candy (MSc, Pr.Sci.Nat.) - Project Manager (EAP): Beth is an environmental scientist with more than 12 years' experience in environmental impact assessments and environmental management. With a strong background in Geology (BSc Hons Geology) her core experience and expertise is in the mining industry sector, focusing on Risk Assessments, Environment Impact Assessments (EIA), Environmental Management Programmes (EMP), Water Use Licence Applications (WULA), due diligence and integrated regulatory processes. Her involvement in such projects varies from project management and co-ordination, to the complication and review of technical and environmental documents and reports. In the mining sector she has been involved in the authorisation of EIAs, EMPs and WULAs for both underground and opencast mining operations, as well as the associated activities such as ash facilities, waste disposal facilities, conveyors routes, access roads, dragline walkways, pollution control and other dams, stream diversions, undermining of wetlands, pipelines and oil and fuel storage facilities amongst others. Other experience includes industrial sector projects and construction projects.

Natasha Anamuthoo (BSoc Sc. Honours, CEAPSA) – Project Manager / Reporting (EAP): Natasha is a Senior Environmental Scientist at SRK Consulting (Johannesburg) with 11 years of experience in environmental management field. Natasha holds a BSoc Sc. Honours in Environmental Management from the University of Kwa-Zulu Natal. Natasha is a Certified Environmental Assessment Practitioner of South Africa. Natasha has been involved in numerous mining, petroleum and industrial environmental impact assessments and basic assessments within South Africa. Natasha has also been involved in large-scale mining, energy and cement related projects for various clients such as Anglo American Platinum, ENRC, NYA, PPC Cement and the South African Power Pool (SAPP). Natasha has also been involved in a number of stakeholder engagement implementation processes for various petroleum, industrial and mining projects. She has also been involved in some environmental control officer and auditing work within the industrial and linear related projects. Natasha is also a member of the Golden Key Society, the International Association of Impact Assessments and the Society for Human Geographers of South Africa.

Avril Owens (BSc Hons Botany and Zoology) – WULA Specialist: Avril has been involved in the Environmental & Water quality management field for the past 12 years. Her expertise includes surface water quality monitoring, assessment, training and capacity building, water use licensing, pollution source identification and control, characterisation of wastewater and surface waters and integrated water resource management.

Lysette Rothmann-Guest (BL) - Stakeholder Engagement Specialist: Lysette is a senior stakeholder engagement consultant with 25 years' experience in stakeholder engagement and environmental management. Her expertise includes design and implementation of stakeholder engagement processes and engagement facilitation for Environmental and Social Impact Assessments (ESIAs) in Africa and South Africa, in compliance with international good practice and in country regulatory requirements. Lysette also worked closely with international consortium teams to develop innovative stakeholder engagement processes for implementing new technologies in the South African Context.

Appendix A provides copies of qualifications of the EAP's and **Appendix B** provides copies of CVs.

2 Governance framework

2.1 South African legislation

There are a number of regulatory requirements at local, provincial and national level with which the proposed project must conform. Some of the key laws and regulations include:

- Constitution of the Republic of South Africa (Act 108 of 1996)
- National Environmental Management Act (Act 107 of 1998), as amended (NEMA)
- EIA Regulations 2014 (Vol. 604 30, No. 39343), promulgated in terms of NEMA
- National Water Act (Act 36 of 1998) (NWA)
- National Heritage Resources Act (Act 25 of 1999) (NHRA)
- National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEM:BA)
- National Environmental Management: Waste (Act 59 of 2008) (NEM:WA)
- Spatial Planning and Land Use Management Act 16 of 2013 (SPLUMA)

A brief summary of SRK's understanding of the relevant Acts and Regulations that are applicable to this study is provided below. Note that other legislative requirements may also pertain to the project. As such, the summary provided below is not intended to be definitive or exhaustive, and serves only to highlight key environmental legislation and obligations.

2.1.1 Constitution of the Republic of South Africa, Act 108 of 1996

Section 24 of the Constitution enshrines the right to the environment. Everyone has the right to:

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

Legal requirements for this project:

Eskom (the proponent) has a responsibility to ensure that the proposed activities and the S&EIR process conform to the principles of the Constitution. The proponent is obliged to take actions to prevent pollution or degradation of the environment in terms of Section 24 of the Constitution, and to ensure that the environmental impacts associated with the project are considered and mitigated, where possible.

2.1.2 National Environmental Management Act 107 of 1998, as amended

NEMA establishes a set of principles, which all authorities have to consider when exercising their powers. These include the following:

- Development must be sustainable
- Pollution must be avoided or minimised and remedied
- Waste must be avoided or minimised, reused or recycled
- Negative impacts must be minimised
- Responsibility for the environmental consequences of a policy, project, product or service applies throughout its life cycle.

Section 28(1) states that "every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or

degradation from occurring, continuing or recurring". If such degradation/pollution cannot be prevented, then appropriate measures must be taken to minimise or rectify such pollution.

These measures may include:

- Assessing the impact on the environment
- Informing and educating employees about the environmental risks of their work and ways of minimising these risks
- Ceasing, modifying or controlling actions which cause pollution/degradation
- Containing pollutants or preventing movement of pollutants
- Eliminating the source of pollution
- Remedying the effects of the pollution.

Legal requirements for this project:

Eskom (the proponent) has a responsibility to ensure that the proposed activities and the S&EIR process conform to the principles of NEMA. The proponent is obliged to take actions to prevent pollution or degradation of the environment in terms of Section 28 of NEMA, and to ensure that the environmental impacts associated with the project are considered and mitigated, where possible.

2.1.3 EIA regulations, 2014

Sections 24 and 44 of NEMA make provision for the promulgation of regulations that identify activities, which may not commence without an EA issued by the competent authority (DEA). In this context, the EIA Regulations, 2014 (GN R982, which came into effect on 8 December 2014), promulgated in terms of NEMA, govern the process, methodologies and requirements for the undertaking of EIAs in support of EA applications. Listing Notices 1-3 in terms of NEMA, list activities that require environmental authorisation (EA) ("NEMA listed activities"). The Amendment Listed Activities dated 7 April 2017 (GNR 324, GNR 325, GNR 326 and GNR 327) have been included in the table below.

GN R982 of the EIA Regulations lays out two alternative authorisation processes. Depending on the type of activity that is proposed, either a Basic Assessment (BA) process or a S&EIR process is required to obtain EA. Listing Notice 1 lists activities that require a BA process, while Listing Notice 2 lists activities that require S&EIR. Listing Notice 3 lists activities in certain sensitive geographic areas that require a BA process.

The regulations for both processes (BA and S&EIR) stipulate that:

- Public participation must be undertaken as part of the assessment process
- The assessment must be conducted by an independent EAP.

The relevant authorities must respond to applications and submissions within stipulated timeframes

- Decisions taken by the authorities can be appealed by the proponent or any other I&AP
- A draft EIA/EMP must be compiled and released for public comment.

GN R982 sets out the procedures to be followed and content of reports compiled during the BA and S&EIR processes.

The NEMA National Appeal Regulations make provision for appeal against any decision issued by the relevant authorities. In terms of the Regulations, an appeal must be lodged with the relevant authority in writing within 20 days of the date on which notification of the decision (EA) was sent to the applicant or I&AP (as applicable). The applicant, the decision-maker, interested and affected parties and organ of state must submit their responding statement, if any, to the appeal authority and the appellant within 20 days from the date of receipt of the appeal submission.

The project includes activities that are listed in terms of the EIA Regulations, 2014 and thus need EA (Table 2-1).

Table 2-1: NEMA listed activities applicable to this project

Listed activity as described in GN R 983 984 and 985	Description of project activity that triggers listed activity
GN R. 983 (12) as amended by GN R. 327 (12): The development of— iii. bridges exceeding 100 square metres in size; xii. infrastructure or structures with a physical footprint of 100 square metres or more where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;	A number of watercourses are located along the proposed realigned power line route. At the watercourse crossing the construction of foundations for the development of the three (3) 400kV power lines will be required within the watercourses. The upgrading or construction of access roads within the identified watercourses will also impact a physical footprint of 100 square metres or more within a watercourse.
GN R. 983 (14) as amended by GN R. 327 (14): The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	Storage of diesel and oil during the construction phase of the project for machinery and construction vehicles. There will be no storage of diesel and oil once the power line has been constructed. The location and volume of diesel and oil will be confirmed once the construction contractor has been appointed by Eskom.
GN R. 983 (19) as amended by GN R. 327 (19): The infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic meters from – (i) a watercourse.	The upgrading or construction of access roads will require the infilling or depositing of material of more than 10 cubic meters into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic meters from a watercourse. In addition the construction of pylon's within the identified watercourses will require the dredging, excavation, removal or moving of soil within the watercourse.
GN R. 983 (24) as amended by GN R. 327 (24): The development of a road (ii) With a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres.	Access roads for the construction and operation of the towers will be required and some of these roads will exceed 8m in width.
GN R. 983 (28) as amended by GN R. 327 (28) Institutional developments wherever such land was used for agriculture**,** game farming, equestrian purposes or afforestation after 1 April 1998, outside an urban area where the total land is bigger than 1 ha.	The construction of the power lines will require the use of some land that is currently being used for agriculture.
GN R. 983 (31) as amended by GN R. 327 (31): The decommissioning of existing facilities, structures or infrastructure for— (i) any development and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014; (iii) any development and related operation activity or activities and expansion and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014	Decommissioning of the existing power lines once the proposed realigned power line has been constructed and commissioned. Detail associated with the decommissioning of the existing power lines will be confirmed once the contractor has been appointed by Eskom to undertake the decommissioning of the existing power lines.
GN R. 983 (56) as amended by GN R. 327 (56): The widening of a road by more than 6 meters, or the lengthening of a road by more than 1 kilometre- (i) where the existing road reserve is 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 meters; excluding where widening or lengthening occur inside and urban area.	Upgrading of access roads will require, resulting in the widening of a road by more than 6 meters.

Listed activity as described in GN R 983 984 and 985	Description of project activity that triggers listed activity
GN R 984 (9) as amended by GN R. 325 (9): The development of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kV or more, outside an urban area or industrial complex excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is — (a) (a) temporarily required to allow for maintenance of existing infrastructure; (b) 2 kilometres or shorter in length; (c)) within an existing transmission line servitude; and (d) will be removed within 18 months of the commencement of development.	The power lines are infrastructure that is part of the system for the transmission of 400 kV of electricity outside of urban areas and industrial complexes.
GN R. 985 (4) as amended by GN R. 324 (4) The development of a road wider than 4 metres with a reserve less than 13,5 metres. f. Mpumalanga i. Outside urban areas: (aa) A protected area identified in terms of NEMPAA, excluding disturbed areas; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an international convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; or (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas, where such areas comprise indigenous vegetation; or ii. Inside urban areas: (aa) Areas zoned for use as public open space; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose.	Access roads will either be constructed or upgraded. This will be located on a site outside of urban areas on a site not previously used for this purpose, and could be a Community Conservation Area, Biodiversity Stewardship Programme Biodiversity Agreement area. In addition, in a protected area identified in terms of NEMPAA; a sites or area identified in terms of an International Convention. A Critical Biodiversity area as identified in systemic biodiversity plans adopted by the competent authority or bioregional plans, core areas in a Biosphere Reserves, areas designated for conservation use in a Spatial Development Framework adopted by a competent authority or zoned for conservation purpose. A sensitive area as identified in an environmental management framework as contemplated in Chapter 5 of the Act and as adopted by the competent authority. Also within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve.
GN R. 985 (10) as amended by GN R. 324 (10) The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. f. Mpumalanga i. Outside urban areas: (aa) A protected area identified in terms of NEMPAA, excluding conservancies;	Storage of diesel and oil during the construction phase of the project for machinery and construction vehicles. There will be no storage of diesel and oil once the power line has been constructed. The location and volume of diesel and oil will be confirmed once the construction contractor has been appointed by Eskom.

Listed activity as described in GN R 983 984 and 985	Description of project activity that triggers listed activity
(bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an international convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, where such areas comprise indigenous vegetation; or (hh) Areas within a watercourse or wetland, or within 100 metres of a watercourse or wetland; or ii. Inside urban areas: (aa) Areas zoned for use as public open space; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose.	

2.1.4 National Water Act 36 of 1998

Water use in South Africa is controlled by the NWA. The executive authority is the Department of Water and Sanitation (DWS). The NWA recognises that water is a scarce and unevenly distributed national resource in South Africa. Its provisions aim at achieve sustainable and equitable use of water to the benefit of all users and to ensure protection of the aquatic ecosystems associated with South Africa's water resources. The provisions of the Act aim to discourage pollution and wastage of water resources.

In terms of the Act, a land user, occupier or owner of land where an activity that causes or has the potential to cause pollution of a water resource has a duty to take measures to prevent pollution from occurring. If these measures are not taken, the responsible authority may do whatever is necessary to prevent the pollution or remedy its effects, and to recover all reasonable costs from the responsible party.

Section 21 of the NWA specifies a number of water uses, including:

- *Section 21 (c) – Impeding or diverting the flow of water in a*
- *Section 21 (i) – altering the bed, banks, course or characteristics of a watercourse*

These water uses require authorisation in terms of Section 22 (1) of the Act, unless they are listed in Schedule 1 of the NWA, are an existing lawful use, fall under a General Authorisation (GA) issued under section 39 or if the responsible authority waives the need for a licence.

Legal requirements for this project:

The proposed project activities may trigger water use activities in terms of Section 21 (c) of the NWA for impeding or diverting the flow of water in a watercourse for the pylons as well as Section 21 (i) for altering the bed, banks, course or characteristics of a watercourse. No Water Use Licence (WUL) is required for the project, however a GA is required from the competent authority the DWS.

From correspondence with DWS, it was confirmed that the proposed project activities do not trigger a full water use in terms of Section 21 of the NWA, and therefore only an application for a GA was submitted to the DWS on 31 May 2017.

2.1.5 National Environmental Management: Waste (Act 59 of 2008) (NEM:WA)

This act aims to (amongst other things) regulate waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation. This project does not trigger any waste activities.

Legal requirements for this project:

The proposed project does not trigger any waste licence. However all domestic and hazardous waste will be disposed at a registered landfill site. All proof of certificates to be kept by Eskom.

2.1.6 National Heritage Resources Act 25 of 1999

The protection and management of South Africa's heritage resources are controlled by the NRHA. The enforcing authority for this act is the South African National Heritage Resources Agency (SAHRA). The NRHA aims to promote good management of cultural heritage resources and encourages the nurturing and conservation of cultural legacy so that it may be bestowed to future generations.

The Act requires all developers (including mines) to undertake cultural heritage studies for any development exceeding 0.5 ha. It also provides guidelines for impact assessment studies to be undertaken where cultural resources may be disturbed by development activities.

SAHRA will need to approve the heritage assessment undertaken as part of the EIA/EMP process.

Legal requirements for this project:

Eskom (the proponent) is required to commission a heritage assessment of the project area as the development exceeds 0.5 ha. This assessment will be uploaded on the SAHRA site along with the EIA/ EMP and will require approval should any sites of cultural heritage significance be identified within the project footprint.

2.1.7 National Environmental Management: Biodiversity Act 10 of 2004

The purpose of the NEM:BA is to provide for the management and conservation of South Africa's biodiversity and the protection of species and ecosystems that warrant national protection. The NEM:BA makes provision for the publication of bioregional plans and the listing of ecosystems and species that are threatened or in need of protection. Threatened or Protected Species Regulations (2007), Guidelines for the determination of bioregions and the preparation and publication of bioregional plans (2009) and a National List of Ecosystems that are Threatened and in Need of Protection (2011) have been promulgated in terms of NEM:BA.

A published bioregional plan is a spatial plan indicating terrestrial and aquatic features in the landscape that are critical for conserving biodiversity and maintaining ecosystem functioning. These areas are referred to as Critical Biodiversity Areas (CBAs) in terms of NEM:BA. Bioregional plans provide guidelines for avoiding the loss or degradation of natural habitat in CBAs with the aim of informing EIAs and land-use planning (including Environmental Management Frameworks [EMFs], Spatial Development Frameworks [SDFs], and Integrated Development Plans [IDPs]).

Permits to carry out a restricted activity involving listed threatened or protected species or alien species may only be issued after an assessment of risks and potential impacts on biodiversity has been undertaken.

Legal requirements for this project:

Although no CBAs or Ecological Support Areas (ESAs) are located in the project area the impacts of the project on the biodiversity of the area will be assessed.

2.1.8 Spatial Planning and Land Use Management Act 16 of 2013

The Spatial Planning and Land Use Management Act (SPLUMA) was promulgated in May 2015. SPLUMA is a framework act for all spatial planning and land use management legislation in South Africa. It seeks to promote consistency and uniformity in procedures and decision-making in this field. SPLUMA will also assist municipalities to address historical spatial imbalances and the integration of the principles of sustainable development into land use and planning regulatory tools and legislative instruments.

Legal requirements for this project:

No rezoning is required for the project as confirmed during discussions with the local municipality. Refer to Meeting Minutes **(Appendix C 2**).

2.1.9 Relevant energy sector strategic documents

A range of policies, laws and strategic documents governs the energy sector. The EIA/ EMP further considered energy sector strategic documents, including the following:

- White Paper on the Energy Policy of the Republic of South Africa (December 1998)
- Eskom's Transmission Development Plan
- Integrated Energy Plan
- Integrated Strategic Electricity Planning (ISEP)
- Electricity Regulation Act (Act 4 of 2006) as amended
- National Electricity Response Plan (NERP) (2008)
- National Guidelines on Environmental Impact Assessment for facilities to be included in the Electricity
- Response Plan (2008)
- Environmental Impact Assessment Guidelines for transmission lines within the Southern African Power Pool Region (1999).

2.1.10 Eskom corporate policies and programmes

Relevant Eskom Environmental Policies for Transmission Lines

All activities in relation to work carried on the Eskom transmission lines will be affected with due consideration of relevant environmental legislation as outlined in its environmental management system (ISO 14001). The following documents prescribe the environmental management criteria in more detail:

- ESKPBAAD6, Environmental Management Policy
- ESKPVABW6, Environmental Management Systems Policy
- ESKPBAAA9, Environmental Impact Assessment Policy
- ESKPVAAZ1, Environmental Management Programme
- TPC41-508, Transmission Environmental Impact Procedure
- Servitude Life Cycle Management Plan
- Transmission Bird Perch Guidelines, TGL41-332

- Bird Nesting Guidelines, TGL41-333
- Transmission Vegetation Management Guidelines, TGL41-334.

2.1.11 Eskom Safety, Health, Environment and Quality (SHEQ) Policy – 2015 (32-727)

Eskom has a SHEQ policy (2015) that integrates safety, health, environment and quality requirements into its activities so that decisions are made to ensure the consideration of economic development, environmental quality, and social equity. This will assist in the continual improvement of performance and the achievement of stakeholder requirements.

Eskom's commitment to SHEQ management is achieved through:

- *"implementation of management systems*
- *achieving compliance with applicable legislative and other requirements*
- *addressing the needs and expectations of Eskom's electricity customers and stakeholders*
- *setting SHEQ objectives and measuring performance to achieve continual improvement*
- *conducting risk-based medical surveillance*
- *SHEQ training and awareness*
- *stakeholder engagement*
- *ensuring that Eskom's suppliers meet its SHEQ requirements*
- *ensuring that adequate resources are available for SHEQ management*
- *the prevention of pollution, pursuing a low-carbon future and prioritising energy and water efficiency and conservation.*

Eskom's principles and rules that underpin the way in which it approaches SHEQ are as follows:

- *Poor quality, occupational and environmental incidents are preventable*
- *A Zero Harm culture*
- *Management is accountable for SHEQ and the responsibility is with each employee*
- *Respect and care for people, the environment and assets*
- *Eskom will strive to ensure Zero Harm to employees, contractors, the public, and the natural environment*
- *Conformance to Eskom's Life-saving Rules applies to all employees, contractors, and visitors*
- *No operating condition, or urgency of service, justifies exposing anyone to negative risks arising out of Eskom's business, causing an incident with health, safety, environmental, and quality consequences*
- *Governance, decision-making processes and strategies are based on SHEQ objectives and criteria"* (Eskom SHEQ Policy, 2015).

3 Environmental Assessment Process

3.1 Scoping and environmental impact assessment process

The general approach to this study is guided by the principles contained in Section 2 of NEMA and those of Integrated Environmental Management (IEM).

NEMA lists a number of principles that apply to the actions of organs of state and that also serve as reference for the interpretation of environmental legislation and administration of environmental processes. The principles most relevant to environmental assessment processes and projects for which authorisation is required are summarised below.

Principles relevant to the EIA process:

- *Adopt a risk-averse and cautious approach;*
- *Anticipate and prevent or minimise negative impacts;*
- *Pursue integrated environmental management;*
- *Involve stakeholders in the process; and*
- *Consider the social, economic and environmental impacts of activities.*

Principles relevant to the project:

- *Place people and their needs at the forefront of concern and serve their needs equitably;*
- *Ensure development is sustainable, minimises disturbance of ecosystems and landscapes, pollution and waste, achieves responsible use of non-renewable resources and sustainable exploitation of renewable resources;*
- *Assume responsibility for project impacts throughout its life cycle; and*
- *Polluter bears remediation costs.*

The S&EIR process complies with these principles through its adherence to the EIA Regulations, 2014, and associated guidelines, which set out clear requirements for, *inter alia,* impact assessment and stakeholder involvement (see below), and through the assessment of impacts and identification of mitigation measures during the Impact Assessment Phase.

In accordance with the IEM Information Series (DEAT, 2004), an open, transparent approach, which encourages accountable decision-making, has been adopted.

The underpinning principles of IEM require:

- *Informed decision making;*
- *Accountability for information on which decisions are made;*
- *A broad interpretation of the term "environment";*
- *An open participatory approach in the planning of proposals;*
- *Consultation with interested and affected parties;*
- *Due consideration of alternatives;*
- *An attempt to mitigate negative impacts and enhance positive impacts of proposals;*
- *An attempt to ensure that the social costs of development proposals are outweighed by the social benefits;*
- *Democratic regard for individual rights and obligations;*
- *Compliance with these principles during all stages of the planning, implementation and decommissioning of proposals; and*
- *The opportunity for public and specialist input in the decision-making process.*

The study will also be guided by the requirements of the EIA Regulations, 2017, which are more specific in their focus and define the detailed approach to the S&EIR process. It will also consult relevant guidelines published by the DEA, I and in the absence of national guidelines, documents prepared by the Mpumalanga Department of Environmental Affairs and Development Planning (DEA&DP), including:

- DEA's Draft Companion to Environmental Impact Assessment Regulations of 2010 (DEA, 2010)
- DEA&DP's EIA Guideline and Information Document Series (DEA&DP, 2013), which includes guidelines on Generic ToR for EAPs and Project Schedules, Public Participation, Alternatives, Need and Desirability, Exemption Applications and Appeals, an information
- DEA&DP's "One Environmental Management System" and the 2014 EIA Regulations Circular (DEA&DP, 2014).

The competent authority for this project is the National DEA.

3.2 Environmental impact assessment process

The Environmental Authorisation process consists of two phases, namely the Scoping Phase and an Impact Assessment Phase (the current phase) (Figure 3-1 below).

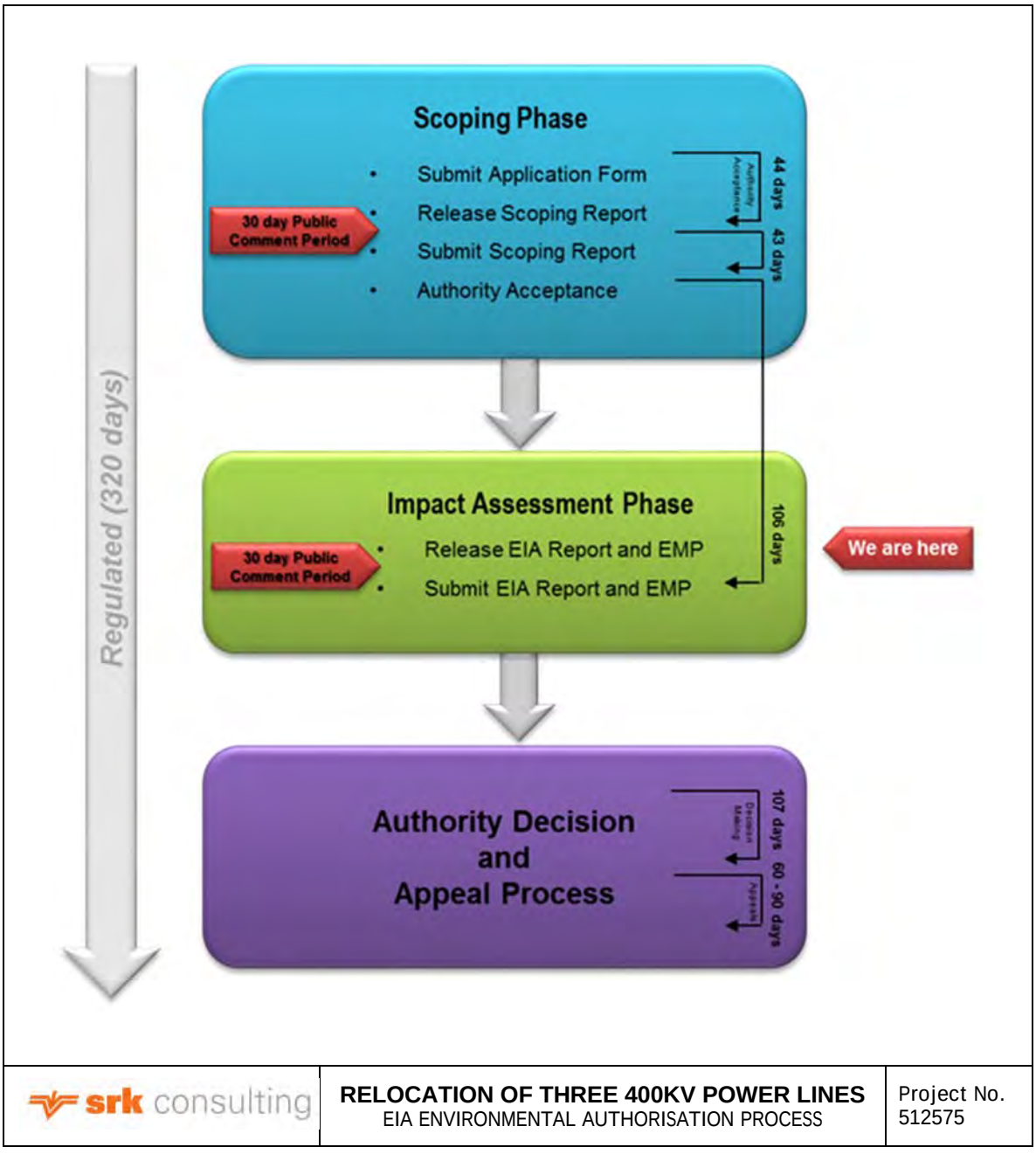


Figure 3-1: Scoping and Environmental Impact Assessment process

The objectives of the scoping phase are to:

- Inform stakeholders of the proposed activity, feasible alternatives and the S&EIR process
- Provide stakeholders with the opportunity to participate effectively in the process and identify any issues and concerns associated with the proposed activity, review specialist study ToR and the Plan of Study for EIA
- Submit the Scoping Report to the relevant authorities.

The aims of the impact assessment phase (the current phase) are to:

- Inform and obtain contributions from stakeholders, including relevant authorities, the public and local communities and address their relevant issues and concerns
- Build capacity amongst stakeholders during the scoping and environmental impact assessment phase process, so that they may actively and meaningfully participate
- Document and contextualise the biophysical baseline conditions of the study area and the socio-economic conditions of affected communities
- Assess in detail the potential environmental and socio-economic impacts of the project
- Identify environmental and social mitigation measures to avoid and/or address the impacts assessed
- Develop and/or amend environmental and social management plans based on the mitigation measures developed in the EIA/EMP
- Environmental decision by authorities
- Appeal process.

4 Project Description

4.1 Introduction

Power is generated at a power station (which could be coal fired, nuclear, solar, wind, hydro or other). From the power station a Transmission power line, which could be 765kV, 400kV or 275kV transports the electricity to the area where it is needed. If this is a very long distance, then Transmission substations may be required along the route. Once the electricity is in the area that it is required, it is transformed to 132 kV, 88kV, 66kV, 44kV or 33kV for distribution to the end user. At distribution substations, the electricity is stepped down to 22 kV or 11kV and ultimately to 400 or 240 V before connecting to the end user.

The project assessed in this EIA consists of a proposed relocation of three 400 kV transmission power lines. A diagram of the Eskom Supply Chain is provided in Figure 4-1 below.

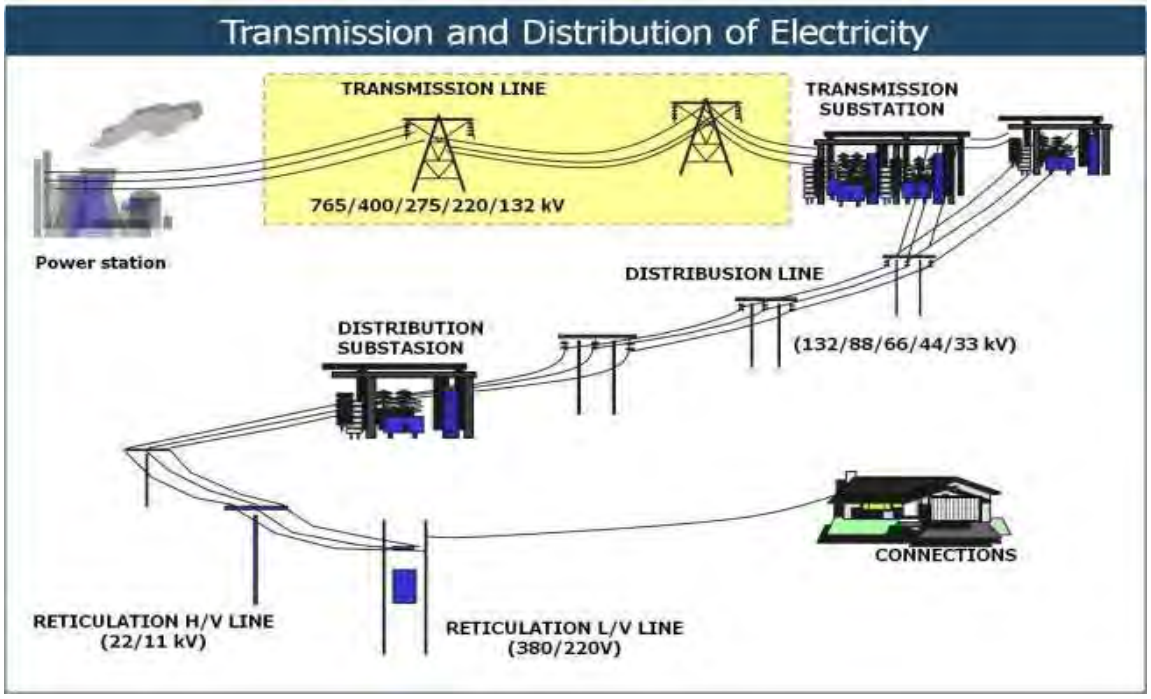


Figure 4-1: Illustration of the transmission and distribution of electricity (Eskom EIA, 2013)

4.2 Project motivation

Eskom proposes to relocating a section of three 400 kV power lines that traverse Anglo Operations (Pty) Ltd (AOL) Khwezela Colliery (formerly known as Landau Colliery Mining Right area). The current 400 kV power line route extends across previously mined underground bord and pillar workings of the numbers 2, 4 and 5 seams. Burning sinkholes have developed at Landau I and II due to historical shallow underground mining operations. Due to the formation of sinkholes and subsequent spontaneous combustion the re-routing of the three 400kV power lines is being proposed.

The following towers are at risk due to instability of the mined ground surface at the Landau I and II areas:

- PS 2.2.1 Duvha - Apollo 400kV line: tower 42 to tower 51
- PS 2.2.2 Duvha - Kusile 400kV line: tower 42 to tower 51

- PS 2.2.3 Duvha – Vulcan No 2 400kV line: tower 42 to tower 51.

The proposed route will pass the old rehabilitated AOL Landau 3 Mineral Residue Deposit (MRD) and as a result, the discard material from the MRD will be reclaimed. It is proposed to transport the reclaimed material from the MRD to AOL existing Khwezela Bokgoni (previously known as Kleinkopje) and Khwezela Navigation (previously known as Landau Navigation) plants. Eskom cannot gain access to the areas where the sinkholes are present; hence, they cannot undertake maintenance on these power lines, necessitating the rerouting of the power lines.

4.3 Project alternatives

Section 2 (h) (i) of the EIA Regulations, 2014, require that all S&EIR processes must identify and describe 'alternatives to the proposed activity that are feasible and reasonable'. Different types or categories of alternatives can be identified, e.g. location alternatives, type of activity, design or layout alternatives, technology alternatives and operational alternatives. The 'No Go' or 'No Project' alternative must also be considered.

Not all categories of alternatives are applicable to all projects. However, the consideration of alternatives is inherent in the detailed design and the identification of mitigation measures, and therefore, although not specifically assessed, alternatives have been and will be taken into account in the design and S&EIR processes.

4.3.1 Location alternatives

AOL together with Eskom explored four options aiming to avoid areas with high potential for sinkhole development as well as prevent the sterilization of resources. After the analysis was undertaken Option 1 was the preferred option.

Option 1 (Preferred option)

This option entails starting the relocation of the power lines before the N12 highway crossing. The actual positioning is proposed to be outside the Naauwpoortspruit wetlands located to the South of the highway (Figure 4-2). To undertake this option, the western end of Landau 3 MRD would have to be trimmed to create space for the power line corridor of 165m.

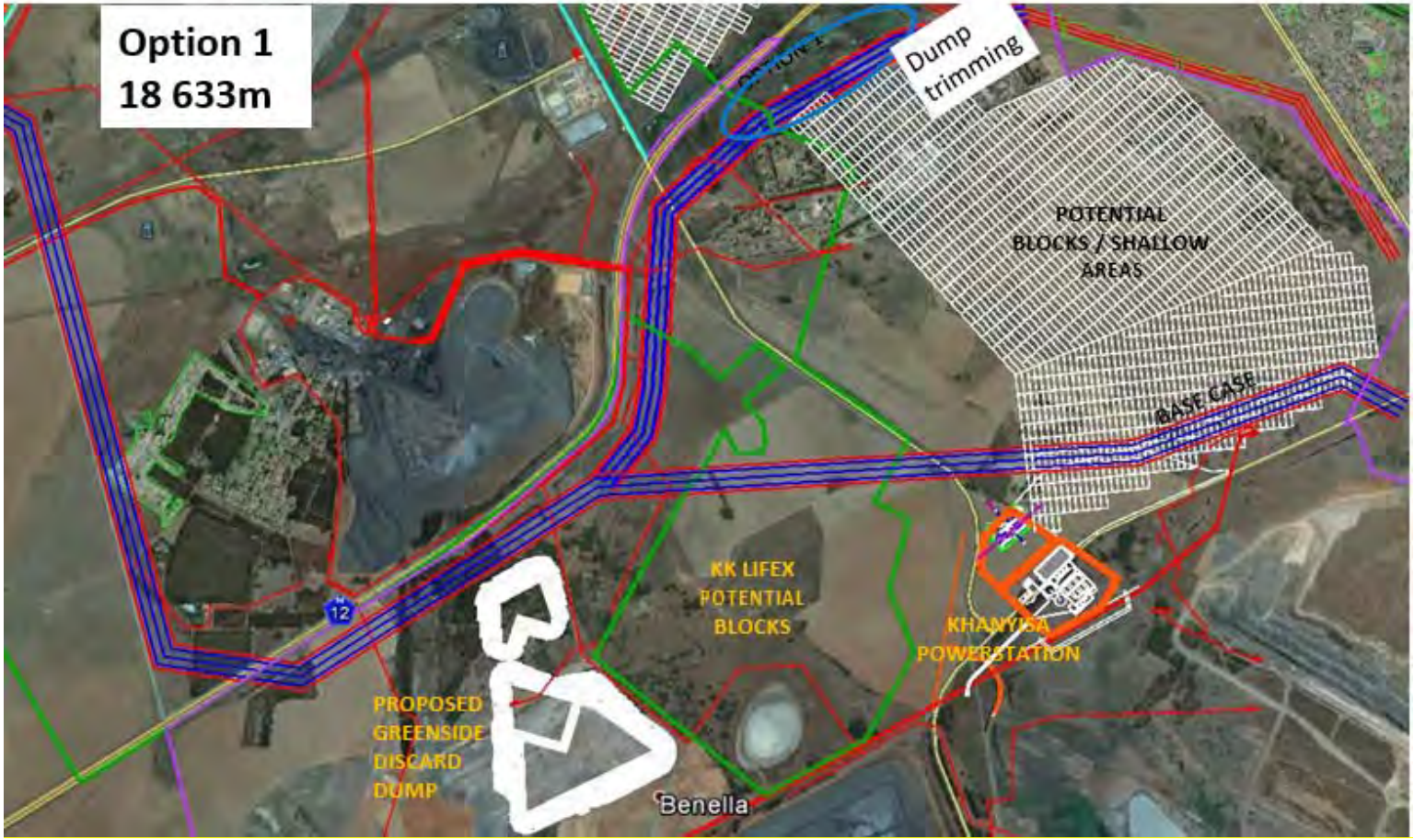


Figure 4-2: Option 1

Option 2

The 165m wide servitude required for the relocation would encroach on a pan at the Kleinkopje MRD. The portion behind the 3A North pit has been rehabilitated less than 10 years ago and does therefore not immediately qualify for inclusion in the new route. This option also traverses the sinkhole risk area along Tweefontein road (Figure 4-3).

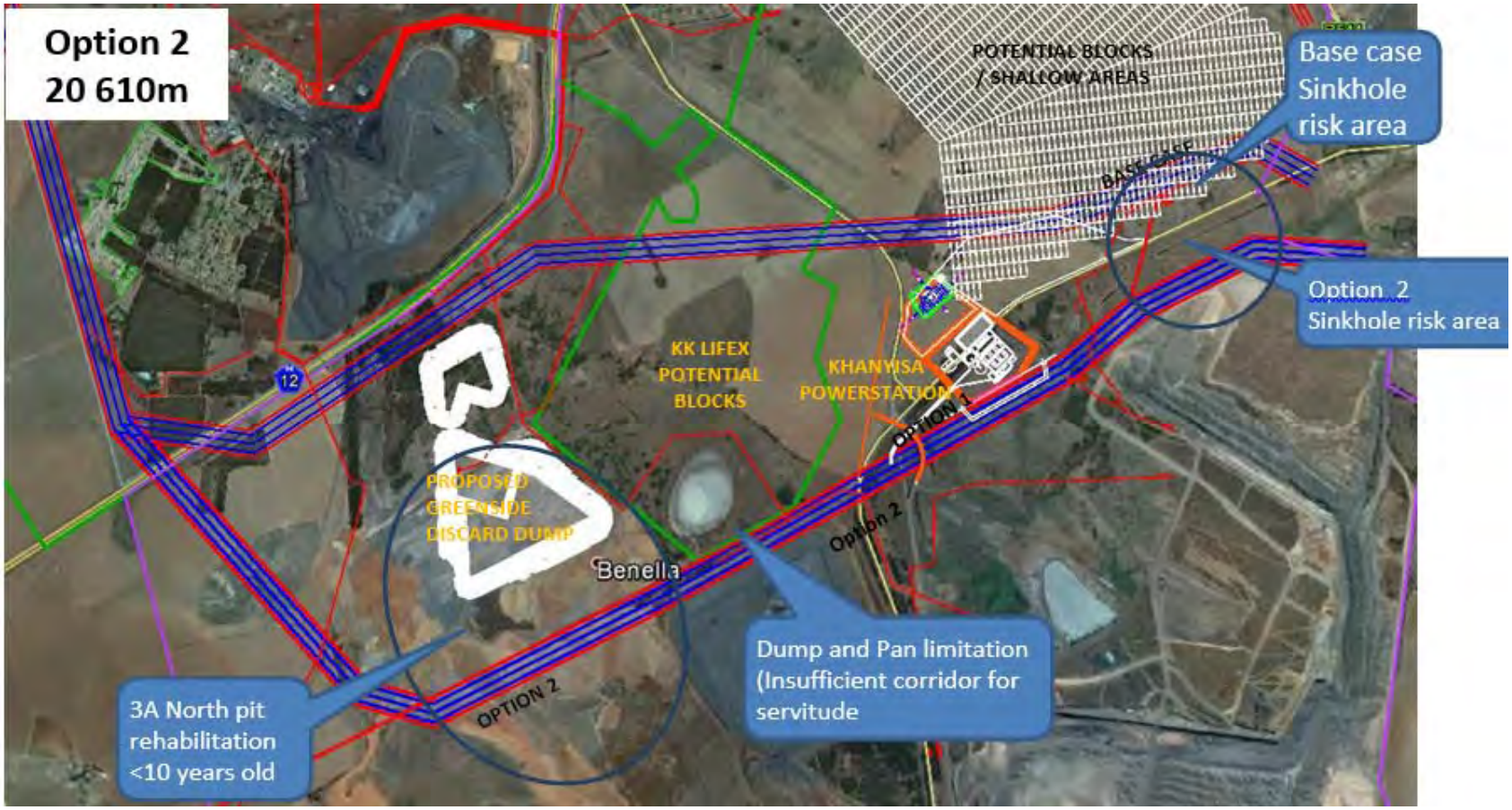
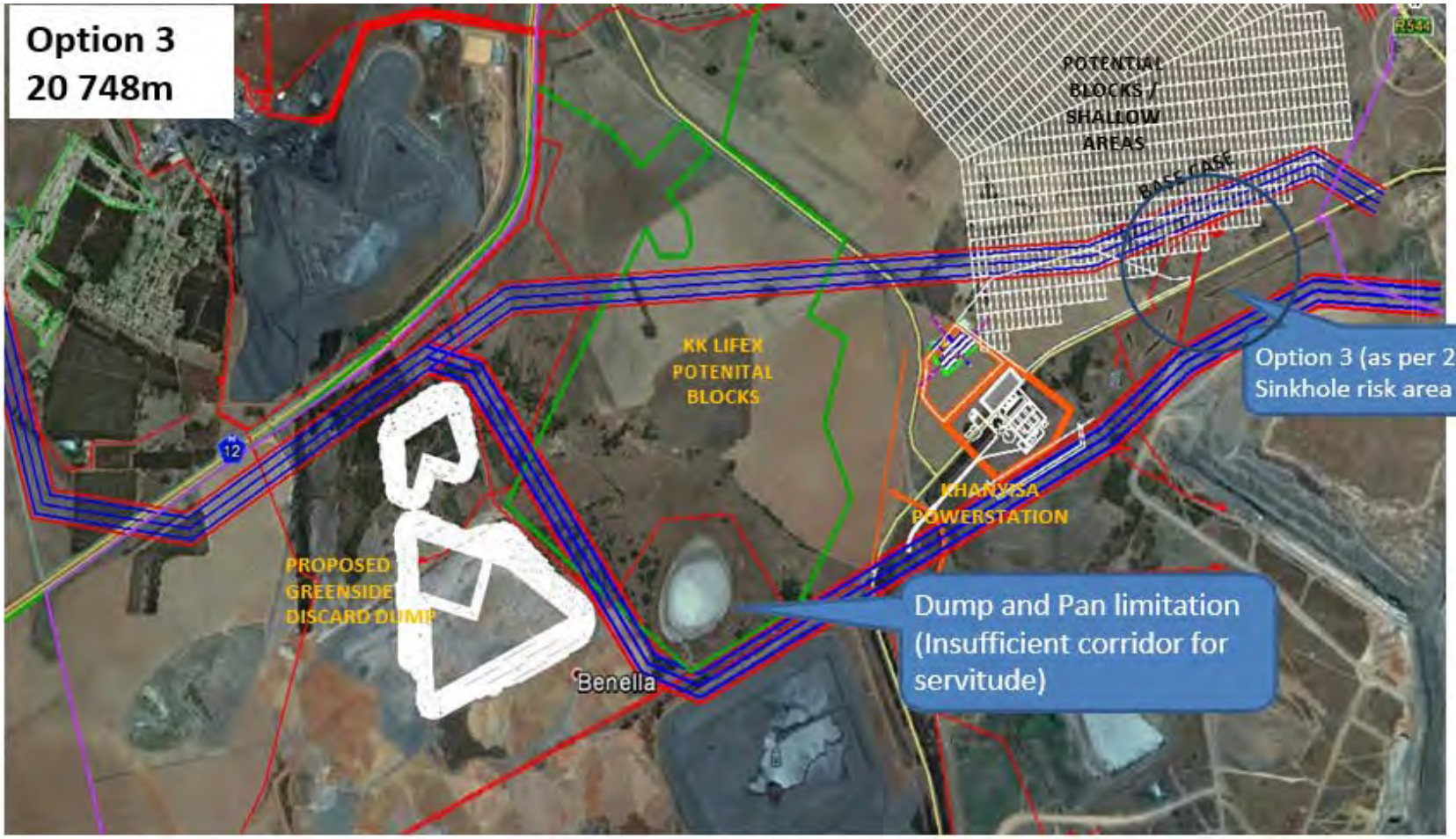


Figure 4-3: Option 2

Option 3

The intention with this option is to avoid the portion of 3A North pit, which was rehabilitated in the last 3 years (Figure 4-4). The Tweefontein road sinkhole hazard and MRD corridor constraints as in Option 2 still remain and therefore this option is no longer considered



srk consulting	**RELOCATION OF THREE 400KV POWER LINES** LOCATION ALTERNATIVE - OPTION 3	Project No. 512575

Figure 4-4: Option 3

Option 4

The total high yielding ROM tonnes that would be sterilized by this route is estimated at well over 11Mt, along Kleinkopje/Landau road (Figure 4-5).

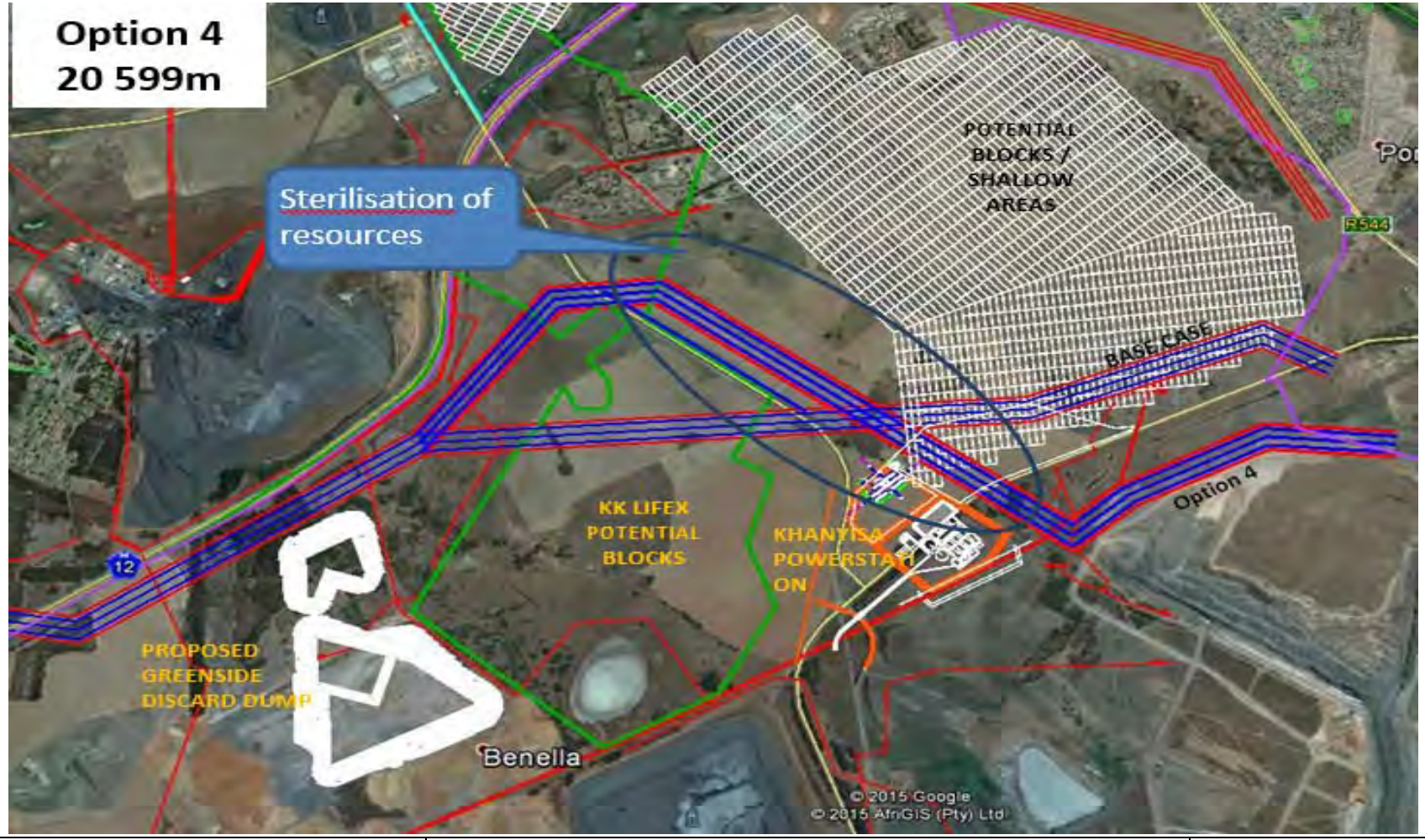


Figure 4-5: Option 4

4.3.2 Design considerations

Certain standard design considerations for a 400kV transmission line include:

- Standard servitude width is 55m (i.e. 27.5m on either side of centre line)
- Minimum spacing between pylons is ± 300m and the maximum spacing is ± 500m (depending on the topography of the area)
- Line may be 90m from the centre line of a national road, unless a relaxation on this is granted by the roads department
- Minimum clearance between the midspan point of the line and the ground is 8.1m
- Minimum distance between any part of a tree or shrub and any bare phase conductor must be 5.6m
- Minimum safe distance required from the centre of the power line to the beginning of a domestic house is 27.5m.

4.3.3 The no go alternative

The current power line route is at risk as it extends across historically shallow underground mining operations. Sinkholes have developed at Khwezela Colliery due to the shallow historical workings. In the event of tower structures collapsing due to the instability caused by the sinkholes this could result in disruption in continued power supply to the National Grid.

As a result, no No Go alternatives have been considered for this project.

4.4 Power line servitude, tower and substation infrastructure

4.4.1 Power line servitude

A 55m servitude (27.5 m on either side of the centre line) is required to accommodate the towers on which the overhead line will be strung. The servitude is required to ensure safe construction, maintenance and operation of the line and Eskom will be entitled to unrestricted access. Where 400kV power lines are constructed in parallel, a minimum separation distance of 55m between centre points is required. Minimum vertical clearance distance between the ground and power line conductors is 8.1m.

The minimum vertical clearance to any fixed structure that does not form part of the power line is 5.6m. The minimum distance from a power line running parallel to a proclaimed public road is 90m from the centreline of the road servitude. The minimum safe distance required to the edge of a domestic house is 40m from the centre of the power line (i.e. 27.m plus 12.5 m). The maximum crop height within the servitude is 4.3m. The maximum operation height under the conductors is 2 m.

4.4.2 Tower structures

The selection of a tower types depends on several factors, including terrain, expense etc. Below are examples of towers that where considered for a 400 kV transmission line.

Self-supporting tower

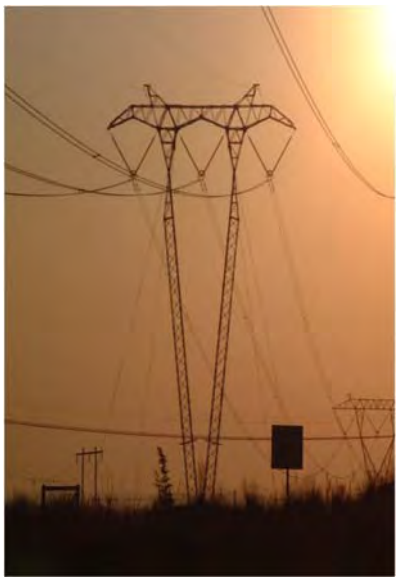
This structure is typical of most single circuit structures in use by Eskom for their 400kv lines. It carries twin dinosaur conductors, a relatively light configuration. The use of a V-string assembly allows for compaction of phase spacing, which in turn results in both structural and electrical efficiency (Figure 4-6).

srk consulting	**RELOCATION OF THREE 400KV POWER LINES** SELF SUPPORTING TOWER	Project No. 512575

Figure 4-6: Self supported tower

Guyed Suspension tower

This structure is typical for optimal use with the zebra configuration. The guyed--vee towers has one large foundation and four guys therefore four smaller foundations. Guyed--vee towers provide the best protection from lightning impulses due to the ground wire and cross arm configuration. Tower cross bar helps with the live line maintenance (Figure 4-7).



srk consulting	**RELOCATION OF THREE 400KV POWER LINES** GUYED SUSPENDED TOWER	Project No. 512575

Figure 4-7: Guyed suspension tower

Most farming activities, except for sugar cane and commercial forestry, can be practiced under the conductors, provided that there is adherence to safe working clearances, crop height restrictions and building restrictions.

Cross rope tower

This structure is typical for optimal for guided mast design, making it lighter and more efficient. Cross rope towers are cost effective and high performance towers (Figure 4-8).

srk consulting	**RELOCATION OF THREE 400KV POWER LINES** CROSS ROPE TOWER	Project No. 512575

Figure 4-8: Cross rope tower

From the above mentioned examples of the various types of towers, Eskom will select the best option prior to erection of the towers.

4.4.3 Tower footing earthing Improvement

The minimum tower footing resistances as per TST41-321 Eskom Internal Tower Guideline Document) should be obtained. One aspect to note is that the tower footing resistance limits stated in the preceding standard is based on conservative assumptions about the prevailing ground flash densities. In order to attain more realistic limits, it is necessary to recalculate the required footing resistance for the actual prevailing flash densities and as a function of the desired back flashover rate and tower configuration.

The installation of earthing counterpoises and electrodes should be preceded by pre-engineering studies to obtain the optimal earthing configuration. As a minimum the following activities should be undertaken:

- Measurement of the tower footing resistance using a null balance insulation tester or other approved high frequency meters as per ELEC/178/008, Transmission Tower Footing Resistance Measurements Eskom Internal Tower Guideline Document), with a high frequency meter
- Where measures indicates resistance values higher than the maximum required, or indicates room for further improvement , a soil resistivity test will be undertaken at the relevant tower, utilising the Wenner soil survey method, as per ELEC/178/009, Wenner Soil Resistivity Survey Measurements Eskom Internal Tower Guideline Document)
- This data should be modelled into an earthing simulation software, such as CDEGS, to obtain the optimum electrode configuration for the prevailing soil conditions
- The earthing straps or conductor used, as counterpoises shall comply with Eskom Transmission standards.

For the replacement of earth straps, which have been removed, vandalised or corroded, special measures are required in order to ensure engineering and technical correctness. Particularly where copper earth straps or electrodes are stolen or vandalised, equivalent diameter of galvanised steel or suitable alternatives should be used in accordance with SABS 0199: The Design and Installation of an Earth Electrode. There is also a need to optimise these installations due to the high costs involved in deep drilled operations. A cheaper, workable alternative can provide impetus to wide scale application on transmission lines. One such solution is the use of copper-coated steel as counterpoises with agricultural gypsum as backfill. This methodology should be applied on a trial basis before more wide scale application. This will provide a means of comparable study between the effectiveness of both methodologies (Eskom: Life Cycle Management Plan for Transmission Lines, 2009).

4.4.4 Tower erection and modification

The correct erection procedures as contained within The Standard for the Construction of Overhead Power Lines 240-47172520 (TRMSCAAC5.2). Tower modifications are to be accompanied by detailed structural analysis and design as well as customised foundation designs by the relevant specialists (Eskom: Life Cycle Management Plan for Transmission Lines, 2009).

4.4.5 Stringing and re-tensioning

Re-tensioning of conductors for the purpose of obtaining required line clearances or increased power transfer, shall be preceded by the following:

- Measurements taken by a surveyor or a competent person on the incumbent line spans, shall include vertical clearances at lowest sag points as well as conductor attachment height measurements. The choice between aerial surveying and ground based surveying will depend on the magnitude of the exercise. It has been found that certain acoustic measuring apparatus provide inaccurate results. It should therefore only be used as a spot check and not for detailed and accurate measurements
- Additional data recorded shall include, span lengths, wind speed and direction as well as ambient temperature and time of day to assess the line loading
- This data is then used to determine the actual conductor temperature and to plot the profile of the line using Computer Aided Design and Drafting (CADD) software specific for this purpose, such as PLS-CADD Eskom Internal Tower Guideline Document)
- The line is then templated at the original design temperature of 50°C and re-plotted to attain the required clearance
- New tension schedules will be issued to direct the re-tensioning operation
- Stringing and regulating of phase and earth conductors shall be performed in accordance with TSP41-591, Section 8, by an accredited contractor.

4.4.6 Re-insulation of line with composite insulators

When replacing glass cap and pin insulators with composites, the following must be given consideration:

- Line and tower geometry (types of towers, position of conductors, lengths of insulators)
- Hardware configuration (clevis-tongue, ball-socket etc.)
- Required dry-arching distance
- Line location
- Line performance (fault causes and locations).

The minimum requirements for re-insulation will include the following:

- An on-site inspection and measurement of current glass disc parameters, clearances and sag as well as hardware assemblies
- This should then be followed by detailed specifications for the equivalent composite strings which will be suitable for the insulation, dimensioning, loading, and environmental (pollution level, humidity) conditions prevailing
- CAD modelling of the proposed/desired insulator relative to the tower window, to ensure sufficient clearances under maximum swinging conditions
- Determining excessive sagging and infringement of vertical clearance, by measuring clearances at critical spans. This will determine the need for re-tensioning of the conductors
- The decision as to whether to attempt live line or deadline installation shall be guided by the availability of outages, and resources as well as the sensitivity of customer loads
- The re-insulation shall be done, and only if internal resources are not available, by an accredited contractor and all quality and technical provisions are to be followed (Eskom: Life Cycle Management Plan for Transmission Lines, 2009).

4.4.7 Corrosion protection of towers and line hardware

Corrosion protection is to be done in accordance with, TSP41-608:Eskom Internal Tower Guideline Document. It is imperative that a qualified corrosion specialist assist in the analysis of the microclimate, which the line traverses, and the type of corrosion on each individual tower member, as well as nuts and bolts. This should be duly recorded for each tower inspected. This will assist in determining the surface preparation and coating system required, while identifying suitable, approved products to be applied (Eskom: Life Cycle Management Plan for Transmission Lines, 2009).

4.5 Project phases

There are several phases, which are presented in detail:

4.5.1 Feasibility phase

The feasibility phase of the provide will include:

- Selecting a suitable corridor for the route of the proposed transmission line and execution of an EIA process. Servitude negotiations are also initiated during this phase
- Eskom and environmental specialists (e.g. ecologist, heritage) conduct a walk-down survey to determine the exact locations of the towers, based on sensitive environmental features and technical criteria.

This project is current in the Feasibility phase.

4.5.2 Planning and design (implementation) phase

The planning and design phase, which is only undertaken should environmental authorisation be obtained, will include:

- An aerial survey of the route
- Selection of the most appropriate structures
- Preparation of relevant planning documentation, including technical and design documentation.

4.5.3 Construction phase

The proposed construction of the three 400kV power lines involves a number of activities, and these are presented below.

Perimeter fence and security

A secure perimeter fence of approximately 2.3 m in height will be erected along the proposed power line route with controlled security access. The perimeter fence will be a clear view fence with concrete plinths for supporting poles.

Vegetation clearance

The whole servitude along the power line route will be cleared of all trees and shrubs down the centre of a transmission power line for stringing purposes. Any tree or shrub in other areas that will interfere with the operation and/or reliability of the transmission power line must be trimmed or completely cleared. The clearing of vegetation will take place in accordance with Eskom's minimum standards for the construction of new Transmission power lines, as listed below in Table 4-1.

Table 4-1: Minimum standards for vegetation clearing for new transmission power line

Item	Standard	Follow up
Centre line of the proposed Transmission power line	Clear to a maximum (depending on tower type and voltage) 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 regrow.
Access/service roads	Clear a maximum (depending on tower type) 6 m wide strip for vehicle access within the maximum 8m width, including destumping/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 20m (self-supporting, guyed suspension towers or cross rope towers) and 40 x 40m around the position, including de- stumping/cutting stumps to ground level, treating with an 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 8m strip and within the servitude area, selective trimming or cutting down of those identified plants posing a threat to the integrity of the proposed power line.	Selective trimming
Alien species within servitude area (outside of maximum 8m strip)	Area outside of the maximum 8m strip and within the servitude area, remove all vegetation within servitude area and treat with appropriate herbicide.	Cut and treat with appropriate herbicide.

Surveying (pegging of tower positions)

The following resources will be deployed to undertake the surveying. These include surveyor, survey assistants (3), survey instruments, 4x4 Vehicle, hammers, steel tapes and steel pins.

The tower positions are pegged using a single steel pin knocked into the ground. The position is reached by utilising GPS co-ordinates taken from the tower staking table. Cross sections of the site will be taken to facilitate the calculation of the tower leg extensions.

Whilst driving in the field, special care is taken not drive through visible wet areas and drive through streams. Existing tracks are preferred and will be utilised as far as possible by the contractors.

In the event that access is not available or impossible, the pegging process will be undertaken on foot.

The surveyor will note all available access routes and problem areas. Access routes will be investigated and agreed upon in writing by the Environmental Control Officer, where after they will be marked.

Construction camp establishment

The locations of the construction camp will be determined by the appointed contractor. The consideration of the proposed camp sites will be undertaken in accordance with Eskom Transmission's *'Generic Environmental Management Plan – Line Construction'*.

The construction camp size will be determined by the appointed contractor. The following areas/ activities may occur within a construction camp:

- Fuel storage and re-fuelling areas
- Laydown areas
- Portable ablution facilities and / or wash areas
- Designated eating areas
- Accommodation facilities for contractors
- Security guardhouse / checkpoint
- Vehicle, plant, equipment and material storage areas
- Cement mixing areas
- Any other infrastructure required for the construction of the substation.

Setting out of towers

The following resources will be deployed to undertake the setting out of the towers. These include,

surveyor, survey assistants, survey equipment, steel measuring tapes, hammers and 4x4 vehicle.

Once the foundations have been designed and the drawings approved the surveyor will peg the foundation as per the approved drawings, driving to the tower position via the approved access routes.

Notes and photographs are to be taken of the position for record purposes, as before and after construction.

Foundation excavations

A site plan or a tower foundation excavation layout plan shall be drawn up as a basis for discussion between the Contractor and the Employer (Site Representative and Environmental Control Officer) resulting in a formal signed document of how the foundation will be excavated at a given site. There are three basic part of this layout plan:

- Tower site information
- Foundation construction survey
- Foundation site information.

Tower site information

The tower site information includes all the limitations and restrictions as per the Environmental Authorisation for access, operation and demobilisation of the equipment required to install the spread foundation (conventional foundation) such as:

- Restrictions on points of access to the tower position
- Equipment limitations on site
- Underground and overhead services
- Existing structures
- Clearing restrictions

- Presence of surface water
- Environmental restrictions.

Foundation construction survey

The construction survey establishes the foundation centre hub, reference points, elevations and required depth of the excavations. Before the excavation of the foundation can start, the outline of the tower foundation is set out as per the approved foundation drawing and the depth of the excavation calculated. The centre of the leg excavation is established and the depth calculated in relation to the foundation hub. The foundation hub is used to control the depth of the excavation. The four corners of the foundation excavation should match the dimensions of the concrete foundation slab if the concrete is cast against in-situ material.

Foundation site information

Foundation site information in compliance of the environmental impact assessment includes the following:

- Access to the tower position
- Foundation assembly site
- Spoil pile management
- Erosion control measurements.

Access to the foundation sites and the sequence of excavating each foundation must be planned to avoid the undercutting of other foundations. Access limitations may require that only one leg foundation may be done at a time; excavated, assembled, set and backfilled. Large spread foundations are often required, which require a spoil pile management plan. The excavated material is normally used for backfilling. The topsoil and fines need to be separated so that they can be replaced as topsoil and used adjacent to the foundation. All surplus material will be removed from site. Erosion control measures shall be carried out in consultation with the Environmental Control Officer.

Excavation

The equipment and methods that are used for the excavation of the foundation depends on the type of soil that is encountered at the excavation site. The following types of soil can be encountered on site:

- Type1: competent soil with equal or better consistency than would be encountered in stiff cohesive soils
- Type 2: A less competent soil than type”1” with weaker or equal consistency in firm to stiff cohesive soils
- Type 3: dry loose non cohesive soil or very soft to soft cohesive soils
- Type 4: submerged cohesion less and cohesive soils. This includes soils below the permanent water table, including soils below a re-occurring perched water table or permeable soils in low lying areas subjected to confirmed seasonal flooding.

Often the high water table will require dewatering of the excavation. Depending on the specific site conditions, open pumping, cut-off drains (trenches), or drainage pits may be necessary to remove the water. Should the water continue to run into or seep from the walls or the bottom of the excavation a sump hole may be dug at one of the corners of the foundation bottom and a small pump used in these pumping holes to keep the foundation dry during the foundation installation.

Whenever personnel are in the excavations, the safety hazards shall be assessed. There must be a good means of ingress and egress from the excavation. Excavated material shall be stock piled away from the edges of the excavation and round rocks and boulders must be placed in a location and

manner that will prevent them from rolling back into the excavation. The stability of the side walls shall be inspected to establish the soundness thereof in mitigating the protection of collapsing sides.

Foundation preparation

After the excavation the stability of the foundation bottom shall be checked to ensure that the bearing capacity is adequate. In the case of type “3’and type “4’ foundations a blinding layer of not less than 50mm shall be cast as to have a firm and clean surface to work on. The excavation shall be kept free of water and mud.

Foundation installation

All the reinforcing shall be placed using the specified bar sizes and spacing top and bottom before the stubs are place in the centre of the foundation and the rake of the stub set at the required angles.

Foundation setting

Once the reinforcing and the stubs have been placed the final setting are done. Measurement and levels are set to within the allowable tolerances and checked. Cover blocks are placed and checked that the specified cover is obtained from the bottom and sides of the excavation before first layer of concrete is cast. Successive layers are checked and cast after the cover to the shuttering is checked and released for concrete casting.

Concrete placing

During the casting of concrete into the foundation slabs, plinths and columns care shall be taken to prevent any spillage of concrete from the concrete mixer trucks. Any spillage shall be cleaned and wasted concrete placed in special containers for this purpose and then disposed of at registered dumping sites. No washing or rinsing of the mixer drums will be allowed. Rinsing may be disposed of in special constructed areas to contain the cement water in consultation and approval of the ECO.

Backfilling

Backfilling will be done in layers of 300mm utilising suitable excavated material. Should the excavated material not be suitable imported material shall be used from approved burrow pits. The final layers shall be done with the topsoil separated from the rest of the excavated material.

Site restoration

After the backfilling has been completed the excess soil shall be removed from site and dumped at an approved site as agreed with the ECO. The area around the excavation site shall be cleared of all debris and rubbish. The oversight of possible oil, cement and concrete spillage shall be cleared in the specified manner and properly disposed of. All site vehicles and equipment shall be equipped with the necessary oil drip trays.

Tower assembly and erection: tower site information

Tower site information includes the following:

- Access to the tower position
- Tower assembly site (Material lay down area)
- Tower assembly and erection management
- Proposed Crane positions for safe lifting of tower. The use of a crane for the erection of lattice type towers is in general the most efficient method of erection.

Access to the tower sites and the sequence of assembly and erection of each tower must be planned to avoid unsafe working conditions. All site vehicles and equipment shall be equipped with oil drip trays (Eskom: Life Cycle Management Plan for Transmission Lines, 2009).

Stringing of phase and earth conductors

Cable drums, which carry approximately 2.5 km of cable, will be delivered to the site. Conductors are used singularly, in pairs, or in bundles of three, four or six. The choice is determined by factors such as audible noise, corona, and electromagnetic field (EMF) mitigation. Many sizes of conductor are available, the choice being based on the initial and life-cycle costs of different combinations of size and bundles, as well as the required load to be transmitted. Two cable drums, with a winch in the middle, are placed approximately 5 km apart along the route. A pilot cable, which is laid with a pilot tractor that drives along the route, is pulled up on to the pylons with the use of pulleys. The line is generally strung in sections (from bend to bend) (Eskom: Life Cycle Management Plan for Transmission Lines, 2009).

Puller and tensioner site information

Puller and tensioner includes the following:

- Access to the proposed puller, tensioner and drum station positions as per the agreement and approval of the ECO
- Access to tower positions to offload and dress towers with insulators and hardware
- Access to Tower positions along the servitude to install the pilot ropes/cables as per the agreement and approval of the ECO
- Possible clearing/cutting of bush and trees that may foul the stringing of the conductors (Eskom: Life Cycle Management Plan for Transmission Lines, 2009).

Installation of pilot cables

Once the stringing section (approximately 2000m to 3000m depending on the terrain) has been established and agreed upon the pilot cables/ropes are run out along the servitude and installed onto the stringing pulley blocks. Should the access along the servitude be inaccessible to the pulling vehicle (wetlands or deep valleys) a light rope or fish line can either be walked through or pulled through by other approved means and the pilot cable then pulled along the servitude. Both ends of the pilot cable are attached to the Puller and the Tensioner, ready for pulling the phase and earth wire conductors (Eskom: Life Cycle Management Plan for Transmission Lines, 2009).

Stringing operation

The conductors (one Phase at a time) are pulled through the tensioner from the drums and then attached to the Pilot cable. The puller then starts applying tension to the pilot cable to lift the cable off the ground, to a height of 1 to 3m to prevent any damage to the conductors by dragging them on the surface and the clearing of obstacles along the servitude (Eskom: Life Cycle Management Plan for Transmission Lines, 2009).

Regulating and sagging

The section stringing completed, the conductors are pulled to the required tension as per the sag and tension charts either using a dynamometer of sag boards attached to the towers in a predetermined span. The conductors are made off dead-ends applied and attached the strain towers. Suspension towers the conductors are placed in the suspension clamps and the pulley blocks lowered to the ground for collection and installation on the following stringing section (Eskom: Life Cycle Management Plan for Transmission Lines, 2009).

Site rehabilitation

After the completion of the binding in of the conductors all pulley blocks and ropes shall be removed from site utilising the access routes agreed upon. All rubbish will be collected and place in the required bins for collection and disposal at registered dumping sites.

Once the site has been cleared the ECO shall do and inspection to see that all the conditions as stated in the Environmental Authorisation have been complied with and then only sign off the release. Special care shall always be taken when crossing wetlands and river streams in compliance with the requirements of the Water Use General Authorisation. All site vehicles and equipment shall be equipped with oil drip trays (Eskom: Life Cycle Management Plan for Transmission Lines, 2009).

4.5.4 Infrastructure Requirements during the construction phase

The following elements and infrastructure will be required during the construction phase of the proposed project. There might be additional requirements, however these will be confirmed by the appointed contractor.

Water

During the construction stage, the appointed contractor will require water for potable use by construction workers and water will also be used in the construction of the foundations for the towers. The necessary negotiations will be undertaken with Eskom, the appointed contractor, landowners/ local authorities that are traversed by the transmission line to obtain water from approved sources. These negations will only take place once the contractor has been appointed by Eskom (This will happen prior to construction activities taking place).

Sanitation

Sanitation services will be required for construction workers in the form of chemical toilets, which will be serviced at regular intervals by the supplier. The securing of the required sanitation services will only be determined once the contractor has been appointed by Eskom (This will happen prior to construction activities taking place).

Access roads

Existing access roads will be utilised as far as possible. For the use of private roads, the requisite negotiations will be conducted with the affected landowners. These roads will be constructed according to Eskom and Anglo standards.

Waste

Solid waste generated during the construction phase will be temporarily stored at suitable locations (e.g. at construction camp) and will be removed at regular intervals and disposed of at approved waste disposal sites within the local municipality that are affected by the project. All the waste disposed of will be recorded. Wastewater, which refers to any water adversely affected in quality through construction-related activities and human influence, will include the following:

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

Suitable measures will be implemented to manage all wastewater generated during the construction period. These measures will be detailed by the appointed contractor.

Electricity

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

Traffic

The construction haul routes will use the existing road network. Construction traffic will include large vehicles / trucks for material delivery. The access of passenger vehicles (for construction workers) will

be in accordance with the Anglo security procedures. The number of construction vehicle trips per day is unknown at this stage. Once the contractor has been appointed by Eskom this will be determined.

Construction workers

The number of construction workers expected during the construction phase will be determined once the contractor has been appointed by Eskom

Construction schedule

Construction of the power line will commence once approval has been provided by the Department of Environmental Affairs. Construction activities are expected to occur during normal working hours of 07h30 to 16h35 and will largely be limited to Mondays to Fridays. Construction activities will only be allowed outside these times where unavoidable, subject to the contractor successfully motivating for an extension.

4.5.5 Operation and maintenance

The following section provides detail around the operational and maintenance phase of the proposed project.

Operation

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

SHEQ policy

Eskom has a SHEQ Policy in place, which is implemented and enforced on all Eskom sites. This policy ensures that SHEQ is an integral part of the operation and that no operating condition, or urgency of service, justifies exposing anyone to negative risks, causing an incident or damage to the environment (See Section 2 for further detail around the SHEQ Policy).

Environmental awareness

Eskom has an effective environmental awareness communication programme (Public Safety Information Forum), which ensures that the surrounding community is well informed of existing operations and future development projects in the area.

Maintenance

The maintenance process encompasses the identification and correction of defects which could have detrimental effect on future line operation. This include a means of inspection, evaluation and repair of the identified defects in a reasonable period so as to prevent imminent failure or reduced reliability.

The continual reduction in the maintenance and operational budget necessitates employing strategies which will ensure the optimal operation of transmission lines. One such strategy is employing integrated practises to reduce specific modes of failure. The current bird management and vegetation management are good examples of this. There is a need to broaden this approach to other causes of line faults such as lightning and pollution. Furthermore, broad based maintenance strategies to reduce the onset of conductor and tower corrosion should also be addressed. Important to note is that the inherent performance of a line is determined during the design phase. We do not design for zero faults and trying to maintain this into a line is not feasible. Maintenance can merely ensure that a line performs to its designed performance level. Maintenance and the required performance should be determined by the customer requirements. The current Cost of Dip study undertaken by LES will

enable us to determine to what extent customers are effected and from there we will be able to ascertain more realistic performance targets for the various lines (Eskom: Life Cycle Management Plan for Transmission Lines, 2009).

Servitude maintenance

A readily accessible servitude road facilitates quicker line patrols and maintenance. It also expedites the execution of emergency repairs. It is thus imperative for these to be properly maintained and managed. More importantly is the exposure of concrete foundations, which introduces the risk of tower collapse during high wind loading conditions. The environmental deterioration is another concern which constitutes contravention of environmental legislation. This document will identify the various methods available to address erosion problems such as bio systems, geocells, geomats and gabions. The encroachment on the right of way by settlements poses a safety risk to the public. The responsibility to inform the public and address this issue resides with the Lands and Rights Department, but the consequences of these encroachments, such as increased incidence of vandalism and hardware theft, needs to be carefully managed. The LETT should assist in this regard by recommending and implementing measures to address this issue (Eskom: Life Cycle Management Plan for Transmission Lines, 2009).

Live line maintenance

Conventional stick and bare hand techniques were introduced to Eskom in the mid-seventies. Aerial live work, using a helicopter, was introduced in the mid-eighties. Internal developments and innovations have led to the establishment of a world class capability.

Live work is centred on the ability to maintain the integrity of the air gap insulation between any live part and a person or part at ground potential (Eskom: Life Cycle Management Plan for Transmission Lines, 2009).

The insulating capabilities of the air gap, is influenced by altitude and humidity amongst others. The required air gap, is determined by the voltage and the degree of over voltages that can be expected on particular system. Both these quantities are used to determine the safe electrical distance between a live part of a particular system and ground potential. An ergonomic distance is determined to accommodate inadvertent movement of a live line worker. The *"safe approach"* distance is calculated as the sum of the electrical and ergonomic distances. Maintaining the safe approach distance is critical for safe live working. In light of the above, two techniques of live working have been developed on transmission voltages. The "stick" or "distance" method utilised insulated pole and special tools and equipment to perform work on live apparatus while at ground potential. This technique is mainly used on 132 and 220 kV as the safe approach distance, and as a result the stick length, becomes impractical on the higher voltages.

For higher voltages the "bare hand" technique is used. In this method the live line worker is energised to the voltage of the live part to be worked on and physically performs the work with his hands, rather than using a stick as described earlier. Special precautions are taken to ensure an equi-potential zone around the body. Insulated aerial devices, insulated ladders as well as helicopters are used to transfer the live line worker from ground to system potential. It goes without saying that maintaining the safe approach distance at all time is critical. Because of the risks involved, the live work environment is highly procedurised and controlled. Strict requirements are contained in standards and procedures in the Eskom Transmission quality manual (Eskom: Life Cycle Management Plan for Transmission Lines, 2009).

Maintenance management systems

To ensure effective maintenance and management of assets, require reliable asset data and information is essential. The two primary systems in use are Phoenix and Thromboxane synthase inhibitors (TXSIS).

Phoenix is mainly used as a work scheduling program whereas TXSIS are the defector assets database. TXSIS provided superior functionality over Phoenix, which allows for a degree of data interrogation and manipulation. Another important system is the Lightning Positioning and Tracking System (LPATS). This system enable verification of lightning strikes, which could impact on line performance. This assists the Grids in the analysis of lightning faults and motivation for earthing improvement projects. The accuracy of LPATs is questionable and a means need to be found to improve on this. Initial attempts at motivating for an upgrade of the current system has failed. The inaccuracy of the system hamper proper statistical analysis of lightning data. Accurate distance to fault location is essential to ensure that line patrols are performed speedily and the location of faults accurately determined. Transmissions in service experience shows that the TWS locators provide superior fault location capabilities. This is the preferred system for this purpose. A project has been initiated to integrate these three platforms and to spatially enable the data. This will enable faster fault statistical analysis and trending. It will also permit a single point of entry for all lines data, limiting the discrepancies due to multiple datasets (Eskom: Life Cycle Management Plan for Transmission Lines, 2009).

4.5.6 Decommissioning of existing power lines

This project includes the decommissioning of the existing power line once the proposed power lines have been constructed and commissioned.

Due to historical mining subsidence has occurred along a portion of the existing power line route, which is considered to be unsafe for contractors to decommission this portion of the line. Management measures associated with the facilitation of access to the areas of concern will be implemented prior to the commencement of decommissioning.

The decommissioning of the line follows an equivalent process to that of construction, which includes the following activities:

- Survey unsafe areas in order to identify suitable management measures to provide access in order to remove existing infrastructure to decommission the line
- Implement suitable mitigation and management measures in order to provide safe access to the site (e.g. buffer blasting)
- Decommission the existing power line (switch line off)
- Dismantling and removable of transmission cables, certain accessible towers (as some towers will remain as it is unsafe to dismantle due to underground burning), pylons and associated existing infrastructure
- Rehabilitation of foundations and excavations
- Material transport and disposal or recycling
- Implement rehabilitation and disposal strategies.

5 Description of biophysical and social environment

The following chapter presents an overview of the biophysical and socio-economic environment in which the proposed power lines are located. The purposes of this section is to:

- Understand the general sensitivity of and pressures on the receiving environment
- Inform the identification of potential impacts associated with the proposed project, which will be assessed during the Impact Assessment Phase
- Identify gaps in available information to inform specialist study requirements
- Start conceptualising practical mitigation measures.

5.1 Biophysical environment

This section of the report describes the biophysical trends of the project environment, prior to commencement of the proposed relocation of the power lines.

For this project, the following specialist studies where undertaken:

- Biodiversity: Terrestrial Ecological Assessment
- Heritage Impact Assessment
- Soils and Land Capability Assessment
- Wetlands Assessment (**Appendix D** for specialist studies reports)

The proposed power lines transverse three of AOL's mining right areas namely: Greenside, Khwezela Bokgoni Colliery (previously known as Kleinkopje) and Khwezela Colliery, previously known as Landau Colliery. The description of the receiving environment is baseline on previous specialist studies undertaken for these mining areas.

5.1.1 Topography

The natural topography of the area has generally been disturbed by mining activities in the region. These mining activities have been conducted over the past several decades with the main contributors to the topography disturbance being that of opencast mining and rehabilitation activities. The surface is gently undulating with elevations of between 1 350 and 1 400 mamsl. The area is typical of the Eastern Highveld with gently rolling hills and shallow valleys where watercourses often display "ox bow" configurations or form marshes with undefined channels. A number of small rock outcrops are found on the northern side of the mentioned unnamed tributary of the Grootspruit. Surface runoff flows into marshy pans or tributaries, which in turn flow into either the Tweefonteinspruit or the Olifants River.

5.1.2 Geology

The eMalahleni area is underlain by the Karoo supergroup. The Karoo Supergroup comprises mainly a sedimentary succession of sandstone, siltstone, shale, mudstone, coal, diamictite and tillite. The Karoo Supergroup is lithostratigraphically subdivided into the Dwyka, Ecca and Beaufort groups, succeeded by the Molteno, Elliot and Clarens formations and the Drakensburg Formation. The Ecca Group comprises successions of formations, which consists of sandstone, shale and coal and were developed within the Karoo basin locally. Figure 5-1 indicates a general geological profile. The positions of the dykes have been interpreted from geophysical surveys, but have mostly been delineated through mapping when intersected in the underground workings (Scoping Report for AOL Kleinkopije, 2016).

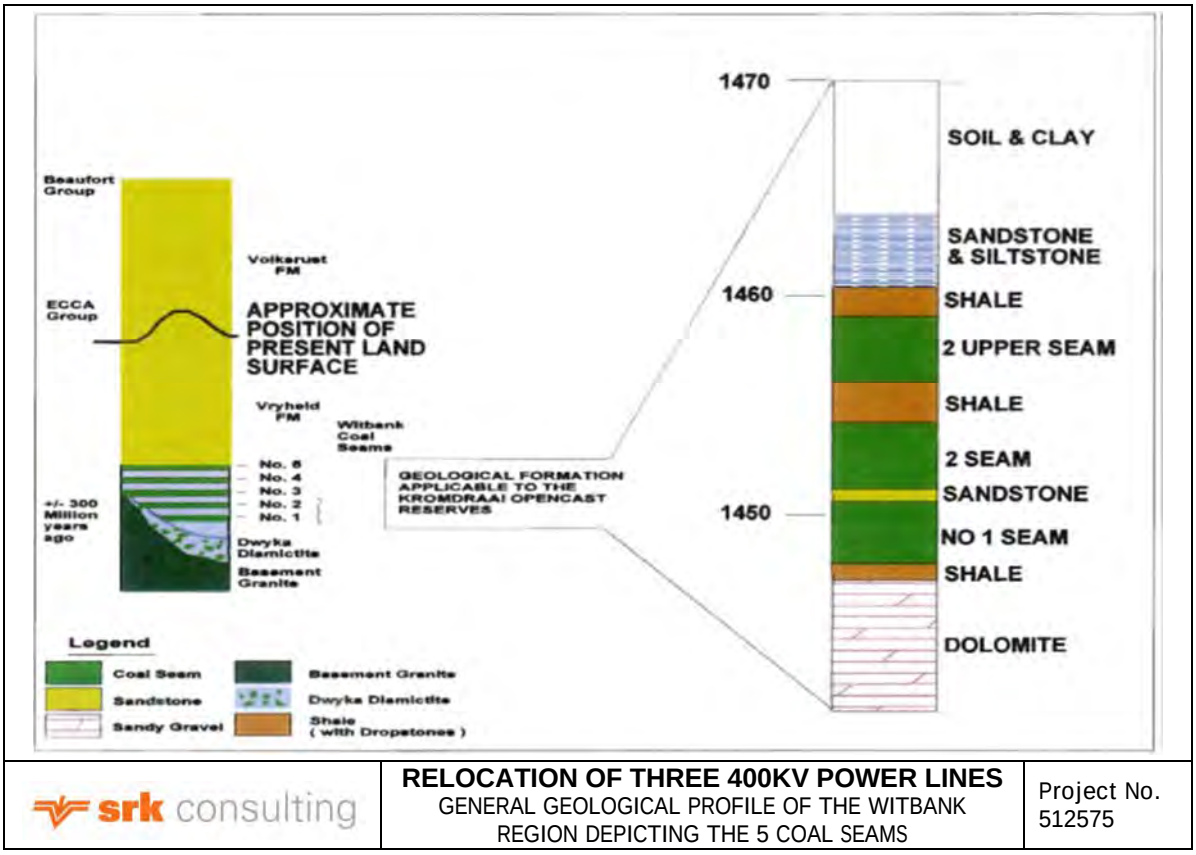


Figure 5-1: General geological profile of the Witbank region depicting the five (5) coal seams

The thickest portions of the Ecca Group were deposited in the southern Karoo basin in contrast to the relatively thin sequence which is now preserved in the East Rand. This succession of sedimentary rocks generally overly the well-consolidated conglomerates/diamictites of the Dwyka Formation, but in places the Ecca Group rocks rest directly on the felsites and granites of the pre-Karoo Basement rocks. Igneous intrusions of late Karoo Supergroup age in the form of dolerite dykes and sills also occur through the sedimentary succession. The sills usually precede the dykes, with the latter being emplaced during a later period of tensional forces within the earth's crust. Tectonically, the Karoo sediments are practically undisturbed. Faults are rare. However, fractures are common in competent rocks such as sandstone and coal.

The sediments of the Vryheid Formation overlie an uneven Dwyka floor, which is controlled by the topography of the pre-Karoo platform upon which the Karoo sediments were deposited. The Vryheid Formation is present throughout the Witbank Area. At their thickest these sediments attain some 120 – 140m and can contain a number of coal seams of which four are considered to have economic potential. This area is known as the Witbank Coal fields (Shangoni, EIA, 2016)

5.1.3 Climate

The area lies in the summer rainfall region (Eastern Highveld) of Southern Africa, with cold and dry winters, and warm and wet summers. Temperatures range from 9°C to 32°C in summer and from 6°C to 22°C in winter. Frost occurs frequently between May and September. During summer months prevailing winds are northerly or easterly and during the winter months prevailing winds are north westerly to south westerly.

Temperature information from the Witbank Weather Station is presented in Figure 5-2 below (South African Weather Service, 2006). The highest average maximum daily temperatures occur from November to March ranging from 25.2ºC to 27.5ºC. June, July and August are the coldest months of the year with the average minimum temperatures ranging from 5ºC to 6ºC.

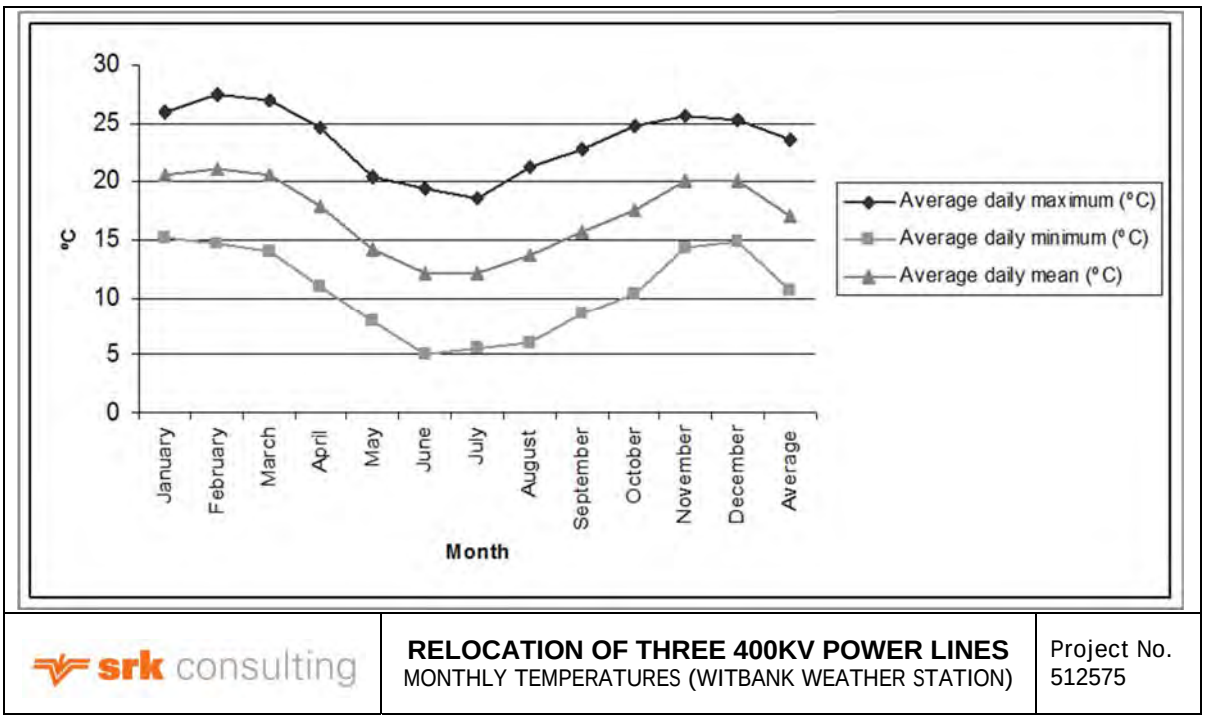


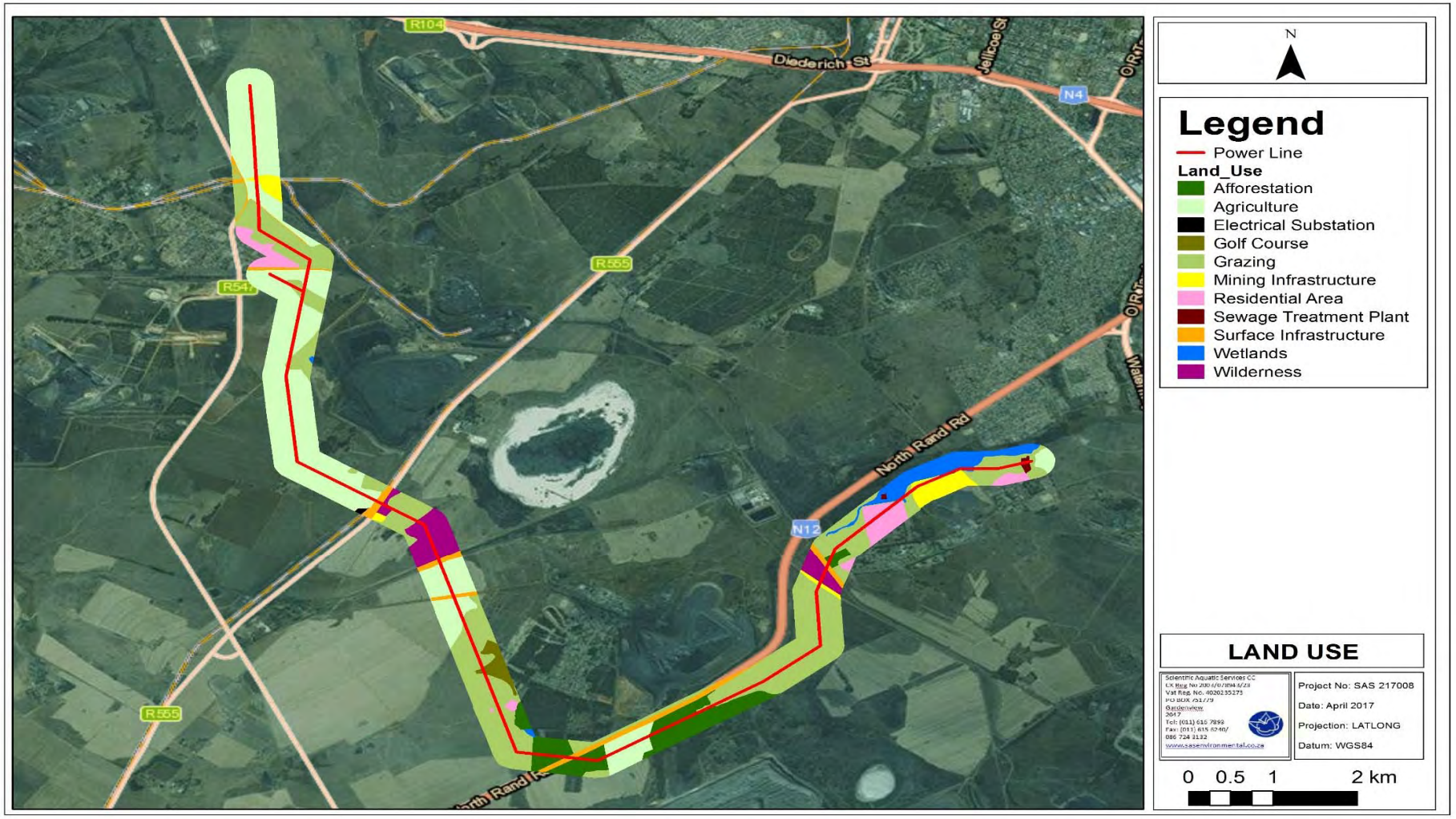
Figure 5-2: Average monthly maximum and minimum temperatures (Witbank weather station)

Precipitation in the area is highly seasonal with a mean annual rainfall of 702.7 mm according to the rainfall data from the DWA hydrological datasets. Most of the rainfall occurs during the summer months with the majority of rain events between October and April. The region receives the highest rainfall in January and the lowest in July. Wind in the area blows predominantly in a northerly direction during winter and spring, and predominantly in a south easterly direction during summer and autumn. The average monthly wind speed for the period 1993 - 2003 was 10.26 m/s. The maximum wind speed of 13.6 m/s was measured in October 1995 and the minimum wind speed of 8 m/s was experienced in June and July 2000 (Shangoni, EIA, 2016)

5.1.4 Soils and land use

Soils

A soil survey was conducted on 10 and 11 April 2017. The majority of the power line study area traverses through an area considered to be heavily modified, and comprising of modified old cultivated lands and remnants of natural land areas, according to the Mpumalanga Terrestrial Biodiversity Sector Plan, as showed in Figure 5-3 below.



srk consulting	**RELOCATION OF THREE 400KV POWER LINES** LAND USES IN THE VICINITY ACCORDING TO THE MBSP, 2014	Project No. 512575

Figure 5-3: Land uses in the vicinity of the study area according to the MBSP, 2014.

Additional desktop assessment data was obtained from various data sources including but not limited to the Agricultural Geo-referenced Information System (AGIS) and other sources as listed under references:

- The Mean Annual Precipitation (MAP) is estimated to range between 601-800mm per annum in the vicinity of the study area
- According to the 1:250 000 geological map of South Africa, the geology along the majority of the study area comprises the Ecca geological group formation, whereas the eastern portion of the study area comprises the Transvaal, Rooiberg and Griqualand- West geological group formations
- The SOTER database indicates that the study area comprises of Haplic Acrisols (ACh), Plinthic Acrisols (ACp), and Lithic Leptosols (LPq) soil types, derived from the Sandstone, greywacke and arkose parent material, as presented in Figure 5-4;
- According to the AGIS Land Capability Atlas, the majority of the study area falls within an area considered to be of moderate potential arable land of Class III land capability, with a minority of marginal potential arable land (Class IV land capability) on the eastern and southern portions of the study area, as presented in Figure 5-5;
- According to the AGIS database, the livestock grazing capacity potential is estimated to be approximately 3 hectares per large animal unit within the study area (Morgenthal et al., 2005); and
- The natural soil pH is estimated to range between 0 and 5.5 within the study area, as interpolated from topsoil pH values obtained from the National Soil Profile Database (AGIS database). This indicates that the soils are anticipated to be acidic within the study area (**Appendix D 6** for Soils and Land Capability specialist report).

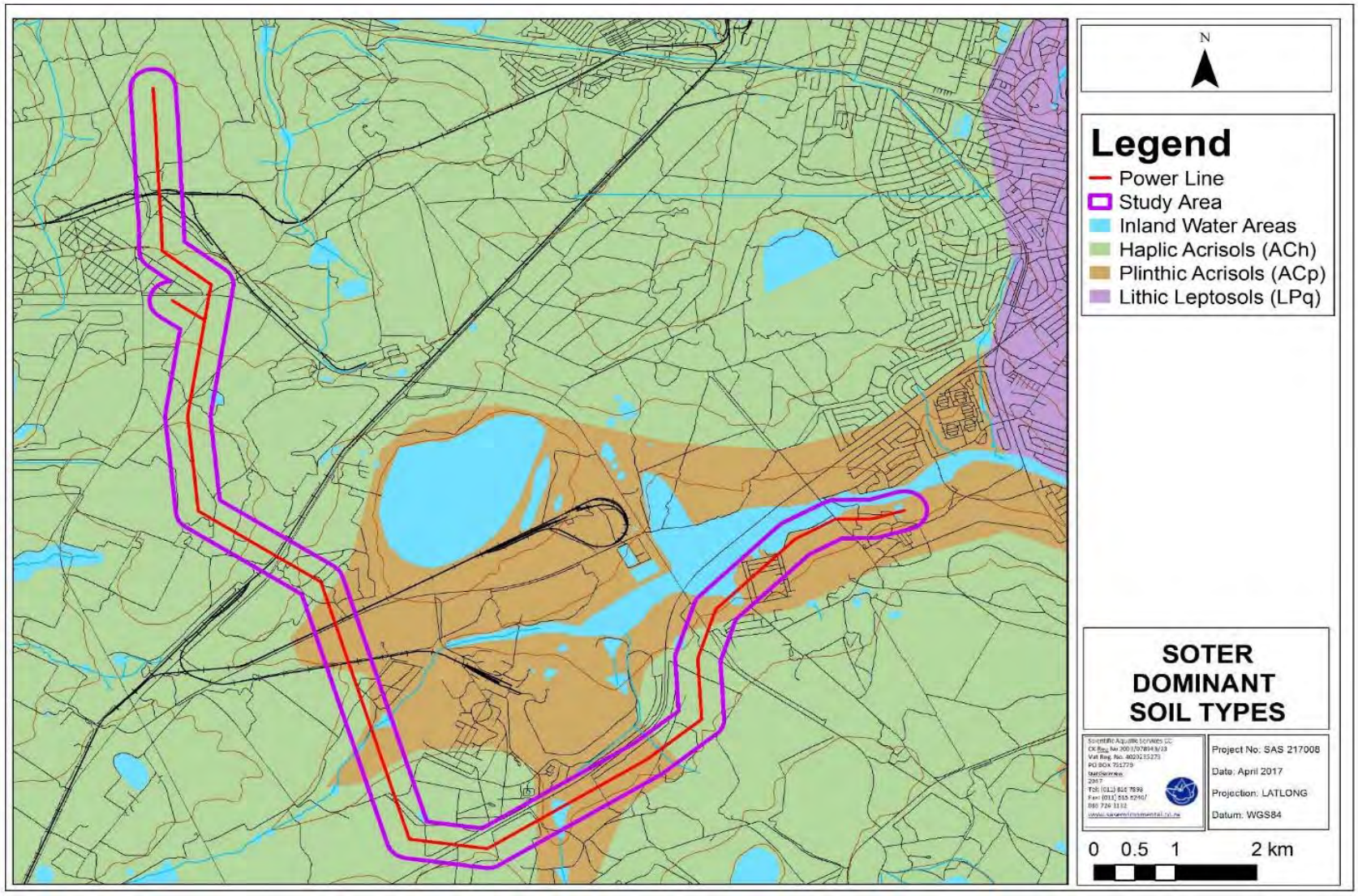
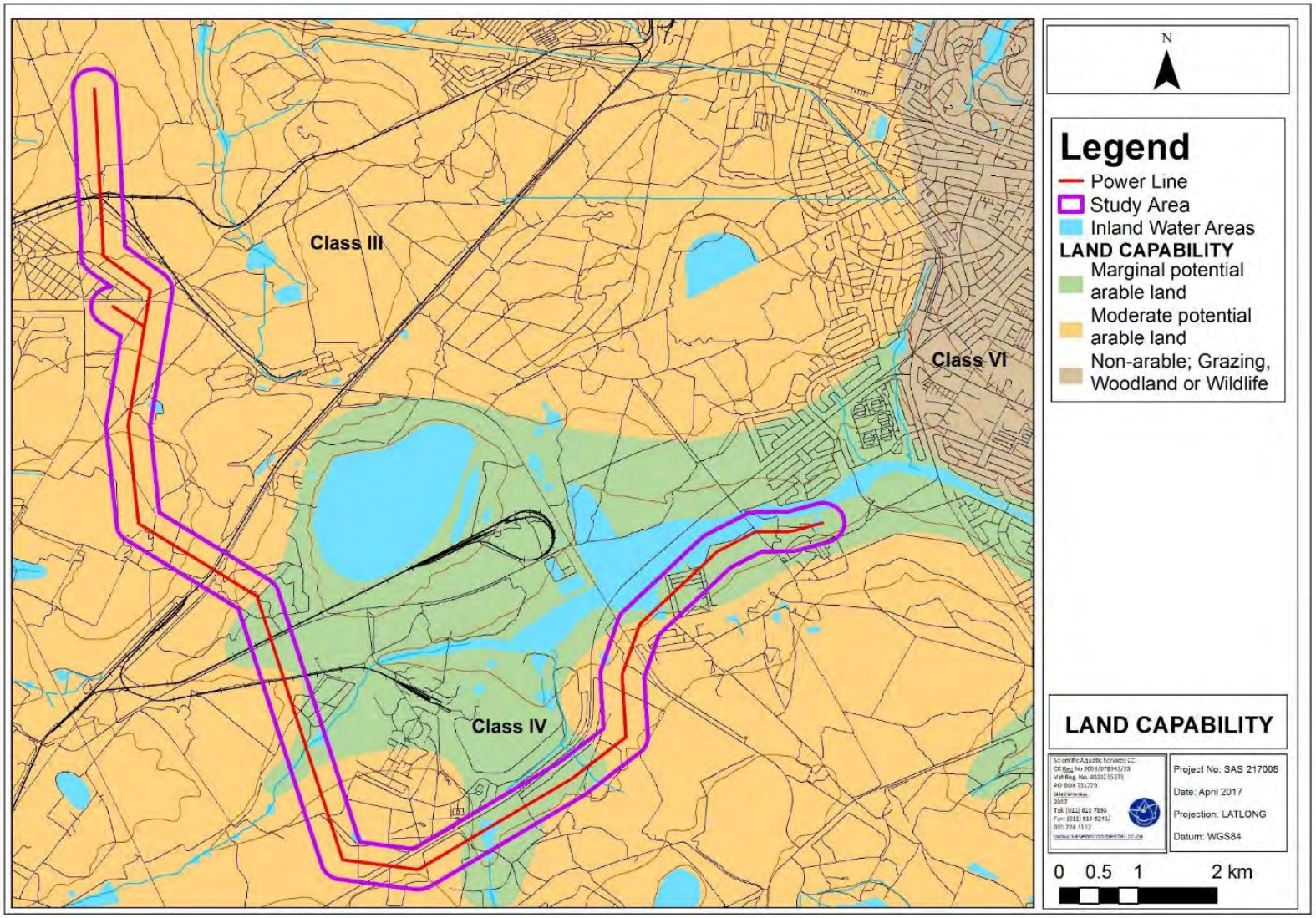


Figure 5-4: Dominant soil types in the vicinity of the study area according to the SOTER database.



srk consulting

RELOCATION OF THREE 400KV POWER LINES
LAND CAPABILITY OF PREVAILING SOILS

Project No. 512575

Figure 5-5: Land capability of the prevailing soils in the vicinity of the study area according to the AGIS database

Current land uses

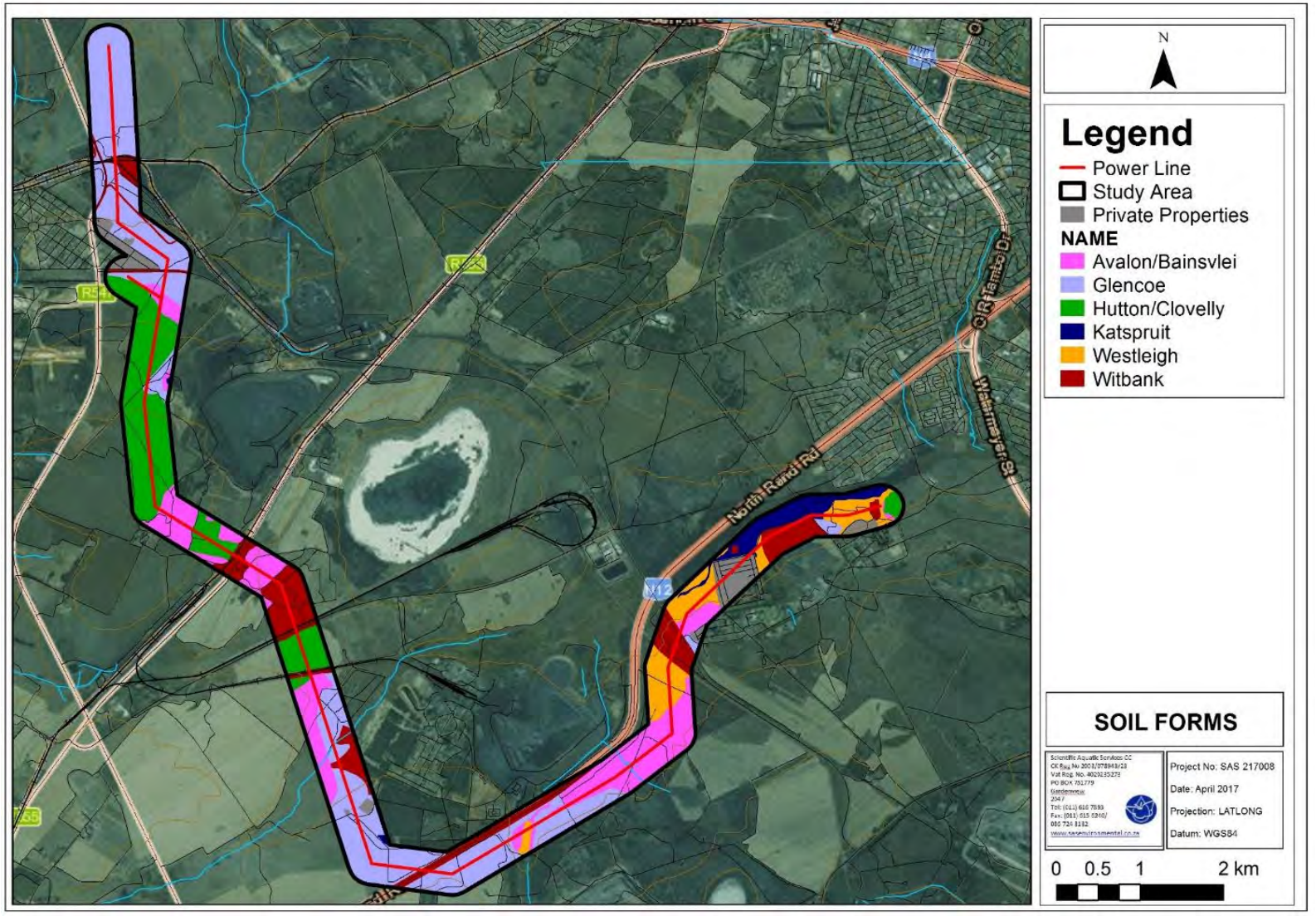
During the site visit it was observed that coal mining is the dominant land use in the vicinity of the study area, with limited cultivation and livestock grazing under current conditions. Maize is the only arable crop observed during the survey. The remainder of the study area comprises of rehabilitated mining areas and developed industrial and/or residential properties, as depicted in Figure 5-6 below.

srk consulting	**RELOCATION OF THREE 400KV POWER LINES** VIEW OF IDENTIFIED LAND USE ACTIVITIES	Project No. 512575

Figure 5-6: View of the identified land use activities in the vicinity of the study area

Dominant soil types

The proposed power line development area traverses through a plinthic catena; with the Glencoe soil form identified as the dominant soil type, comprising approximately 38% of the proposed study area. The remainder of the study area comprises of Hutton/Clovelly identified on gently sloping and higher landscape positions, Avalon/Bainsvlei, Westleigh, and Katspruit soil forms on depressed and/or valley bottom position. Extensively disturbed soils with no recognizable diagnostic soil morphological characteristics were also identified within the surveyed area; these soils were classified as the Witbank soil form, corresponds to anthrosols in the international soil classification terminology. The spatial distribution of all identified soil forms within the study area is presented in a soil map in Figure 5-7 below



srk consulting

RELOCATION OF THREE 400KV POWER LINES
LAND CAPABILITY OF PREVAILING SOILS

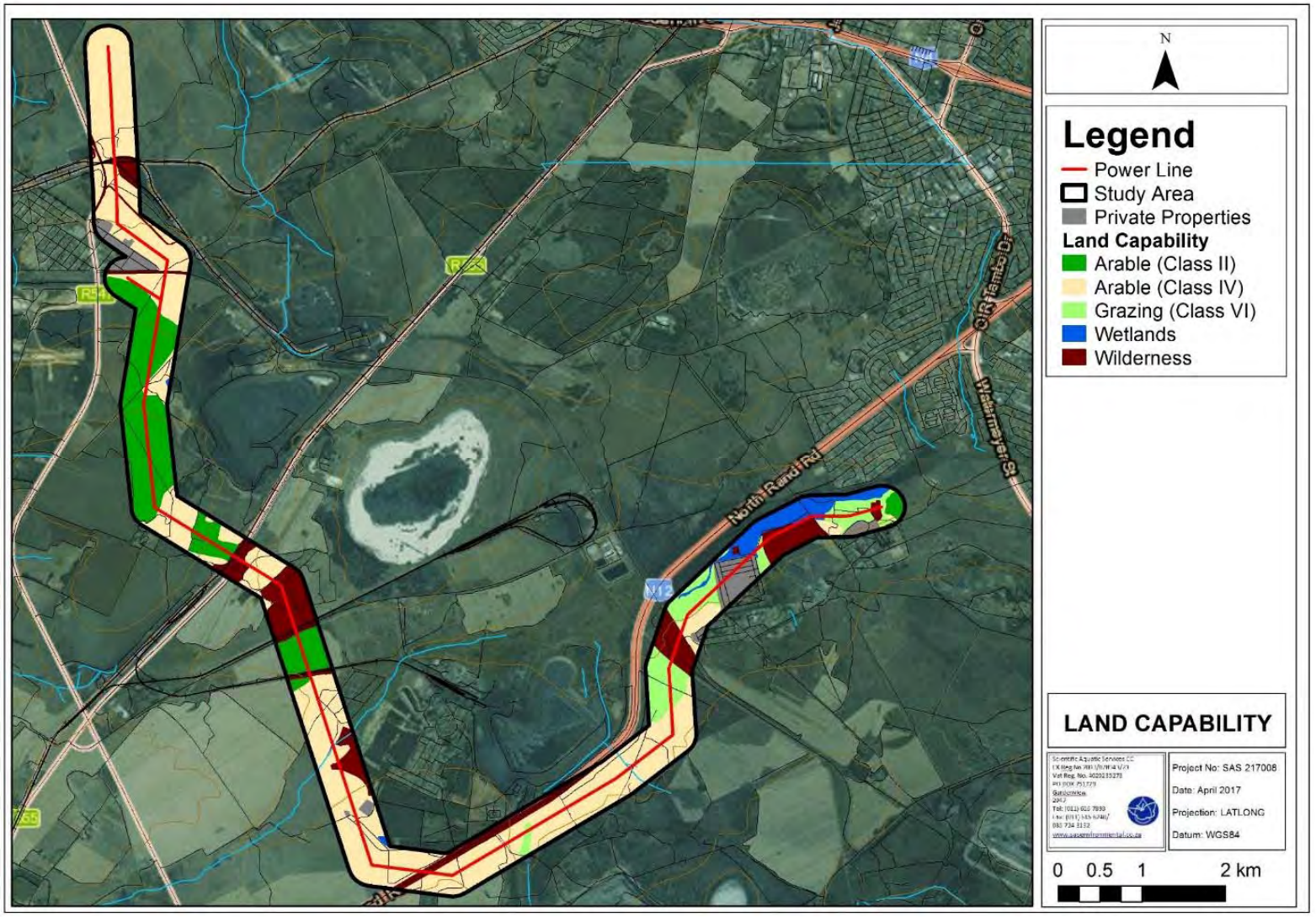
Project No. 512575

Figure 5-7: Soil map depicting identified soil forms within the study area

Land capability

In South Africa, agricultural land capability is generally restricted by climatic conditions, particularly water availability. However, even within similar climatic zones, different soil types typically have different land use capabilities attributed to their inherent characteristics. High potential agricultural land is defined as having the soil and terrain quality, growing season and adequate available moisture supply needed to produce sustained economically high crops yields when treated and managed according to best possible farming practices (Scotney et al., 1987). For the purpose of this assessment, land capability was inferred in consideration of observed limitations to land use due to physical soil properties and prevailing climatic conditions. Climate Capability (measured on a scale of 1 to 8) was therefore considered in the agricultural potential classification. The study area falls into Climate Capability Class 4 at best, with a moderately restricted growing season for arable crops.

The identified soils were classified into five land capability classes within the study area, as presented in Figure 5-8 below. The identified land capability limitations for the identified soils are discussed in comprehensive “dashboard style” summary tables presented in Table 5-1 to Table 5-5 below.



srk consulting

RELOCATION OF THREE 400KV POWER LINES
LAND CAPABILITY MAP DEPICTING LAND CAPABILITY CLASSIFICATION

Project No. 512575

Figure 5-8: Land capability map depicting land capability classification within the study area

Table 5-1: Summary discussion of the Arable (Class II) land capability class

<table>
<tr><th colspan="4">Land Capability: Arable - Class II</th></tr>
<tr><td colspan="2"> 
View of the gently sloping terrain where Hutton / Clovelly soil forms were identified</td><td colspan="2">  </td></tr>
<tr><td>Terrain Morphological Unit (TMU)</td><td>Gently sloping landscape positions < 1 % slope gradient</td><td>Photograph notes</td><td>View of the identified Clovelly and Hutton soil forms</td></tr>
<tr><td>Soil Form(s)</td><td>Hutton / Clovelly</td><td>Areal Extent</td><td>164.9 ha; which constitutes ≈16.7% of the surveyed area</td></tr>
<tr><td>Diagnostic Horizon Sequence</td><td>0 - 28 cm: Orthic A
28 - 100cm: Yellow-brown apedal B / Red apedal B
> 100 cm: Red apedal B/ Unspecified</td><td rowspan="2">Land Capability</td><td rowspan="2">The identified Hutton and Clovelly soil forms are considered to be prime agricultural soils of high (class II) land capability, suitable to arable agricultural land use. Therefore, these soils are considered to contribute significantly to provincial and/or national agricultural productivity if used for crop cultivation, and are essentially also well-suited for other less intensive land uses such as grazing, forestry, etc. However, emphasis is directed to their agricultural crop productivity due to the scarcity of such soil resources on a national scale and food security concerns.</td></tr>
<tr><td>Physical Limitations</td><td>None; these soils have sufficient depth (more than one metre) for most cultivated crops and good drainage characteristics. These soils are inherently ideal for crop cultivation.</td></tr>
</table>

Table 5-2: Summary discussion of the Arable (Class IV) land capability class

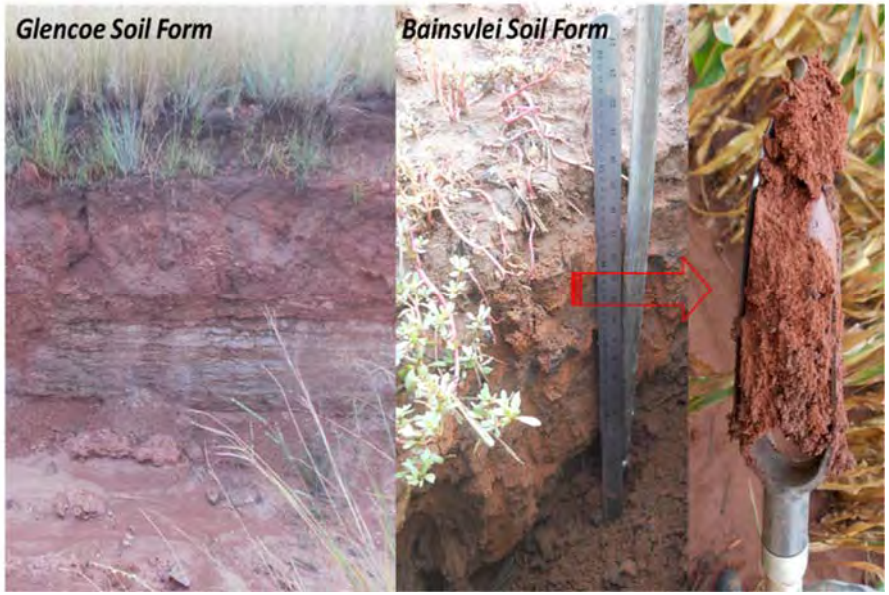
<table>
<tr><th colspan="4">Land Capability: Arable - Class IV</th></tr>
<tr><td colspan="2"> 
View of the gently sloping terrain where Hutton / Clovelly soil forms were identified</td><td colspan="2">  </td></tr>
<tr><td>Terrain Morphological Unit (TMU)</td><td>Relatively flat to gently sloping land of <0.5% slope</td><td>Photograph notes</td><td>View of the identified Glencoe and Bainsvlei/Avalon soil forms</td></tr>
<tr><td>Soil Form(s)</td><td>Glencoe and Bainsvlei/Avalon</td><td>Areal Extent</td><td>187.5 ha; which constitutes 53.5% of the surveyed area</td></tr>
<tr><td>Diagnostic Horizon Sequence</td><td>0 -12 cm: Orthic A
12 - 56 cm: Red/ yellow-brown/ red apedal B
≥ 56 cm: Hard plinthite/ soft plinthic B/ Unconsolidated materials without signs of wetness</td><td rowspan="2">Land Capability</td><td rowspan="2">The identified Glencoe and Bainsvlei/Avalon soil forms are considered to be of moderate (class IV) land capability, and are marginally suitable for arable agricultural land use. Therefore, these soils are considered to make a moderate contribution to agricultural productivity on a regional and national scale.</td></tr>
<tr><td>Physical Limitations</td><td>The occurrence an indurated bedrock layer at relatively shallow depth is the primary land capability limitation of the Glencoe soil form as this horizon cannot be cut with a spade even when wet. Whereas, seasonal waterlogging is the main limitation for the Bainsvlei/Avalon soil forms.</td></tr>
</table>

Table 5-3: Summary discussion of the Grazing (Class VI) land capability class

<table>
<tr><th colspan="4">Land Capability: Grazing - Class IV</th></tr>
<tr><td colspan="2"> 
View of the wetland areas where the Westleigh soil forms were identified</td><td colspan="2">  </td></tr>
<tr><td>Terrain Morphological Unit (TMU)</td><td>Valley bottoms and gently sloping landscapes</td><td>Photograph notes</td><td>View of the identified Westleigh soil form</td></tr>
<tr><td>Soil Form(s)</td><td>Westleigh</td><td>Areal Extent</td><td>70.1 ha; which constitutes 7.1% of the surveyed area</td></tr>
<tr><td>Diagnostic Horizon Sequence</td><td>0-8 cm: Orthic A
≥ 8 cm: Soft plinthic B horizon</td><td rowspan="2">Land Capability</td><td rowspan="2">The identified Westleigh soil forms were classified as class VI land capability due to land use limitations related to prolonged waterlogging attributed to inherently poor internal drainage of the soft plinthite layer encountered at extremely shallow depth. The prolonged waterlogging of these soils limits their land use largely to wetland habitats for various wetland plant species that are inherently tolerant and/or obligate to anoxic conditions. These soils are therefore not considered to contribute significantly to provincial and/or national agricultural productivity.</td></tr>
<tr><td>Physical Limitations</td><td>Plant roots development and water infiltration are largely impeded by the clayey, slowly permeable soft plinthite and/or G horizon occurring at extremely shallow depths of less than 10 cm. Prolonged saturation of these soils are likely to create anoxic (oxygen deficiency) conditions which hamper root development of most arable crops.</td></tr>
</table>

Table 5-4: Summary discussion of the Wetlands (Class VIII) land capability class

Land Capability: Wetlands - Class VIII			
 View of the valley bottom wetland (circled) where Katspruit soil forms were encountered			
Terrain Morphological Unit (TMU)	Valley bottoms and gently sloping landscapes of < 0.5% slope gradient	**Photograph notes**	View of the identified Katspruit soil forms
Soil Form(s)	Katspruit	**Areal Extent**	39.5 ha; which constitutes 4.0% of the surveyed area
Diagnostic Horizon Sequence	0 - 6 cm: Orthic ≥ 6 cm: G horizon	**Land Capability**	The Katspruit soil forms were classified as class VIII land capability due to land use limitations related to prolonged waterlogging attributed to inherently poor internal drainage of the G-horizon encountered at extremely shallow depth. The prolonged waterlogging of these soils limits their land use largely to wetland habitats for various wetland plant species that are inherently tolerant and/or obligate to anoxic conditions. These soils are therefore not considered to contribute significantly to provincial and/or national agricultural productivity.
Physical Limitations	Plant root development and water infiltration are largely impeded by the clayey, slowly permeable soft plinthite and/or G horizon occurring at extremely shallow depths of less than 15 cm. Prolonged saturation of these soils are typically induce anoxic (oxygen deficiency) conditions which hamper root development of most arable crops.		

Table 5-5: Summary discussion of the Wilderness (Class VIII) land capability class

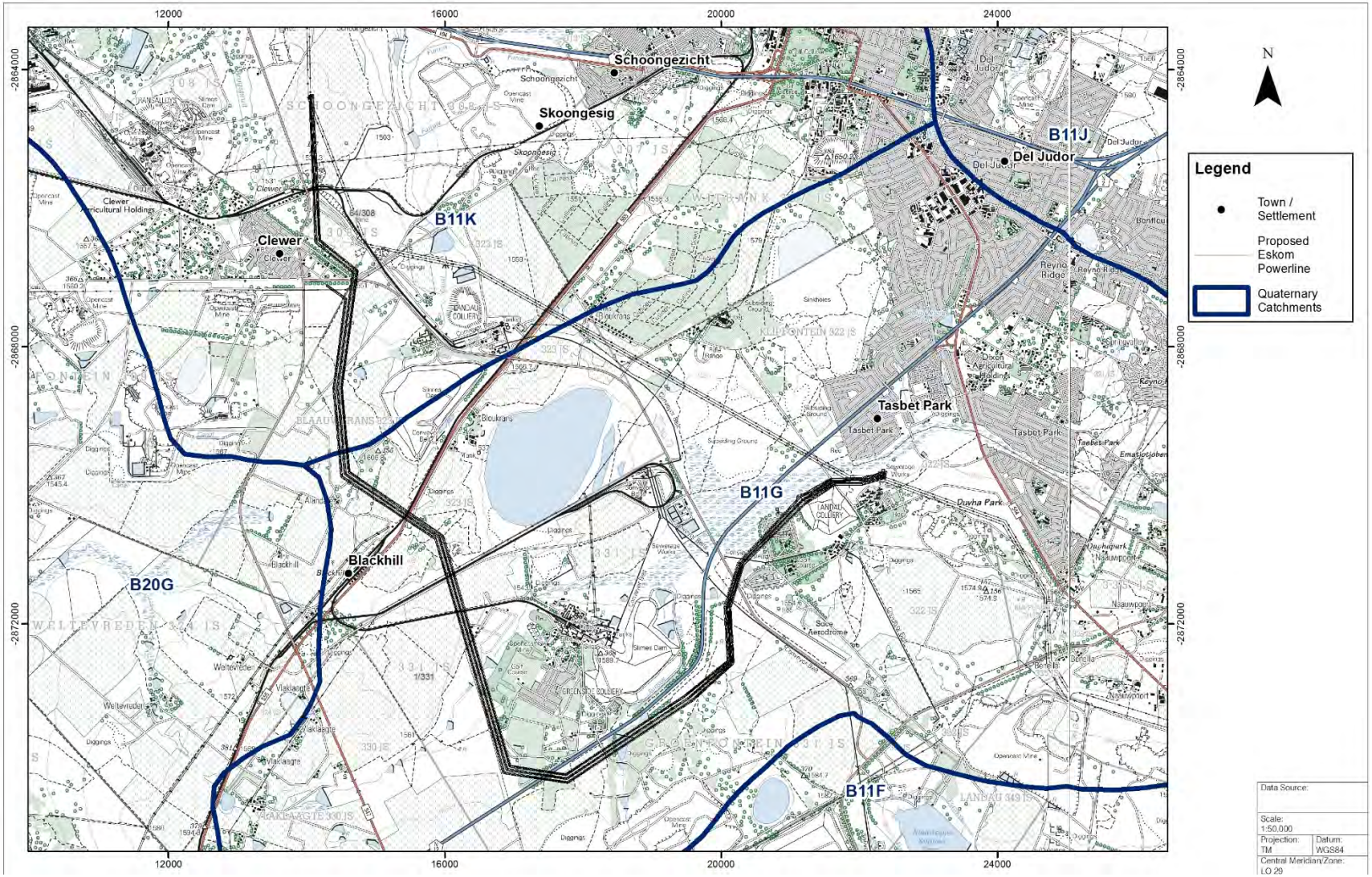
<table>
<tr><th colspan="4">Land Capability: Wilderness - Class VIII</th></tr>
<tr><td colspan="2"> 
View of the highly disturbed and developed/infrastructure areas classified as the Witbank soil form</td><td colspan="2">  </td></tr>
<tr><td>Terrain Morphological Unit (TMU)</td><td>Not applicable; highly disturbed areas</td><td>Photograph notes</td><td>View of the identified Witbank soil forms</td></tr>
<tr><td>Soil Form(s)</td><td>Witbank (Anthrosols)</td><td>Areal Extent</td><td>132 ha; which constitutes 13.4% of the study area</td></tr>
<tr><td>Diagnostic Horizon Sequence</td><td>Not applicable; highly disturbed soils</td><td rowspan="2">Land Capability</td><td rowspan="2">These identified Witbank soils have very poor (class VIII) land capability attributed to the potential toxicity from historic and on-going coal mining activities in the vicinity of the proposed power line servitude. This land capability class also includes area where the original soil has been buried and/or extensively modified by anthropogenic activities. These soils are therefore not considered to make a significant contribution to agricultural productivity even on a local scale.</td></tr>
<tr><td>Physical Limitations</td><td>Comprises of extensively disturbed areas due from anthropogenic activities to an extent that no recognisable diagnostic soil horizon properties could be identified. These soils mainly included the opencast mining areas, as observed during the site assessment. These soils entail various limitations, primarily the absence of soil as a growth medium for arable agriculture.</td></tr>
</table>

5.1.5 Surface water

The study area is located within the Olifants River Catchment (Primary Catchment B). The main tributary is the Naauwpoortspruit (Noupoort), which discharges directly into the upper reaches of the Witbank Dam.

The proposed project falls within the quaternary catchment B11G and B11K in WMA 4 (Olifants River Management Area). Quaternary catchment B11G is drained by the Olifants River and its tributary the Naauwpoortspruit and quaternary catchment B11K is drained by the Klipsruit and its tributaries. The origin of the Naauwpoortspruit is about 2 km west of the Landau 3 MRD. The Naauwpoortspruit flows into the eMalahleni Dam some 15 km east of the site. Refer to Figure 5-9 for the position of the study area in relation to the affected quaternary catchments.

The catchment has been extensively modified due to historic and current mining activities and also has a large pan that greatly reduces the catchment area. Although the construction site does not cross the river, the catchment area was identified as a point opposite the dump and was delineated on 1:50 000 topographical maps. A number of smaller farm dams were observed in the catchment but it is not expected that these will have a significant influence on the hydrology.



srk consulting

RELOCATION OF THREE 400KV POWER LINES
POSITION OF THE STUDY AREA IN RELATION TO THE AFFECTED QUATERNARY CATCHMENTS

Project No. 512575

Figure 5-9: Position of the study area in relation to the affected quaternary catchments

5.1.6 Groundwater

The information contained in this section of the document is contained in the report titled: Landau Colliery: Navigation Section Umlalazi South Block Extension, Geohydrological Investigation as input to the EMP" dated June 2014 and compiled by Shangoni AquiScience (AquiScience, 2014).

A hydrocensus of boreholes on and surrounding area was conducted in 2013, during which all private groundwater users were surveyed within a 1 km radius. During the hydrocensus, all available details of boreholes and borehole-owners were collected (AquiSceince, 2014). This information was used to identify the Interested and Affected Parties which may be impacted upon by the mining activities, specifically relating to impacts on water quantity and quality. The hydrocensus boreholes were subjected to water level measurements including chemical analysis to evaluate the chemical characteristics of the groundwater and to establish baseline data prior to commencement with mining activities. Monitoring borehole information was also supplied by Landau Colliery: Navigation Section. The major groundwater impacts expected to occur arising from the proposed mining activities at the South Block Extension area are related to quality and quantity (aquifer depletion). Prior to any commencement of mining activity, water quality and quantity measurements are recorded that should be used as baselines to monitor any changes over the mining period. The majority of the surface area has already been disturbed by either opencast or underground coal mining activities, contributes to this relatively poor distribution. The majority of boreholes are not in use, while the rest are mainly used for domestic purposes and irrigation/livestock watering.

The National Aquifer Classification System developed by Parson (1995) is used to classify South African Aquifers. The South African Aquifer System Management Classification is presented by five (5) major classes, and include:

- Sole Source Aquifer System
- Major Aquifer System
- Minor Aquifer System
- Non-Aquifer System
- Special Aquifer System.

According to the regional aquifer classification map of South Africa, the surrounding Karoo aquifer has been identified as a minor aquifer. Drill logs indicate that the study area is underlain by three types of aquifers. Based on the underlying geohydrology of the project area the aquifers can classified according to Parsons and system as follows:

- Shallow weathered/perched unconfined aquifer
- Non-aquifer
- Fractured confined or semi-confined aquifer in the Vryheid Formation
- Minor aquifer
- Pre-Karoo aquifer
- Non-aquifer.

The baseline groundwater levels ranged between 1.18 mbgl and 2.85 mbgl with an average 2.29 mbgl. The quality can be described as neutral, non-saline and soft to moderately hard with low to medium levels of nutrients (NO3 and NH4) within acceptable drinking water standards as proposed by the SANS (SANS 241: 2011) and the DWS (DWAF, 1998).

5.1.7 Air quality

Key sources of particulate pollution are likely to be mining and industrial operations. Sources north-west of the project area are dominant contributors of pollution in the study area, based on available meteorological data. Although apportionment of dust deposition to mining and transport sources close

to the site was without reasonable doubt, the sources of suspended particulate matter may have extended further than the immediate industrial and mining operations, up to a distance of 10 km.

5.1.8 Biodiversity

A site visit was undertaken during March 2017 in order to confirm the assumptions made during consultation of the maps and to determine the ecological status of the power line development. A thorough 'walk through' on foot was undertaken in order to identify the occurrence of the dominant floral species and habitat diversities (**Appendix D 2** for Biodiversity Eco Scan specialist report).

Conservation characteristics of the power line development

Table 5-6 contain data accessed as part of the desktop assessment. It is important to note, that although all data sources used provide useful and often verifiable high quality data, the various databases do not always provide an entirely accurate indication of the power line development's actual biodiversity characteristics.

Table 5-6: Summary of the conservation characteristics associated with the power line development.

Details of the power line development in terms of Mucina & Rutherford (2006)		**Description of the vegetation type(s) relevant to the power line development (Mucina & Rutherford 2006)**	
Biome	The biome associated with the power line development is the **Grassland Biome**	**Vegetation Type**	Eastern Highveld Grassland
		Climate	Strongly seasonal summer rainfall, with very dry winters.
Bioregion	The power line development is located within the **Mesic Highveld Grassland Bioregion**.	**Altitude (m)**	1520 - 1780
		MAP* (mm)	726
Vegetation Type	The power line development is located within the **Eastern Highveld Grassland** Vegetation type.	**MAT* (°C)**	14.7
		MFD* (Days)	32
Conservation details pertaining to the power line development (Various databases)		**MAPE* (mm)**	1926
NBA (2011)	The power line development is located within an area that is currently **not protected.**	**MASMS* (%)**	73
		Distribution	Mpumalanga and Gauteng Provinces
National Threatened Ecosystems (2011)	Various sections of the power line development is situated within a **Vulnerable** Ecosystem, namely the **Eastern Highveld Grassland** (Figure 5-10).	**Geology & Soils**	The area is characterised by red to yellow sandy soils of Ba and Bb land types found on shales and sandstones of Madzaringwe formation (Karoo Supergroup).
SAPAD (2017) & SACAD (2017)	The central portion of the power line development traverses the **John Cairns Private Nature Reserve**, while the Witbank Nature Reserve is located ± 7.4 km northeast (Figure 5-11). No conservation area is located within 20 km of the power line development.	**Conservation**	Endangered. Target 24%. Only a very small fraction is conserved in statutory.
NPAES (2009)	No formally or informally protected or focus areas within the immediate vicinity (within 5km) of the power line development, nor the power line servitude. The Witbank Nature Reserve is located ± 7.4 km northeast of the power line development.	**Vegetation & landscape features (Dominant Floral Taxa**	Slightly too moderately undulating plains including some low hills and pan depressions. The vegetation is short dense grassland dominated by the usual Highveld grass composition (*Aristida, Digitaria, Eragrostis, Themeda, Tristachya* etc.) with small, scattered rocky outcrops with wiry, sour grasses and some woody species (*Senegalia caffra, Celtis Africana, Diospyros lyciodes subsp lyciodes, Parinari capensis, Protea caffra, P. welwitschii* and *Searcia magalismontanum*).
IBA (2015)	The power line development is not located within or near (10 km) of an IBA.		
Importance of the study area according to the Mining and Biodiversity Guidelines (2013) (Figure 5-12)			
Highest Biodiversity Importance	Various areas associated with the power line development are considered to be of Highest Biodiversity Importance. Highest Biodiversity Importance areas include areas where mining is not legally prohibited, but where there is a very high risk	**Moderate Biodiversity Importance**	The majority of the power line development, particularly in the southern portion falls within an area considered to be of Moderate Biodiversity Importance. These areas are of moderate biodiversity value and therefore pose a moderate risk to mining. EIAs and associated specialist studies should

Details of the power line development in terms of Mucina & Rutherford (2006)		Description of the vegetation type(s) relevant to the power line development (Mucina & Rutherford 2006)	
	that due to their potential biodiversity significance and importance to ecosystem services (e.g. water flow regulation and water provisioning) that mining projects will be significantly constrained or may not receive necessary authorisations.		focus on confirming the presence and significance of these biodiversity features, identifying features (e.g. threatened species) not included in the existing datasets, and on providing site-specific information to guide the application of the mitigation hierarchy. Authorisations may set limits and specify biodiversity offsets that would be written into licence agreements and/or authorisations.
Detail of the power line development in terms of the Mpumalanga Biodiversity Sector Plan (MBSP, 2014) (Figure 5-13)			
Protected Areas: National Parks & Nature Reserves	The central portion of the power line development is associated with a Protected Area, namely the John Cairns Private Nature Reserve. These include formally proclaimed National Parks, Nature Reserves, Special Nature Reserve, and Forest Nature Reserves. Figure 5-14 indicates this nature reserve and its associated ESA Protected Area Buffer, important to moderate the impacts of undesirable land-uses that may affect the ecological functioning or tourism potential of PAs.	**Critical Biodiversity Area (CBA) Irreplaceable**	Both ends of the power line development traverse CBA irreplaceable areas. These are areas required to meet targets and with irreplaceability values of more than 80%; Critical linkages or pinch-points in the landscape that must remain natural, and Critically Endangered Ecosystems
CBA Optimal	Various areas of the power line development are associated or traverses a CBA Optimal area. These are areas optimally located to meet both the various biodiversity targets and other criteria defined in the analysis. Although these areas are not 'irreplaceable' they are the most efficient land configuration to meet all biodiversity targets and design criteria.	**Other Natural Areas**	A section of the southern portion of the power line development as well as a small area within the northern section are considered as other natural areas. These are areas that have not been identified as priority in the current systematic biodiversity plan but retain most of their natural character and perform a range of biodiversity and ecological infrastructural functions
Moderately modified – Old Lands	Various areas of the power line development are considered to be moderately modified old lands. These are old cultivated lands that have been allowed to recover (within the last 80 years), and support some natural vegetation. Although biodiversity pattern and ecological functioning may have been compromised, the areas may still play a role in supporting biodiversity and providing ecosystem services	**Heavily modified**	The majority of the northern portion of the power line development, as well as some areas in the southern portion is considered to be heavily modified. These are areas that are modified to such an extent that any valuable biological and ecological functions have been lost.

NBA= National Biodiversity Assessment; NPAES= National Protected Areas Expansion Strategy; SAPAD= South Africa Protected Areas Database; SACAD = South African Conservation Areas Database; IBA = Important Bird and Biodiversity Area; CBA = Critical Biodiversity Area; MAP – Mean annual precipitation; MAT – Mean annual temperature; MAPE – Mean annual potential evaporation; MFD = Mean Frost Days; MASMS – Mean annual soil moisture stress (% of days when evaporative demand was more than double the soil moisture supply)

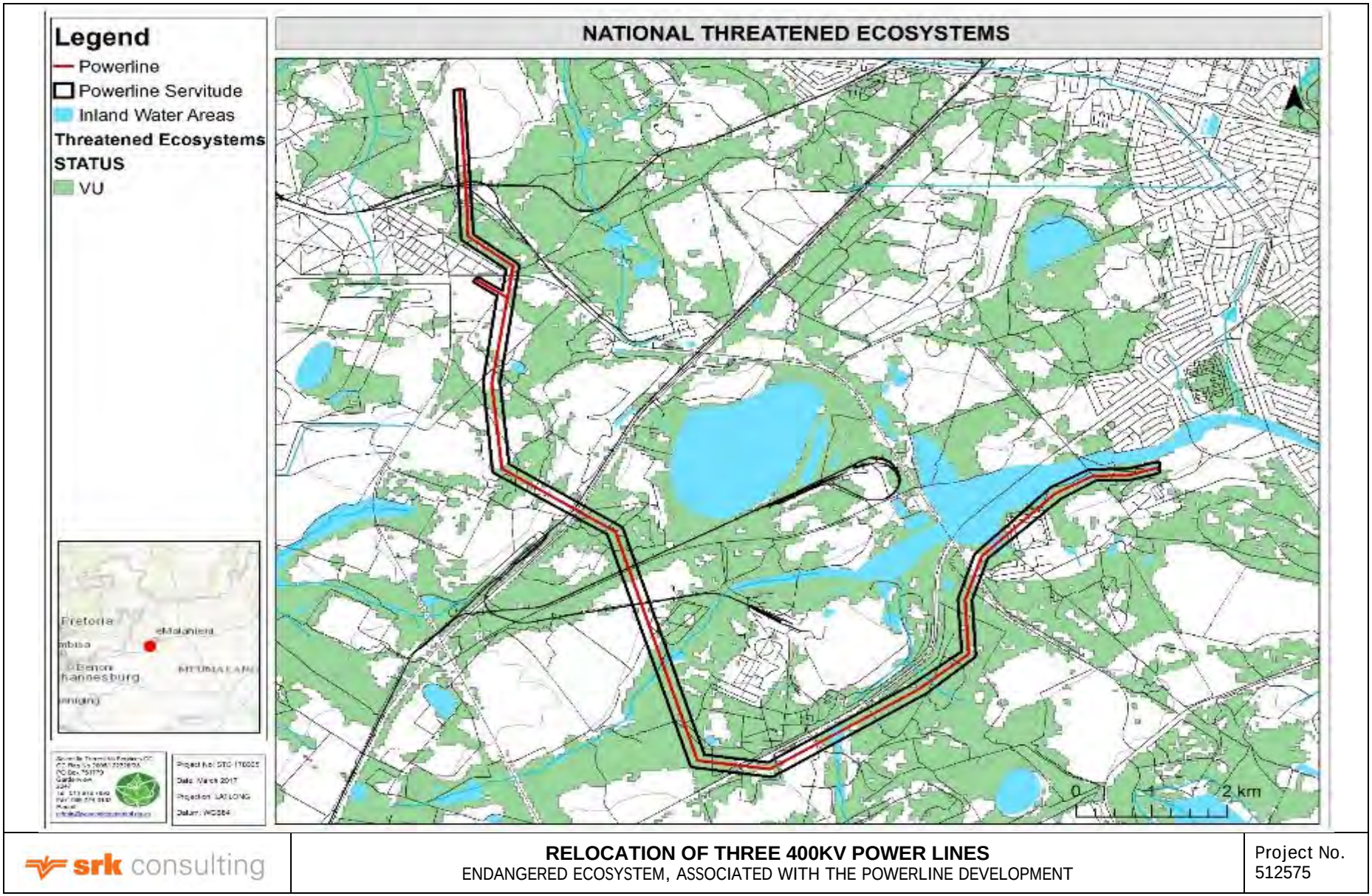


Figure 5-10: Endangered ecosystem, associated with the power line development according to the National Threatened Ecosystem Database (2011)

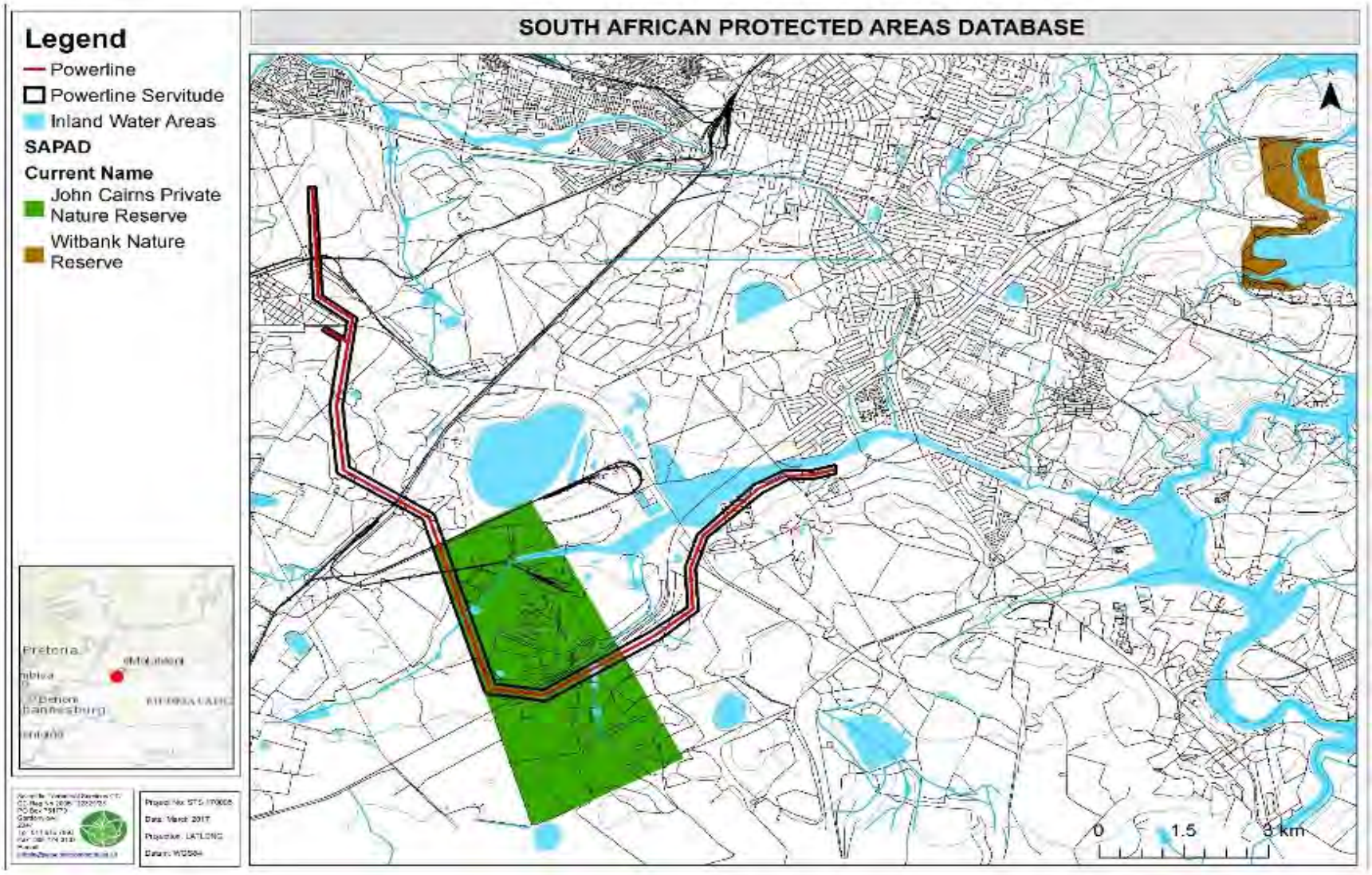


Figure 5-11: The power line development located within the John Cairns Private Nature Reserve according to the SAPAD database (2017).

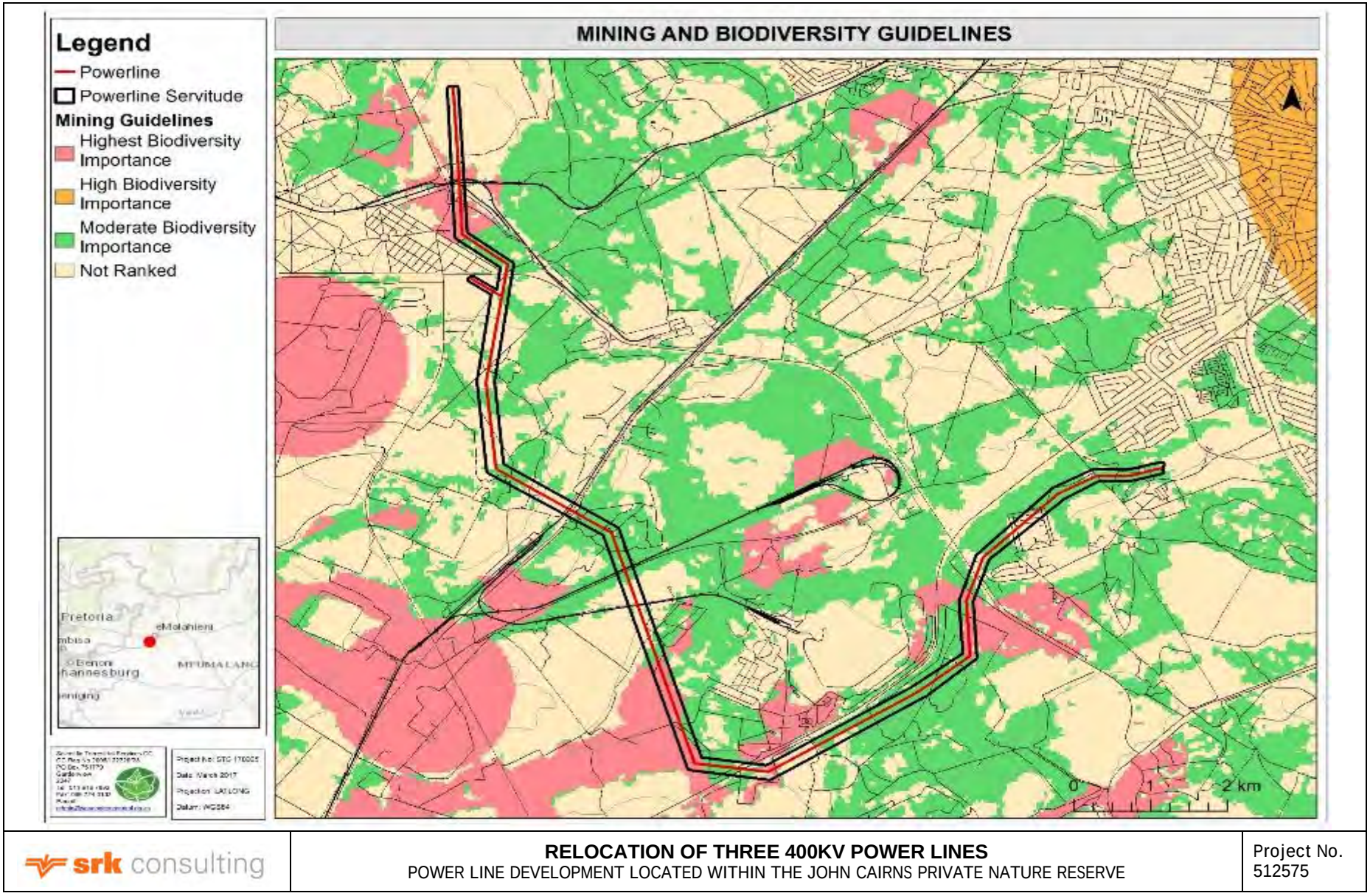


Figure 5-12: Importance of the power line development according to the Mining and Biodiversity Guidelines (2013)

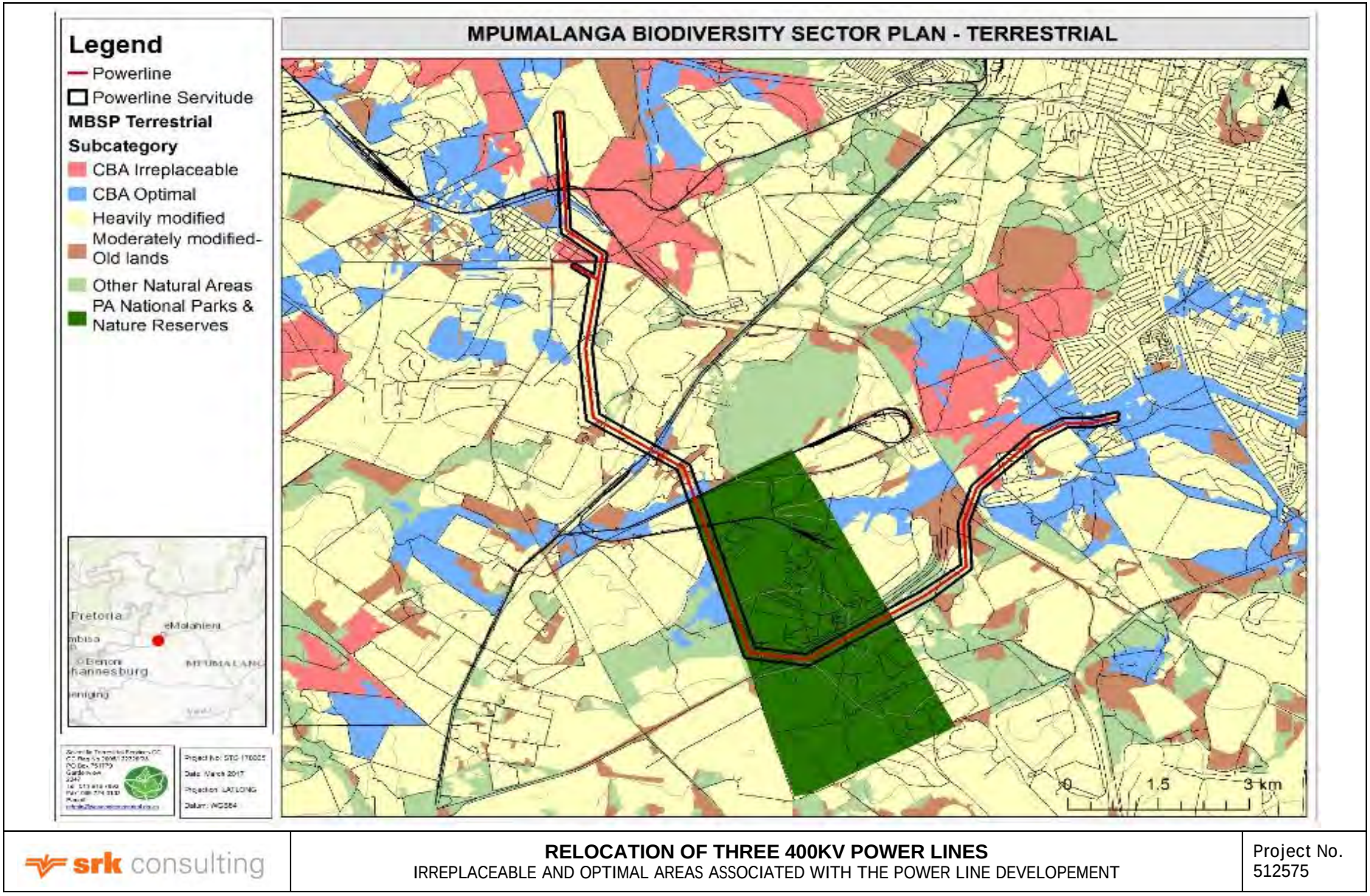
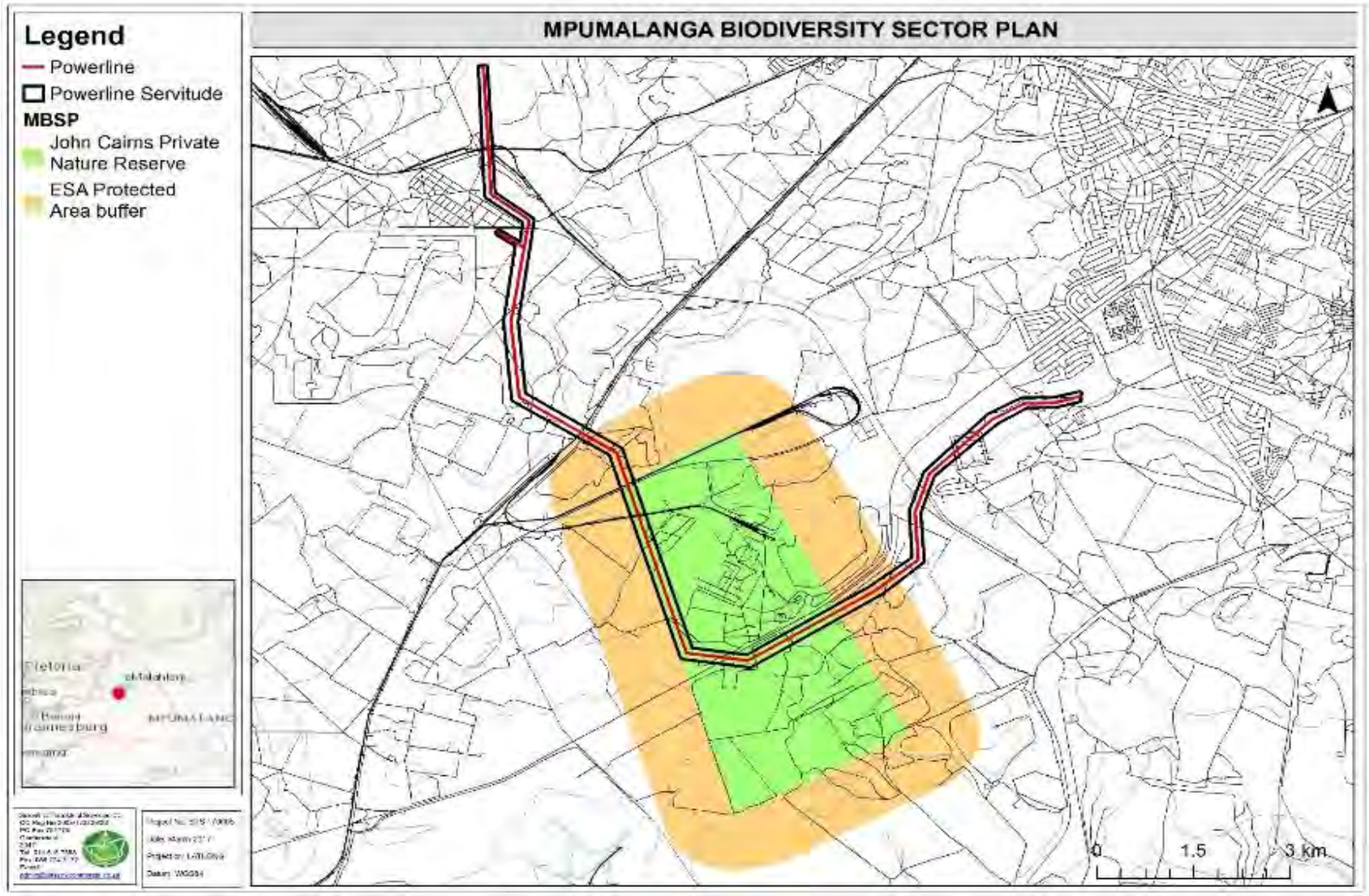


Figure 5-13: CBA Irreplaceable and Optimal areas associated with the power line development according to the MBSP (2014) Terrestrial database



srk consulting

RELOCATION OF THREE 400KV POWER LINES
JOHN CAIRNS PNR AND ASSOCIATED ESA PROTECTED AREA

Project No. 512575

Figure 5-14: The John Cairns PNR and its associated ESA Protected Area Buffer according to the MBSP (2016)

Habitat units

Three habitat units were identified during the assessment of the investigation area, namely Transformed habitat, Degraded Grassland and Wetlands, with the figure below depicting these habitat units in relation to the surrounding area. The Transformed habitat unit is characterised by the extensive loss and transformation of the natural floral habitat as a result of alien floral species proliferation forming dense thickets, crop cultivation and extensive anthropogenic disturbance due to mining. The Degraded Grassland habitat unit is characterised by conditions the where edge effects from agriculture and other activities have led to the transformation of natural grassland habitat to a secondary state of ecological succession. Disturbances to this habitat unit include overgrazing, grass baling, historic farming practices and an altered fire regime. The Wetland Habitat Unit is defined by the presence of vegetation associated with wetlands. The results of the floral ecological scan are presented in the Figure 5-15 and Table 5-7 below.

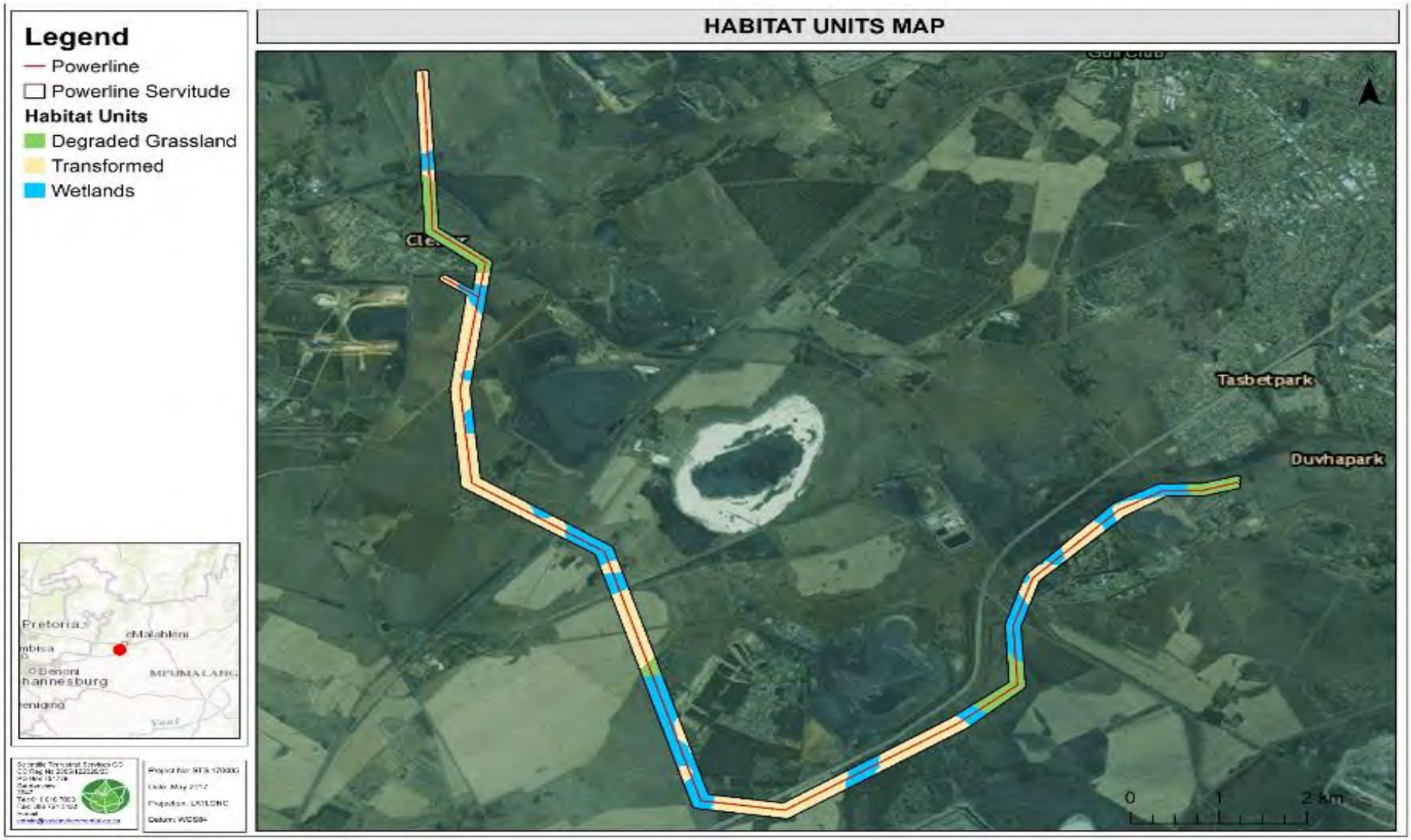
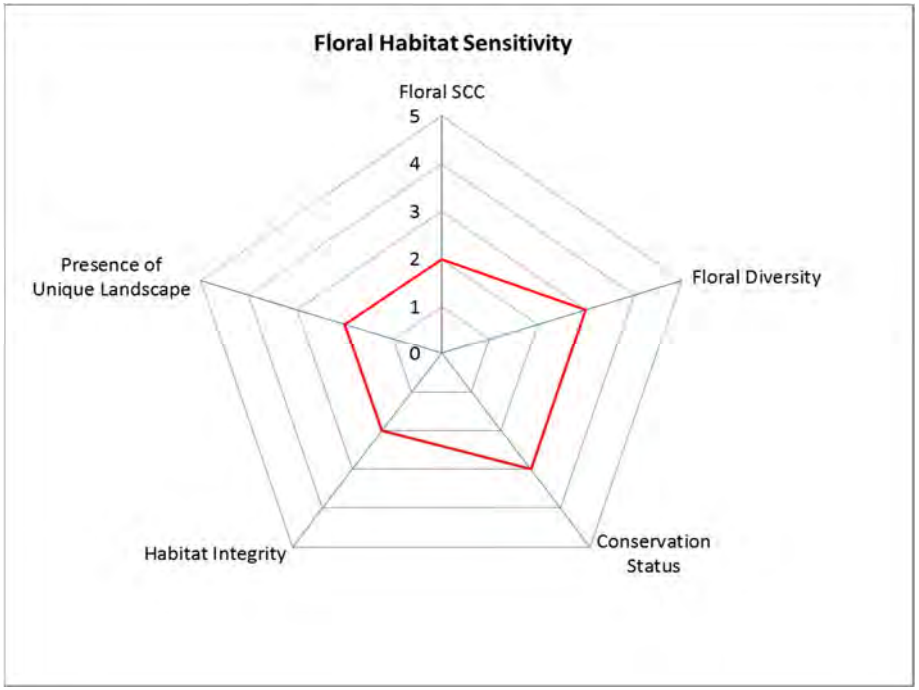


Figure 5-15: Habitat units encountered within the power line development

Table 5-7: Summary of results of the floral habitat units

All habitat units	Floral Habitat Sensitivity	Moderately Low
	Notes on Photograph: Top: Degraded Grassland Habitat; Middle: Transformed Habitat; Bottom: Wetland Habitat.	
Floral Habitat Sensitivity Graph: 		
Floral Species of Conservation Concern (SCC)	One floral SCC, namely *Crinum bulbispermum,* listed as Declining by the IUCN, was encountered in the wetland habitat unit. Furthermore, this species is also protected under the Mpumalanga Nature Conservation Act (MNCA) of 1998. Other species in the family *Orchidiaceae* and *Iridiaceae*, which are also protected provincially may be encountered within the wetlands. Thus, care must be taken during the construction of road crossings that wetland habitat is not unnecessarily disturbed.	

Floral Diversity	Floral diversity was intermediate, with impacts from agricultural activities such as overgrazing and alien and invasive floral infestation, notably by *Acacia mearnsii* (black wattle)*, Eucalyptus camaldulensis* (red river gum), *Centaurea solstitialis* (yellow star thistle) and *Seriphium plumosum* (Bankruptbush) evident. For a complete list of floral species encountered.	General comments: Although none of the habitat units are considered to be particularly sensitive from a floral perspective, the wetlands provide niche habitat for a higher diversity of floral species than surrounding areas and also act as migratory corridors in an area transformed by mining and agriculture. Furthermore, one floral SCC was confirmed and others are likely to be present. Thus, care must be taken to avoid unnecessary disturbances to the wetlands during the construction of the proposed power line development, including the maintenance of the proposed power line and control of alien and invasive plants. .	Business Case, Conclusion and Mitigation Requirements: The investigation area as a whole is if moderately low ecological sensitivity. However, the wetlands are considered to be of intermediate sensitivity. Thus, where the power line will cross any wetland or in close proximity, it must be ensured that crossings do not encroach unnecessarily upon the wetland temporary zone boundary and connectivity upstream and downstream of the crossing must be maintained. Furthermore, where the proposed power line will be constructed, it is important to limit the time of disturbance and limit the construction footprint.
Conservation Status of Vegetation Type/Ecosystem	The vegetation type associated with the investigation area is listed as Vulnerable (Eastern Highveld Grassland) (Mucina & Rutherford 2006). However, due to impacts discussed above, the vegetation composition is only moderately representative of the vegetation type.		
Habitat integrity/Alien and Invasive species	Habitat has been modified by mining activities, existing roads, livestock grazing, agricultural activities and invasion by indigenous species such as *Seriphium plumosum.* Stands of alien invaders such as *Acacia mearnsii* were also encountered.		
Presence of Unique Landscapes	The homogenous landscape in which the investigation area is situated is not considered to be particularly unique and is well represented regionally.		

Floral species of conservation concern (SCC) assessment

An assessment considering the presence of any plant species of concern, as well as suitable habitat to support any such species was undertaken. The complete SANBI PRECIS Red Data Listed plants was acquired for the Quarter Degree Square (QDS) 2529CC, 2529CD and 2629AA. Threatened species are species that are facing a high risk of extinction. Any species classified in the IUCN categories Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) is a threatened species. SCC are species that have a high conservation importance in terms of preserving South Africa's high floristic diversity and include not only threatened species, but also those classified in the categories Extinct in the Wild (EW), Regionally Extinct (RE), Near Threatened (NT), Critically Rare, Rare and Declining.

From the assessment, it is clear that only one of the species listed for the QDS, namely Crinum bulbispermum is likely to occur and was confirmed during the assessment within the wetland habitat unit (refer to Figure 16 for localities of the wetlands). This species is listed as 'Declining' by the IUCN and protected by the MNCA (1998). If individuals or communities of this species will be disturbed by construction activities, they must be relocated to suitable, similar habitat in close proximity to where they were removed from, but outside the disturbance footprint after obtaining the relevant permits from the Mpumalanga Tourism and Parks Agency (MTPA). This rescue and relocation plan must be implemented by a suitably qualified ecologist in the correct flowering season for the abovementioned species after obtaining the relevant permits from the MTPA (Table 5-8).

Habitat description

After the field assessment, it is evident that three faunal habitat units exist within the proposed power line development area, and are briefly discussed below.

Degraded grassland habitat

This habitat unit forms a large part of the proposed power line development area, and provides habitat to a number of common faunal species. Excessive burning of the veld, overgrazing, trampling and alien plant proliferation in areas has resulted in the disturbance of this habitat unit, lowering its potential to provide habitat to faunal species.

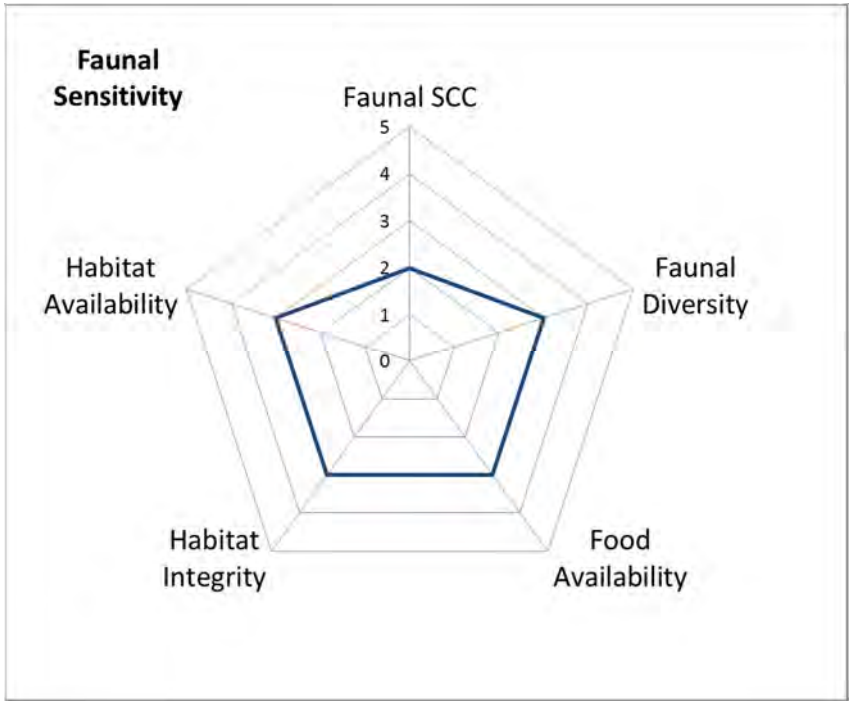
Wetland habitat unit

This habitat unit is located throughout the proposed power line development area. Common faunal species, especially avifaunal species use this habitat unit for breeding purposes. The wetland habitat unit has been moderately to severely modified, but still remains functional and capable of supporting faunal species that will utilise the area for breeding and foraging purposes.

Transformed habitat unit

This habitat unit is characterised by existing disturbances in the form of mine residue dumps, roads and crop fields. The result of these impacts is that natural habitat has been completely transformed. Common faunal species that can adapt to anthropogenic habitat will utilise this habitat unit.

Table 5-8: Summary of results of the faunal assessment

Faunal Class: All classes	Faunal Habitat Sensitivity	Intermediate
	Notes on Photograph: Top: *Raphicerus campestris* (Steenbok) spoor. Bottom: *Canis mesomelas* (Blackbacked Jackal) spoor.	
Faunal Sensitivity Graph: 		
Faunal SCC/Endemics/TOPS/	No faunal SCC were encountered during the field assessment. The potential for other avifaunal SCC to be present in the study area is high because of habitat and food availability. *Circus ranivorus (African Marsh Harrier)* and *Sagittarius serpentarius* (Secretarybird) are likely to utilise the crop fields for foraging purposes. *F. naumanni* will also use power lines in close proximity to the wetlands and crop fields to perch and hunt from. *Phoenicopterus minor* (Lesser Flamingo) *and Phoenicopterus ruber* (Greater Flamingo) have the potential to utilise the area as a migratory route. *Sagittarius serpentarius* (Secretarybird), *Leptailurus serval* (Serval) and *Pyxicephalus adspersus* (Giant Bullfrog) have been observed within the surrounding area (De Castro & Brits, 2015)	

Faunal Diversity	The faunal diversity within the proposed power line development was intermediate and comprised mainly of avifaunal and invertebrate species. A number of common faunal species encountered during the field assessment include *Belenois aurota (Brown-veined White)* as well as avifaunal species such as *Streptopelia capicola* (Cape turtle dove), *Bubulcus ibis* (Cattle Egret), *Corvus albus* (Pied Crow), *Lanius collaris* (Common Fiscal), *Ardea melanocephala (*Black-headed Heron) and *Acridotheres tristis* (Indian Myna).	General comments (dominant faunal species/noteworthy records etc.): The power line development does not fall within any IBA and as a result of historic and ongoing anthropogenic activities within the study area, it has a low probability of supporting avifaunal SCC, with the exception of *Sagittarius serpentarius* (Secretarybird), which was observed during the field assessment (De Castro & Brits, 2009). The wetland areas were the most important habitat areas for the majority of the avifaunal species within the study area, whilst the crop field areas and degraded grasslands are used for foraging. Many of the more mobile common faunal species observed within the proposed power line development area are likely frequent visitors originating from the surrounding less degraded grassland areas that surround the proposed power line development area, and utilise the proposed power line development area solely as a foraging ground.	Business Case, Conclusion and Mitigation Requirements: Disturbance to important avifaunal habitat, such as the wetlands, must be minimised. Bird flappers must be installed on all power lines crossing the wetlands and where power lines are close to or within the wetlands, degraded grassland and crop fields as this will potentially prevent birds from flying into power lines. Bird flappers with LED lights must also be installed to prevent possible collision of avifaunal species migrating during the night. Although the power line development has an intermediate species diversity, many of the species observed within the power line development utilise the grassland for foraging only, and are not expected to utilise the power line development for breeding purposes. As such, construction activities within the power line development are not expected to have any significant impacts on faunal species within the greater area, however all mitigation measures must still be implemented and all edge effects suitably managed. The wetlands located within the power line development are to be demarcated and access into this area should be prohibited during both the construction and operational phases. No hunting of any faunal species should be permitted during any phase of the development. Speed limits should also be implemented to ensure faunal species do not fall victim to fast moving construction vehicles.
Food Availability	Due to the historical and current anthropogenic activities in the study area, only avifaunal species that could adapt to these conditions would be able to have sufficient food to survive. The use of pesticides on crop fields can have detrimental effect on local insect populations and thus may negatively affect a food source for insectivorous avifaunal species. Avifaunal species that prefer seeds as a food source may prefer the crop fields and Degraded Grassland Habitat Unit.		
Habitat Integrity	Habitat integrity is considered to be intermediate. The habitat within the power line development is considered to be transformed and no longer representative of the natural conditions associated with the vegetation type. The high levels of ongoing anthropogenic activity within the proposed power line development, such as uncontrolled veld fires further reduce habitat integrity of the proposed power line development. Faunal movement within the proposed power line development is also negatively affected due to the increased level of alien and invasive floral infestation, as preferred natural habitat for faunal species is lost. The Wetlands will be essential as a corridor for movement between the existing pockets of preferred habitat for faunal species within the immediate surrounding area.		
Habitat Availability	The wetlands and degraded grasslands provided primary avifaunal habitat within the study area, whilst the crop fields can be considered secondary habitats and are mostly used for foraging or as a water source.		

Avifaunal specialist study

During the site visit, a survey was performed to determine the probability of occurrence of avifaunal Species of Conservational Concern (SCC) listed for the region. The following sections present the results of the survey in conjunction with data gathered during the field assessment.

Important bird and biodiversity areas (IBA)

According to Birdlife South Africa (BLSA), the study area does not fall within any Important Bird and Biodiversity Areas (IBA). The closest IBA to the study area is the Loskop Dam Nature Reserve IBA (37km to the north), Steenkampsberg IBA (60km to the east), and Devon Grasslands IBA (57km to the south-west).

Results of avifaunal SCC assessment

The following avifaunal SCC were recorded in Quarter Degree Squares (QDS) 2529CC (SABAP1) and for SABAP2 in 2550_2905, 2555_2905 and 2555_2910 pentads. The Table 5-9 below provides a brief summary of the data:

Table 5-9: A summary of historic and current data obtained from SABAP1 (2529CC QDS) and SABAP2 (2550_2905, 2555_2905 and 2555_2910 pentad).

Common Name	Scientific Name	Regional & Global Status (Taylor *et al*, 2015)	Reporting Rate (%)			
			SABAP1 2529CC	SABAP2 2550_2905	SABAP2 2555_2905	SABAP2 2555_2910
Blue Crane	*Anthropoides paradiseus*	NT,VU	4.96	-	-	-
Grey Crowned Crane	*Balearica regulorum*	EN,EN	0.83	-	-	-
Moccoa Duck	*Oxyura maccoa*	NT, NT	0.83	-	-	5.56
Greater Flamingo	*Phoenicopterus ruber*	NT,LC	8.26	-	8.33	38.89
Lesser Flamingo	*Phoenicopterus minor*	NT,NT	4.13	-	-	11.11
African Grass Owl	*Tyto capensis*	VU,LC	1.24	-	-	-
African Marsh Harrier	*Cirus ranivorus*	EN,LC	1.24	-	-	-
Half-Collard Kingfisher	*Alcedo semitorquata*	NT,LC	0.41	-	-	-
Blue Korhaan	*Eupodotis caerulescens*	End, LC	0.83	-	-	-
White-bellied Korhaan	*Eupodotis senegalensis*	VU	3.31	-	-	-
Secretarybird	*Sagittarius serpentarius*	VU,VU	5.79	16.67	8.33	-
Abdim's Stork	*Ciconia abdimii*	NT,LC	1.65	-	-	-
Black Stork	*Ciconia nigra*	VU,LC	0.83	-	-	-

LC= Least Concern, NT= Near Threatened, VU= Vulnerable, EN= Endangered, End = Endemic

Thirteen avifaunal SCC have been recorded for 2529CC QDGS and 2550_2905, 2555_2905 and 2555_2910 pentads. Only four avifaunal SCC have been recorded during SABAP2 and show an increase in observations of species within the pentads (Table 5-10).

Table 5-10: Avifaunal SCC assessment

Species	Habitat Presence and Requirements	Probability of Occurrence
Circus ranivorus (African Marsh Harrier)	No breeding habitat is present within the study area Prefer to utilise coastal and inland wetlands for breeding and foraging within drier flood plains, grasslands and croplands.	**Highly likely** Will use grasslands and crop fields to forage.
Anthropoides paradiseus (Blue Crane)	Although crop fields are present within the study area, anthropogenic activities made it unfavourable for this species. Preferred habitat for Blue Cranes: • Open grassland and grassland/ Karoo ecotone; • Wetlands; • Cultivated pastures; and • Crop fields.	**Highly unlikely** Suitable habitat is present within the study area, but from historic data it is known that this species is not common in the area.
Eupodotis caerulescens (Blue Korhaan)	No preferred habitat is present within the study area but is present in close proximity of the study area: • Grassland with flat, undulating terrain. • Often in areas with damp ground. • Sometimes attracted to burnt areas. • Prefers vegetation that is not taller than belly height of the bird.	**Highly unlikely** Suitable habitat is present within the study area, but from historic data it is known that this species is not common in the area
Phoenicopterus ruber (Greater Flamingo)	No preferred habitat is present within the study area. • Prefers brackish or saline shallow water bodies such as large dams, salt pans and coastal mudflats; • Sewage treatment plants; and • Ephemeral pans and river mouths.	**Likely** Lack of suitable waterbodies within the study area, but can utilise the area as a migratory route.
Phoenicopterus minor (Lesser Flamingo)	No preferred habitat is present within the study area: • Primarily open, shallow eutrophic, wetlands and coastal lagoons. May occur on more saline and more alkaline water bodies than those used by Phoenicopterus ruber (Greater Flamingo). • Breeds on saline lakes, salt pans and mudflats far out in pans and lakes. Non-breeding birds aggregate at coastal mudflats, salt works and sewage treatment works, where salinities are high. • Small, ephemeral freshwater wetlands are very important for birds dispersing from breeding grounds.	**Likely** Lack of suitable waterbodies within the study area, but can utilise the area as a migratory route.
Oxyura maccoa (Maccoa Duck)	Habitat is present within close proximity of the study area: • Wetlands areas that supports benthic invertebrates within open grassland; and • Stands of young emergent vegetation (Sedges and rushes) is ideal breeding habitat.	**Unlikely** Wetland areas in close proximity of the study area does not support feeding areas.

Species	Habitat Presence and Requirements	Probability of Occurrence
Sagittarius serpentarius (Secretarybird)	Habitat is present within the Secondary Grassland Habitat Unit: • Open grassland with scattered trees, shrubland, open Vachellia (Acacia) and Combretum savanna. • Restricted to large conservation areas in the region. Avoids densely wooded areas, rocky hills and mountainous areas. • Requires small to medium-sized trees with a flat crown for nesting, and often roosts in similar locations.	**Likely** Suitable foraging habitat is present within the grassland areas, but anthropogenic activities within the area lead to less available foraging habitat.
Eupodotis senegalensis (White-bellied Korhaan)	No preferred habitat is present within the study area. • Dense tall grassland; • Mixed and sour grassland; • Lightly or open wooded, hilly to undulating country; • During winter may be present on burnt areas and transformed grassland; and • Use agricultural areas when tall grass areas are present in between crop fields.	**Highly unlikely** Lack of suitable habitat within the study area because of anthropogenic activities.

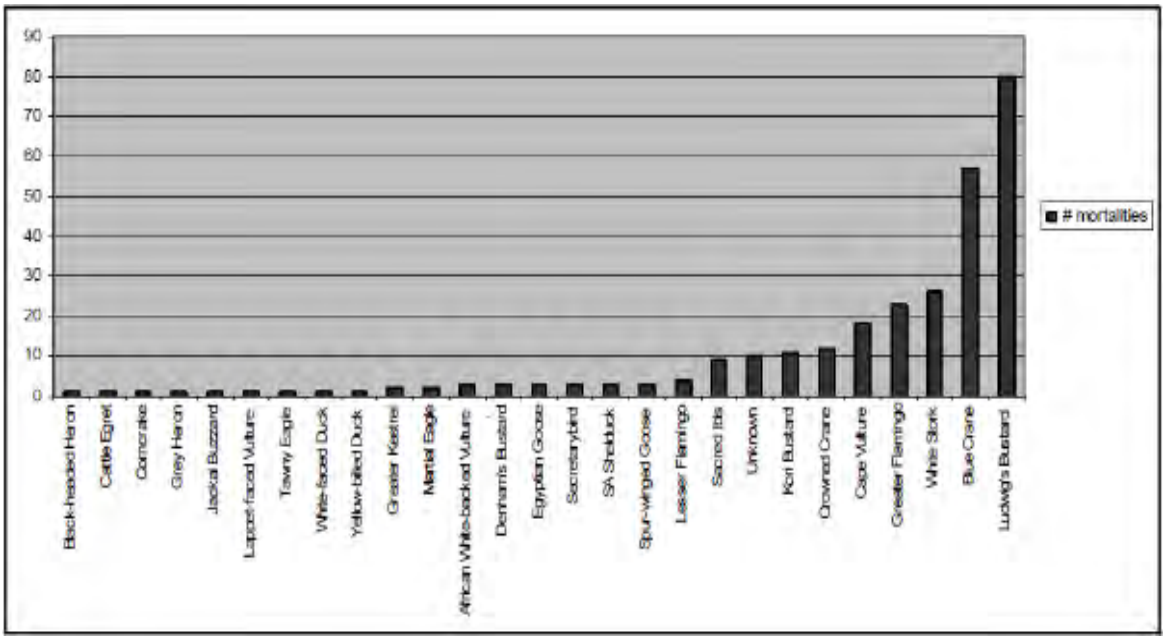
From the results of the above assessment, it is clear that of the avifaunal SCC known to occur in the region, only *Circus ranivorus* (African Marsh Harrier) and *Sagittarius serpentarius* (Secretarybird) are likely to occur within the study area as an occasional visitor, especially for foraging purposes. *S. serpentarius* was observed during previous assessments (De Castro & Brits, 2015). *Phoenicopterus ruber* (Greater Flamingo) and *Phoenicopterus minor* (Lesser Flamingo) have the potential to utilise the area as migratory route, thus collision with the power line especially at night is highly likely. It is highly unlikely that these species will utilise the study area for breeding purposes due to a lack of suitable habitat.

Avifaunal collision with power lines and other infrastructure

Collision with power lines is the biggest threat to avifaunal species within southern Africa. Species prone for collision with power lines are mostly heavy-bodied with limited manoeuvrability and evasive action to avoid collision is limited. The following species are most affected (van Rooyen, 2009):

- Cranes
- Bustards
- Storks
- Various water bird species.

Many of the species mentioned above are Species of Conservation Concern (SCC) in South Africa. Figure 5-16 summarises the collisions of avifaunal species that have been reported on transmission lines.



srk consulting	**RELOCATION OF THREE 400KV POWER LINES** REPORTED COLLISIONS OF SPECIES ON POWER LINES	Project No. 512575

Figure 5-16: Reported collisions of species on power lines (August 1996 to June 2009) (EWT unpublished data).

Collisions reported in Figure 5-16 do not provide a true representation of the species affected as not all power lines can be monitored continually (Van Rooyen, 2009).

Avifaunal SCC that are vulnerable to power line collisions generally have the following characteristics (van Rooyen, 2009):

- Long-lived
- Reproduction slow under natural conditions
- Require specific breeding habitat, resulting in very few successful breeding attempts. Breeding habitat can also be confined to very small and limited areas
- Species have not adapted to high levels of adult mortality and can have a detrimental effect on the populations' ability to sustain itself for medium or even long term.

From Figure 5-16 it is evident that avifaunal SCC are negatively affected and that it is of the utmost importance that mitigation on power lines be implemented to reduce collision numbers of avifaunal species with power lines (van Rooyen, 2009).

Anti-collision devices

The following measures have proven to successfully reduce avifaunal collision with power lines. Reduction of up to 60% in mortality of avifaunal species have been recorded (van Rooyen, 2009).

Static devices

These devices are mechanically more durable than dynamic devices (See Figure 5-17). The lack of moving parts play a major role in durability. Bird Flight diverters (Pigtail) have shown to have a limited success rate (Anderson, 2001). The prominent reason for this is that the smaller pigtails are less visible and it deemed that large pigtails are used that are more visible (van Rooyen, 2009).

srk consulting	**RELOCATION OF THREE 400KV POWER LINES** SMALL AND LARGE PIGTAILS	Project No. 512575

Figure 5-17: Picture on the left illustrates how the smaller pigtails are not predominantly visible. Large pigtail on the right will be more visible to avifaunal species (van Rooyen, 2009).

Dynamic devices

Dynamic devices (bird flappers) consist of moving parts, thus not as durable as static devices. Bird flapper reduces collision of avifaunal species very effectively as these devices seem to be more visible to avifaunal species. These devices are subjected to extensive wear and tear and can cause damage to the cable it is attached (Figure 5-18). Higher cost will be involved if bird flapper needs to be replaced at intervals of a few years. To date no solutions have been found and it must be accepted as a constraint (van Rooyen, 2009).

srk consulting	**RELOCATION OF THREE 400KV POWER LINES** DIFFERENT BIRD FLAPPERS AVAILABLE	Project No. 512575

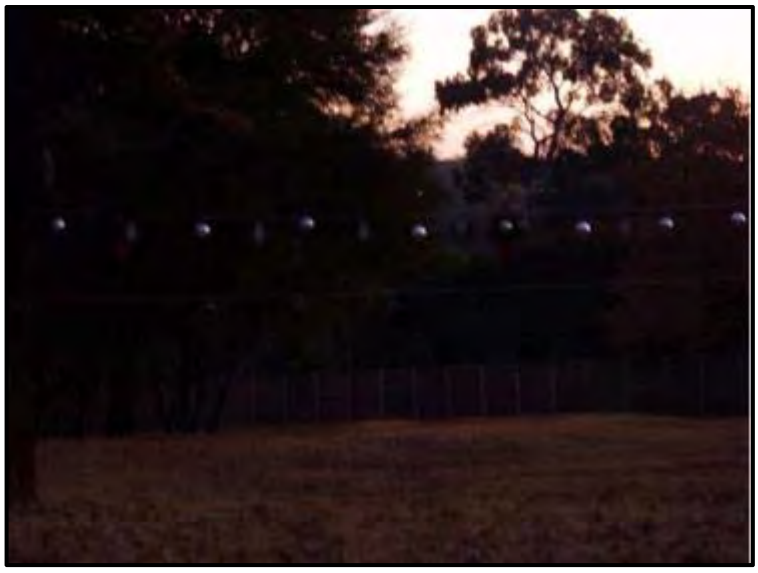
Figure 5-18: Figure above illustrates the different bird flappers that are available (van Rooyen, 2009).

Reflective devices

The Inotec BFD88, a reflective steel sphere of 70mm in diameter shows considerable potential to prevent avifaunal collisions with power lines (Figure 5-19 and Figure 5-20). Experiments show that this device is superior to coloured objects, especially during low light conditions. Due to the spherical shape of the device, light is diverted into all directions (van Rooyen, 2009).

srk consulting	**RELOCATION OF THREE 400KV POWER LINES** REFLECTIVE BIRD DIVERTER AND ILLUSTRATION OF INSTALLATION	Project No. 512575

Figure 5-19: Reflective bird diverter is represented on the left and on the right is an illustration of it installed with conventional bird flapper (van Rooyen, 2009).



srk consulting	**RELOCATION OF THREE 400KV POWER LINES** REFLECTIVE DIVERTERS AT DUSK	Project No. 512575

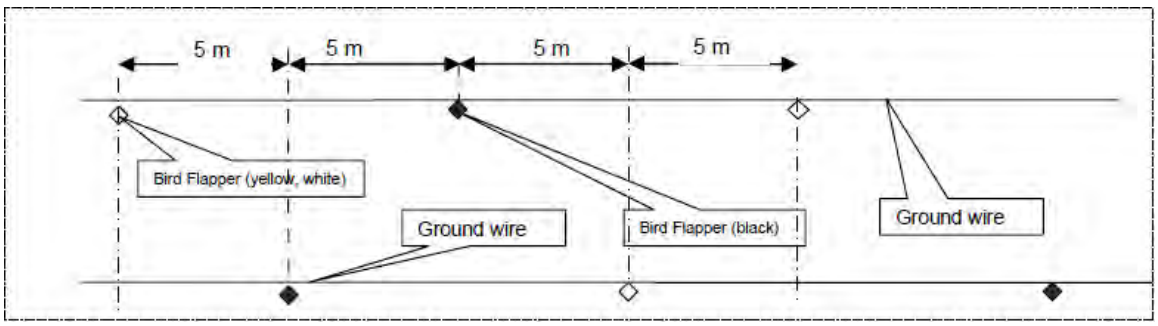
Figure 5-20: Reflective diverters at dusk with conventional white bird flappers in between (Van Rooyen, 2009)

LED devices

A nocturnal Light Emitting Diode (LED) device was produced by The Endangered Wildlife Trust's Wildlife & Energy Programme (EWT-WEP), in partnership with Performed Line products and ESKOM as mitigation devices on power lines. The devices are a combination of bird flight diverters and bird flapper concepts and is equipped with LED lights that are powered by solar panels (Figure 5-21). The LED light activates during the night, thus making the power line more visible and aims to lower avifaunal collisions with power lines during the night (Hoogstad, 2014).

Intervals and spacing of anti-collision devices

Research conducted in the Netherlands suggested that spacing intervals will have a considerable influence on efficiency of anti-collision devices. The same has been found in South Africa. The figure below suggests the intervals (5m) and marking method with bird flappers (BFD88 diverters) (van Rooyen, 2009). It is of the utmost importance that alternate colours (white and yellow) are used, as maximum contrast will be achieved (Van Rooyen, 2009).

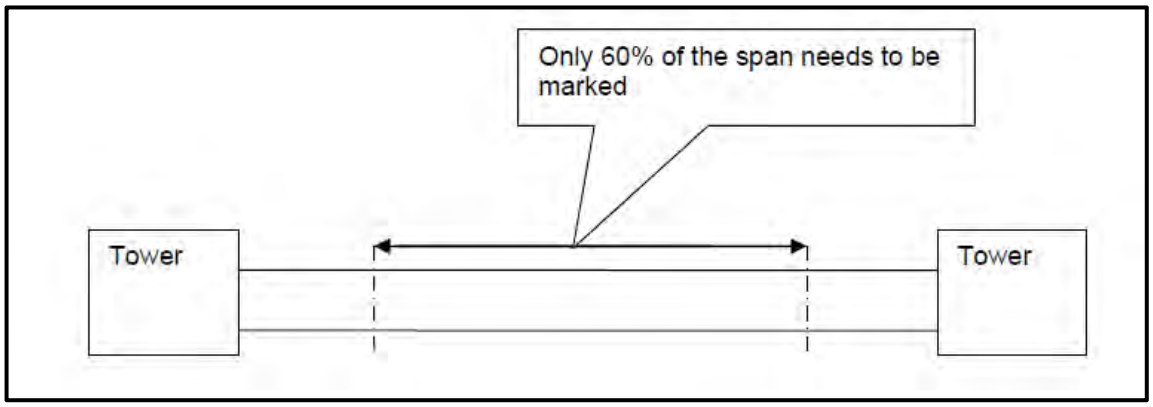


srk consulting	**RELOCATION OF THREE 400KV POWER LINES** MARKING METHOD WITH BIRD FLAPPER	Project No. 512575

Figure 5-21: Marking method with bird flapper as viewed from above. (Van Rooyen, 2009)

Portion of span that must be marked

As illustrated in the figure below, only the middle 60% of each span needs to be marked (Figure 5-22). This is where most of avifaunal collisions occur (Van Rooyen, 2009)



srk consulting	**RELOCATION OF THREE 400KV POWER LINES** MARKING METHOD	Project No. 512575

Figure 5-22: Middle 60% of the span needs to be marked as the majority of avifaunal collision occurs here. (Van Rooyen, 2009)

General faunal SCC POC assessment results

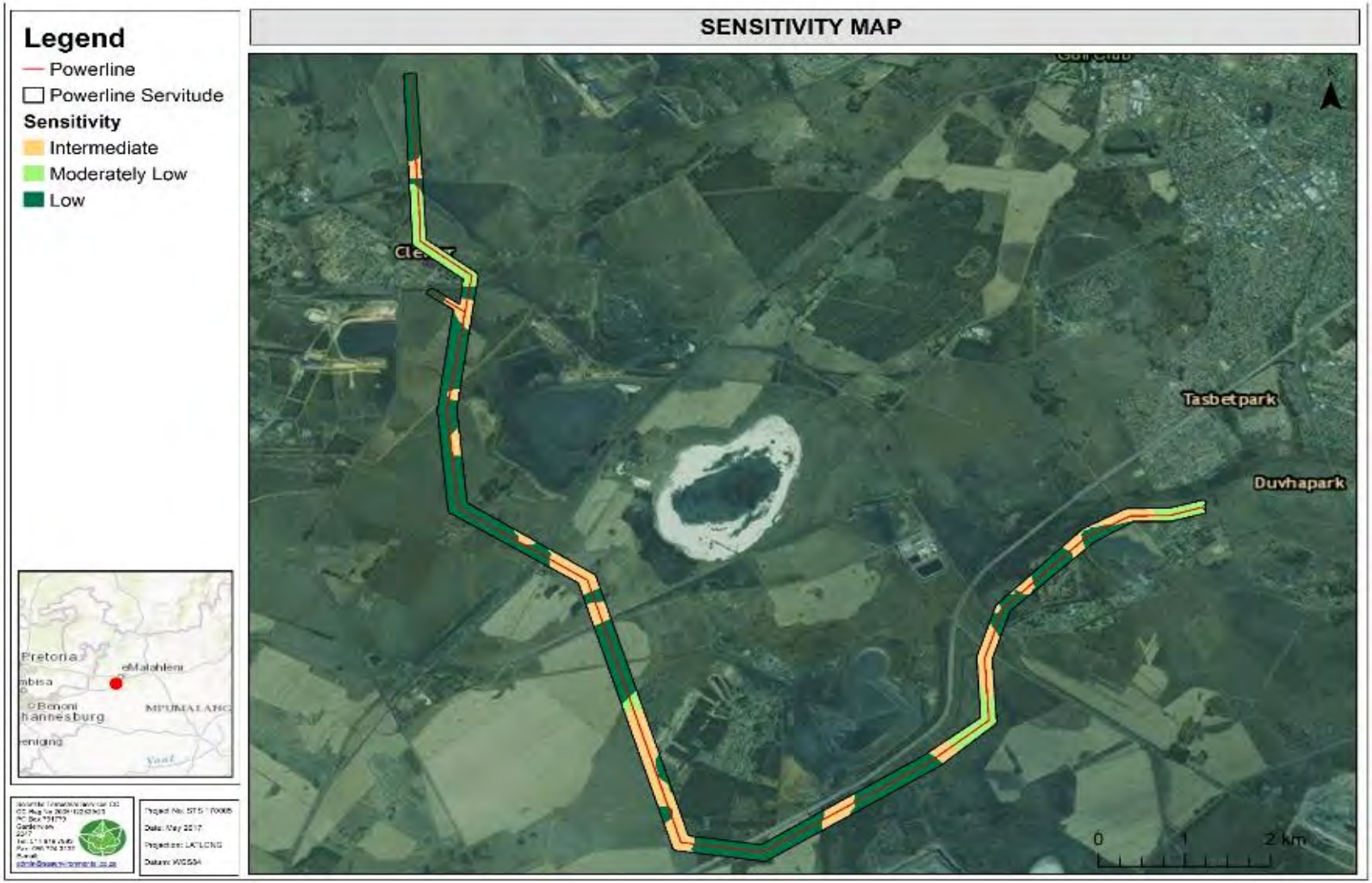
No general (all listed species excluding avifauna) faunal SCC, were identified during the site visit. The high levels of anthropogenic activity within the study area and surroundings have a marked influence on whether species are likely to occur within the study area. None of the listed species had a Probability of Occurrence (POC) higher than 60% for the study area. Due to the fact that no general faunal SCC were identified within the study area, and the low likelihood of such species occurring, it can be surmised that the study area is of low importance in terms of faunal SCC conservation. However, it is still important to ensure that power line crossings do not negatively affect the wetlands by avoiding unnecessary disturbance, minimising construction footprints and ensuring that all disturbed areas are rehabilitated.

Sensitivity mapping

The figure below conceptually illustrates the areas considered to be of increased ecological sensitivity. The areas are depicted according to their sensitivity in terms of the presence or potential for floral and faunal SCC, habitat integrity and levels of disturbance, threat status of the habitat type, the presence of unique landscapes and overall levels of diversity. Table 5-11 and Figure 5-23 present the sensitivity of each identified habitat unit along with an associated conservation objective and implications for development.

Table 5-11: A summary of sensitivity of each habitat unit and implications for development.

Habitat Unit	Sensitivity	Conservation Objective	Development Implications
Degraded Grassland Habitat	Moderately Low	Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects.	Development activities in this area are unlikely to have a significant impact on the receiving environment, however should any faunal or floral SCC species be observed a rescue and relocation programme will have to be implemented by a specialist consultant.
Wetland	Intermediate	Preserve and enhance biodiversity of the habitat unit and surrounds while optimising development potential.	Although placement of infrastructure in this area is unlikely to have a significant impact on the receiving environment, the disturbance timeframes and footprint areas must be minimised and care must be taken to limit edge effects on the surrounding sensitive wetland areas.
Transformed	Low	Optimise development potential.	Activities within this habitat unit must be optimised and limited to the existing disturbance footprint. Care must be taken to limit edge effects on the surrounding sensitive wetland areas.



srk consulting	**RELOCATION OF THREE 400KV POWER LINES** SENSITIVITY MAP OF THE POWER LINE DEVELOPMENT	Project No. 512575

Figure 5-23: Sensitivity map of the power line development

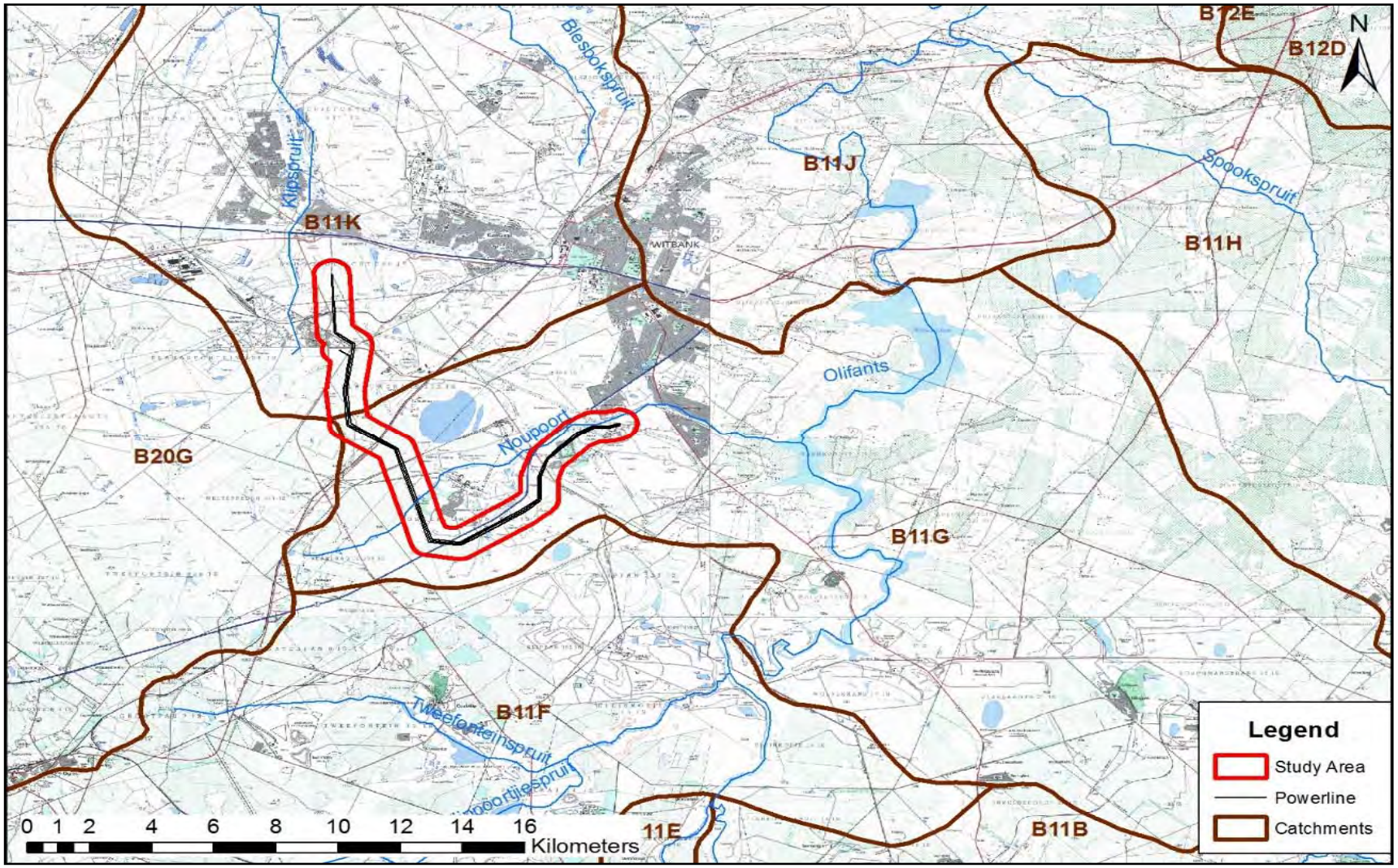
5.1.9 Wetlands

A field survey was undertaken on 12 and 26 April 2017 during which the wetland boundaries were verified in the field and the required data for the ecological assessments was collected.

The Landau power line study area is located within the Primary Catchment B, and more specifically within quaternary catchments B11G and B11K. Catchment B11G is drained by the Olifants River and its tributary the Noupoortspruit, while catchment B11K is drained by the Klipspruit and its tributaries. Information regarding mean annual rainfall, runoff and evaporation potential per quaternary catchment is provided in Table 5-12 (Middleton, B.J., Midgley, D.C and Pitman, W.V., 1990). Figure 5-24 indicates the position of the study area in relation to the affected quaternary catchments (**Appendix D 5** for Wetlands Impact Assessment specialist report).

Table 5-12: Table showing the mean annual precipitation, run-off and potential evaporation per quaternary catchment (Middleton, B.J., Midgley, D.C and Pitman, W.V., 1990).

Quaternary Catchment	Catchment Surface Area (ha)	Mean Annual Precipitation (MAP) in mm	Mean Annual Run-off (MAR) in mm	MAR as percentage of MAP
B11G	33 155	692.54	35.8	5.2 %
B11K	34 053	683.76	46.0	6.7 %

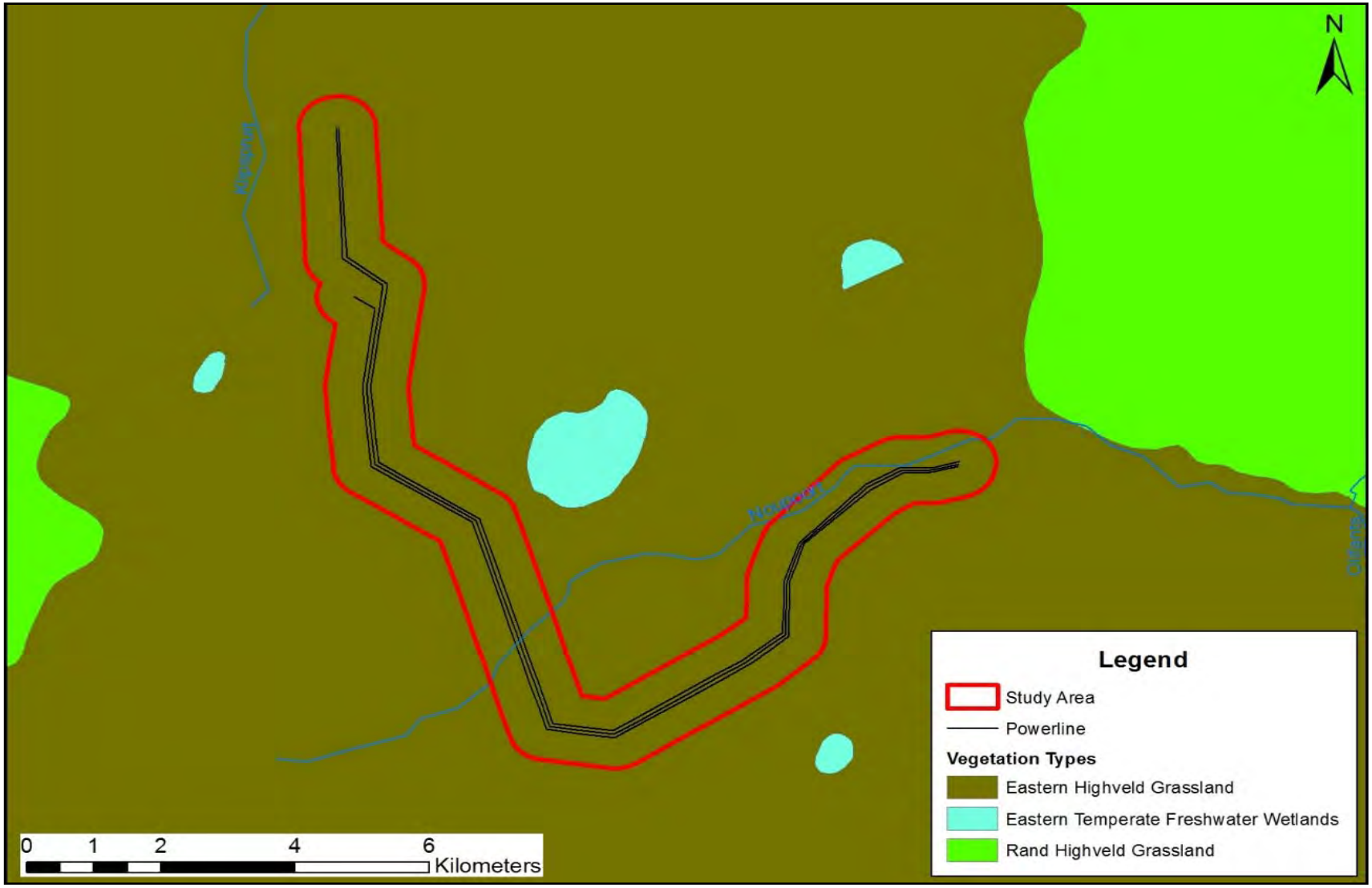


srk consulting	**RELOCATION OF THREE 400KV POWER LINES** STUDY AREAD IN RELATION TO THE QUATERNARY CATCHMENTS	Project No. 512575

Figure 5-24: Map showing the study area in relation to the quaternary catchments.

Vegetation

According to the Vegetation Map of South Africa, Lesotho and Swaziland (Mucina and Rutherford, 2006), the study area falls within the Grassland Biome and the Mesic Highveld Grassland Bioregion. The dominant vegetation type found on site is Eastern Highveld Grassland (Gm12). Under the National List of Ecosystems that are Threatened and in Need of Protection (GN1002 of 2011), the vegetation type is considered *Vulnerable* (Figure 5-25).



srk consulting

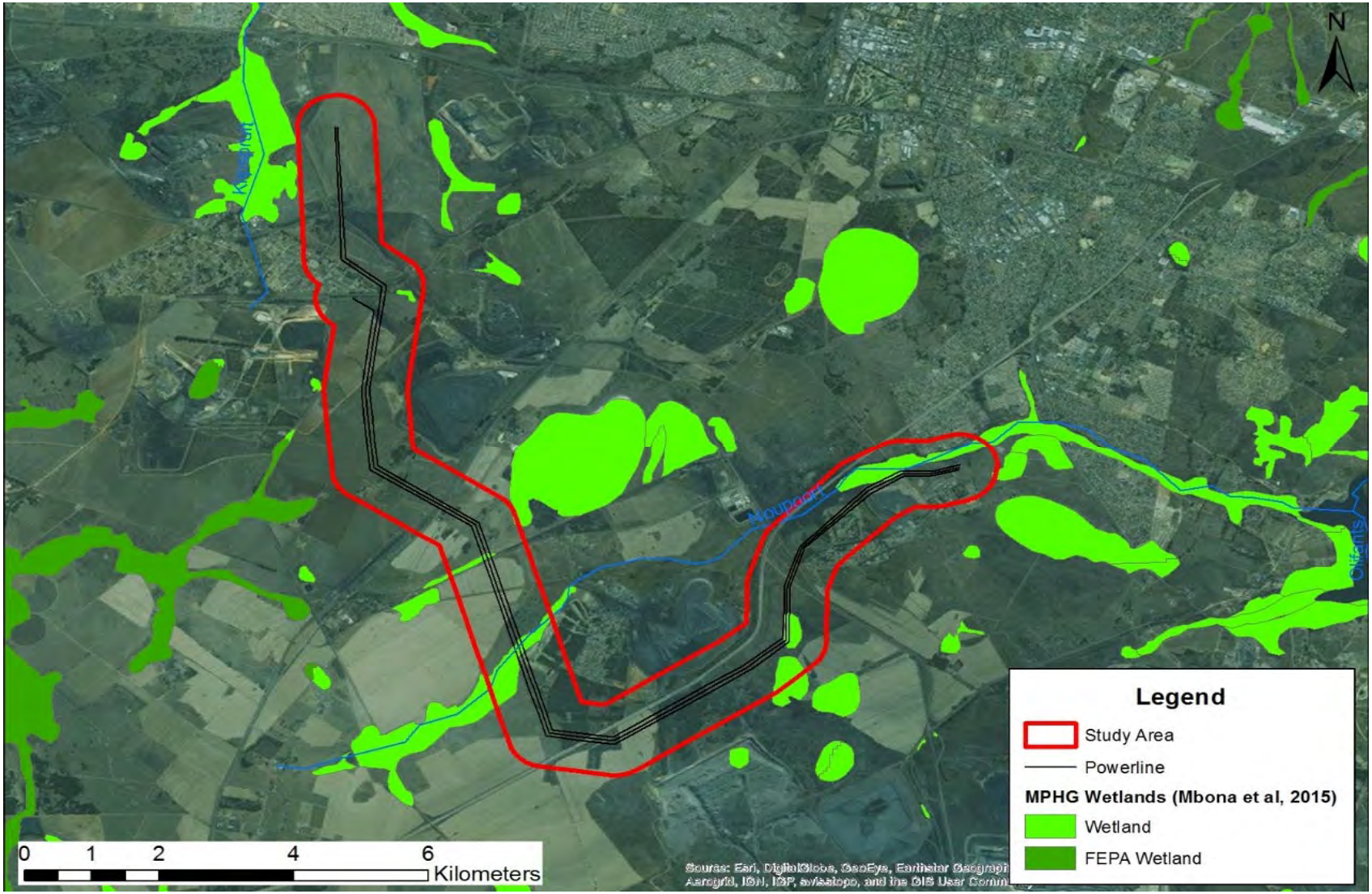
RELOCATION OF THREE 400KV POWER LINES
STUDY AREAD IN RELATION TO THE QUATERNARY CATCHMENTS

Project No.
512575

Figure 5-25: Map showing the vegetation types of the study area.

Freshwater ecosystem priority areas

The Atlas of Freshwater Ecosystem Priority Areas (FEPA) in South Africa (Nel et al, 2011) (The Atlas) which represents the culmination of the National Freshwater Ecosystem Priority Areas project (NFEPA), a partnership between SANBI, CSIR, WRC, DEA, DWA, WWF, SAIAB and SANParks, provides a series of maps detailing strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting sustainable use of water resources. FEPA's were identified through a systematic biodiversity planning approach that incorporated a range of biodiversity aspects such as ecoregion, current condition of habitat, presence of threatened vegetation, fish, frogs and birds, and importance in terms of maintaining downstream habitat. No wetland FEPA's are located within the project study area.



srk consulting	**RELOCATION OF THREE 400KV POWER LINES** WETLANDS AND FEPA'S	Project No. 512575

Figure 5-26: Map showing wetlands and FEPA's within the study area and surroundings as per Mbona *et al*. (2015).

The wetlands on site fall within the Mesic Highveld Grassland Group 4 wetland vegetation type. A recently completed WRC funded project (Mbona et al., 2015), which updated the NFEPA wetland mapping for the Mpumalanga Highveld, determined vegetation threat categories for all wetland vegetation types. Threat categories for the Mesic Highveld Grassland Group 4 wetland vegetation type is indicated in Table 5-13 and Figure 5-26.

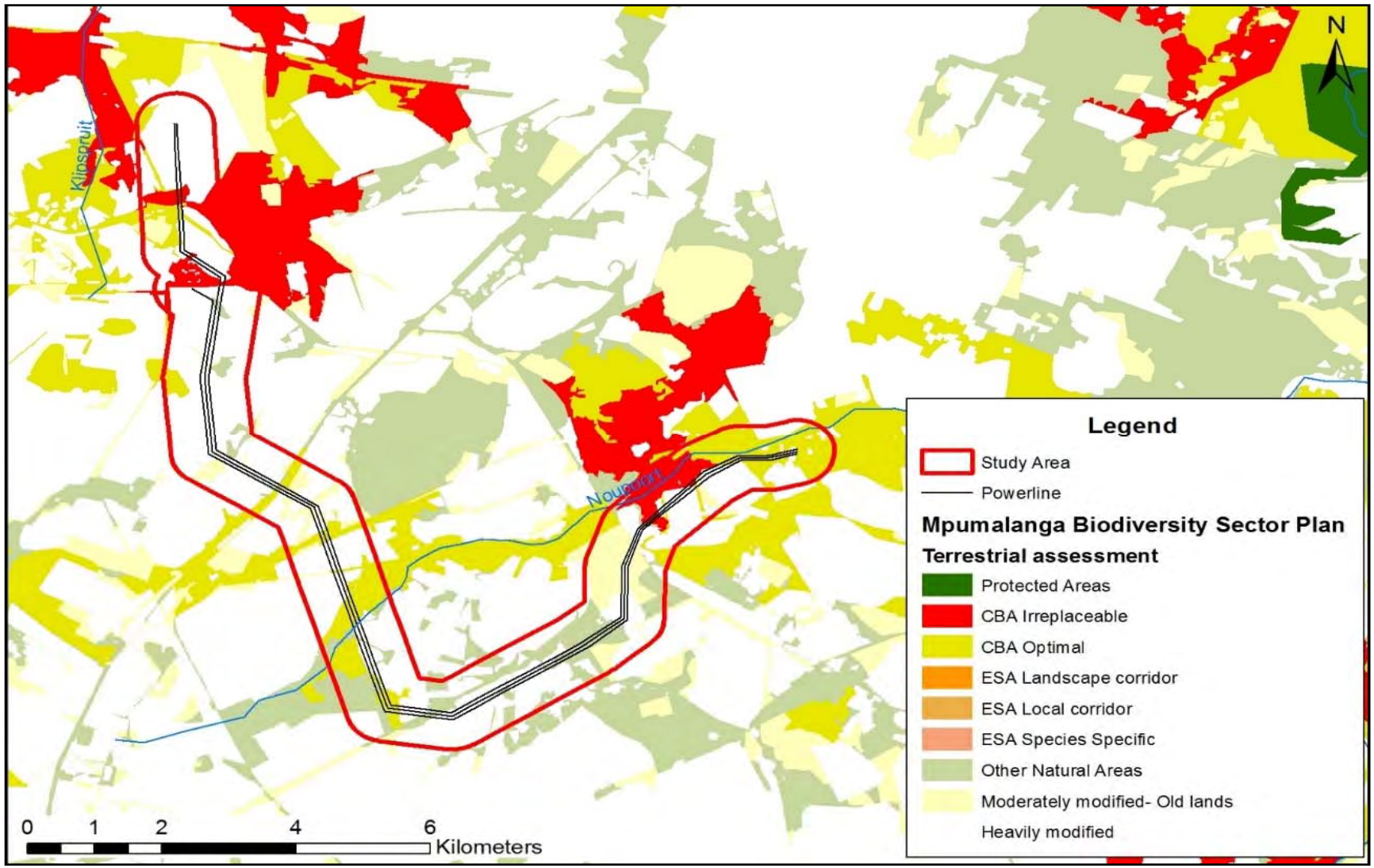
Table 5-13: Wetland ecosystem type, and its assigned threat status category (Mbona et al., 2015), occurring on site.

Wetland Ecosystem Type	Threat Status
Mesic Highveld Grassland Group 4	Least Threatened

Provincial Conservation Plans

The Mpumalanga Biodiversity Sector Plan 2013 terrestrial biodiversity assessment (Figure 5-27) indicates extensive transformation of habitats in the area with large portions of the study area classified as heavily modified. Three broad areas of conservation importance do however occur:

- Critical Biodiversity Areas (CBA) located along the southern banks of the Noupoortspruit near the Anglo Projects Office
- CBA along the upper reaches of the Noupoortspruit
- CBA near the northern end of the proposed power line route just to the east of Clewer.



srk consulting

RELOCATION OF THREE 400KV POWER LINES
EXTRACT FROM THE MPUMALANGA BIODIVERSITY SECTOR PLAN

Project No. 512575

Figure 5-27: Extract from the Mpumalanga Biodiversity Sector Plan 2013 terrestrial biodiversity assessment

Site-specific assessment

Extensive use was made of existing wetland delineation and assessment data from previous studies undertaken in the area. However, additional field surveys were undertaken on 12 and 26 April 2017 during which the wetland boundaries were verified in the field and the required data for the ecological assessments was collected.

Wetland delineation and typing

Within the study area three different hydro-geomorphic (HGM) wetland types were identified, namely:

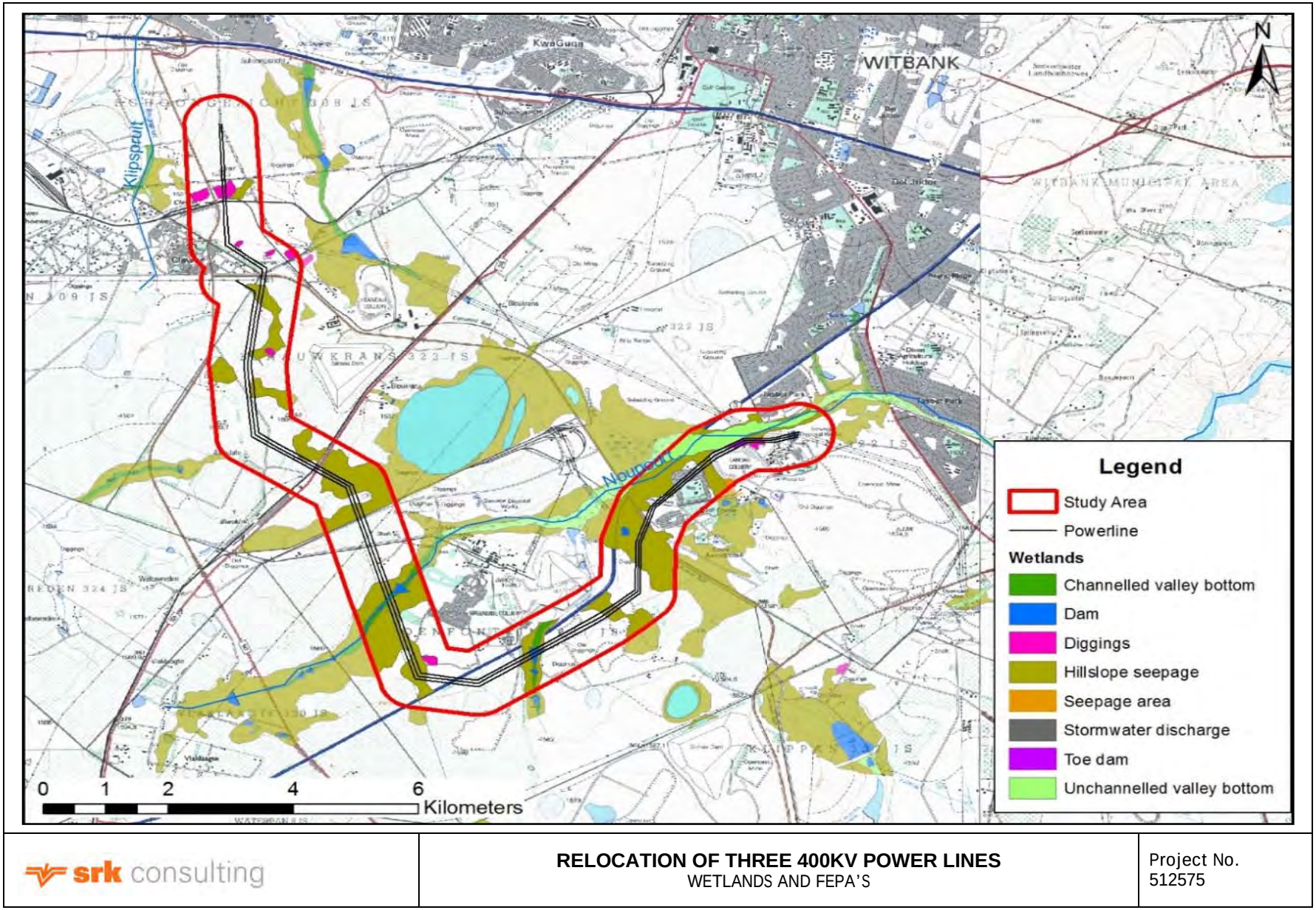
- Hillslope seepage wetland
- Channelled valley bottom wetland
- Unchannelled valley bottom wetland.

In addition to the wetlands, a number of artificial features supporting wetland vegetation were also identified and mapped. These included a number of shallow diggings or excavations in which water collects following rainfall, various farm dams that have been constructed within natural wetland systems, small areas of wetness associated with stormwater discharges from Clewer, as well as water infrastructures associated with mining such as the toe dam at the Landau Mine Residue Deposit.

The wetlands within the study area covers approximately 558 hectares, or 26 % of the study area (study area covers 2132 ha). The delineated wetland areas are illustrated in the map below (Figure 5-28); while Table 5-14 provides information on the actual extent of the wetlands both in terms of area and the contribution as a percentage that the different types of wetlands contribute to the total wetland area.

Table 5-14: Summary of the different wetland types and extents recorded within the study area.

Wetland Type	Area_(ha)	% of wetland area	% of study area
Channelled valley bottom	17.21	3.1%	0.8%
Hillslope seepage	483.30	86.6%	22.7%
Unchannelled valley bottom	57.27	10.3%	2.7%
TOTAL	**557.79**	**100.0%**	**26.2%**



srk consulting

RELOCATION OF THREE 400KV POWER LINES
WETLANDS AND FEPA'S

Project No.
512575

Figure 5-28: Map of the delineated and classified wetlands within the study area and surroundings

Wetland soils

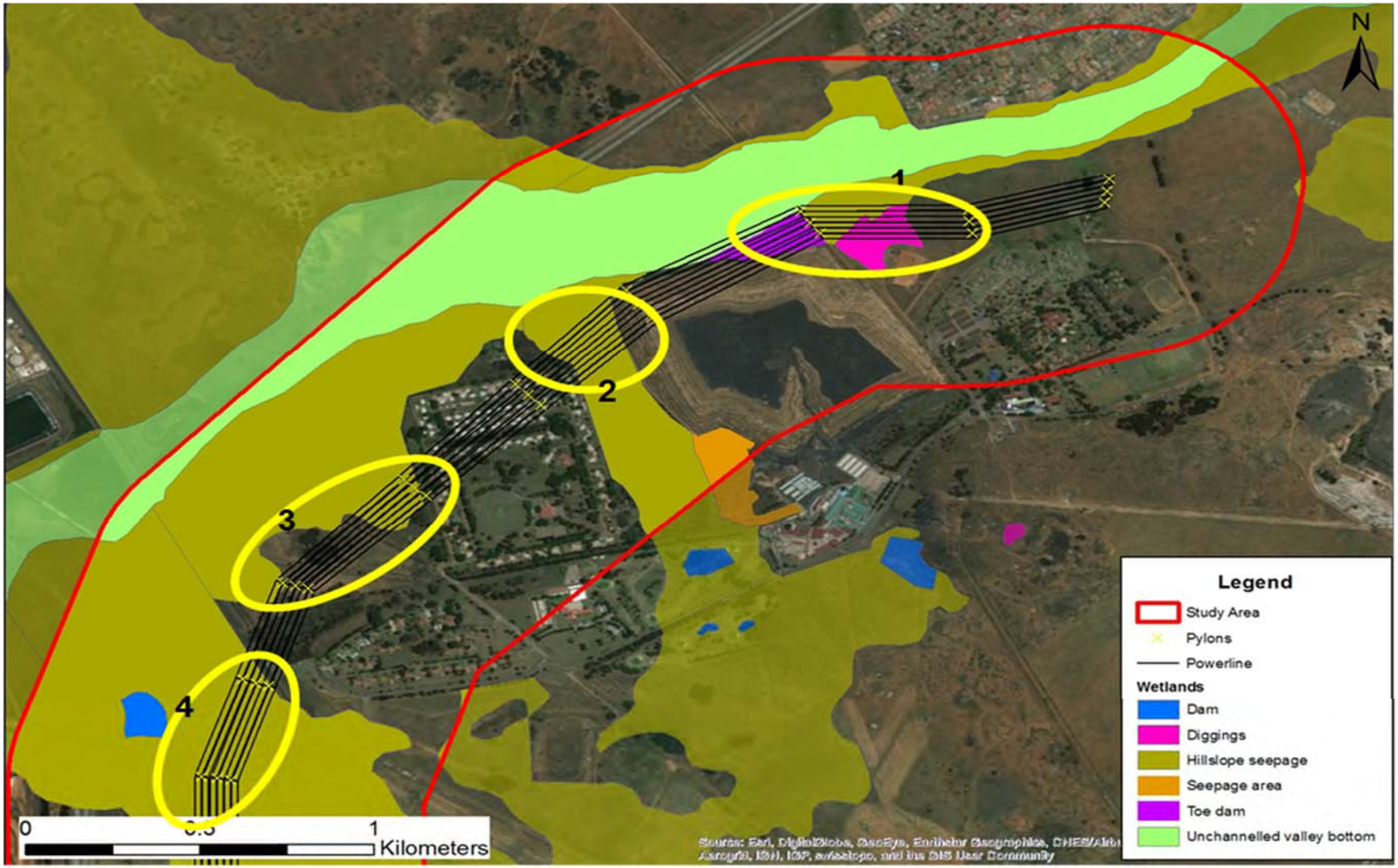
In general, the wetland soils of the area can be described as apedal soils which are sandy soils with weak structure. These soils allow easy infiltration of rainfall and as a result are characterised by reduced surface run-off and increased through flow and interflow (sub-surface seepage of water through the soil profile). Water infiltrates through the soil profile until an aquitard is reached (e.g. a soil horizon of low permeability, unweathered sandstone, hard or soft plinthic layers etc.). The water then moves laterally through the soil profile along the aquitard, forming a perched water table, and expressing itself as hillslope seepage wetlands in areas where the perched water table approaches the soil surface. The fluctuation of the water table causes accumulation and localization of iron and manganese oxides in the soil. This appearance is known as mottling and concretions. Gleying is common is these wet soils which are expressed as grey colours within the soil horizon. Typical soil forms observed within the hillslope seepage wetlands of the area include Avalon, Longlands, Fernwood and Westleigh.

Wetland Crossings/Units

A total of 12 wetland crossings have been identified along the proposed power line relocation route. The wetlands affected by these 12 crossings form the wetland units that are the focus of this assessment. Each individual wetland unit is briefly discussed below:

Wetland Crossing 1

The wetland affected by the first crossing has been typed as a hillslope seepage wetland which drains in a northerly direction into the Noupoortspruit wetland. The wetland is characterised predominantly by hardy and pioneer species such as Cynodon dactylon, Imperata cylindrica and Typha capensis, which suggest disturbances to the wetland vegetation. Indications are that this wetland is impacted by seepage out of the adjacent Landau MRD, with poor water quality having led to a loss of sensitive species. Seepage from the Landau MRD is also expected to have impacted the hydro period, with the wetland considered to be saturated on a seasonal to near-permanent basis. Under natural conditions the wetland is likely to have been temporary to seasonal in nature. Upslope of the hillslope seepage wetland an old excavation/digging was observed. An unpaved road crosses the hillslope seepage wetland and separates the seepage wetland from the toe dam associated with the MRD. The toe dam is completely dominated by Phragmites australis, as is the adjacent Noupoortspruit valley bottom wetland. Three pylons are expected to be located within the wetland in close proximity to the existing road crossing (and Figure 5-30).



srk consulting	**RELOCATION OF THREE 400KV POWER LINES** MAP SHOWING WETLAND CROSSINGS 1 TO 4	Project No. 512575

Figure 5-29: Map showing wetland crossings 1 to 4

srk consulting	**RELOCATION OF THREE 400KV POWER LINES** WETLANDS AFFECTED BY WETLAND CROSSINGS 1 AND 2	Project No. 512575

Figure 5-30: Photographs of the hillslope seepage wetlands affected by wetland crossings 1 (left) and 2 (right).

Wetland Crossing 2

This wetland has also been typed as a hillslope seepage wetland. The wetland drains in a northerly direction between the Landau MRD to the east and a demolished mine village to the west. The wetland is maintained by flows from the upper catchment that pass through the golf course, as well as surface runoff from the Landau MRD and the Anglo Projects Offices. The wetland is highly disturbed and altered due to the surrounding land use activities. Extensive deposits of coal fines occur within the portions of wetland in close proximity to the Landau MRD. As a consequence of these disturbances the affected reach of wetland is dominated almost entirely by Imperata cylindrica, with a scattering of alien trees (Eucalyptus and Pinus species). The wetland will be clear-spanned by the proposed power line with no pylons planned within the delineated wetland habitat.

Wetland Crossing 3

Wetland Crossing 3 again consists of a hillslope seepage wetland draining in a northerly direction into the Noupoortspruit wetland. The wetland is characterised by secondary and disturbed vegetation with numerous stands of alien trees occurring within the wetland, specifically along its eastern edge

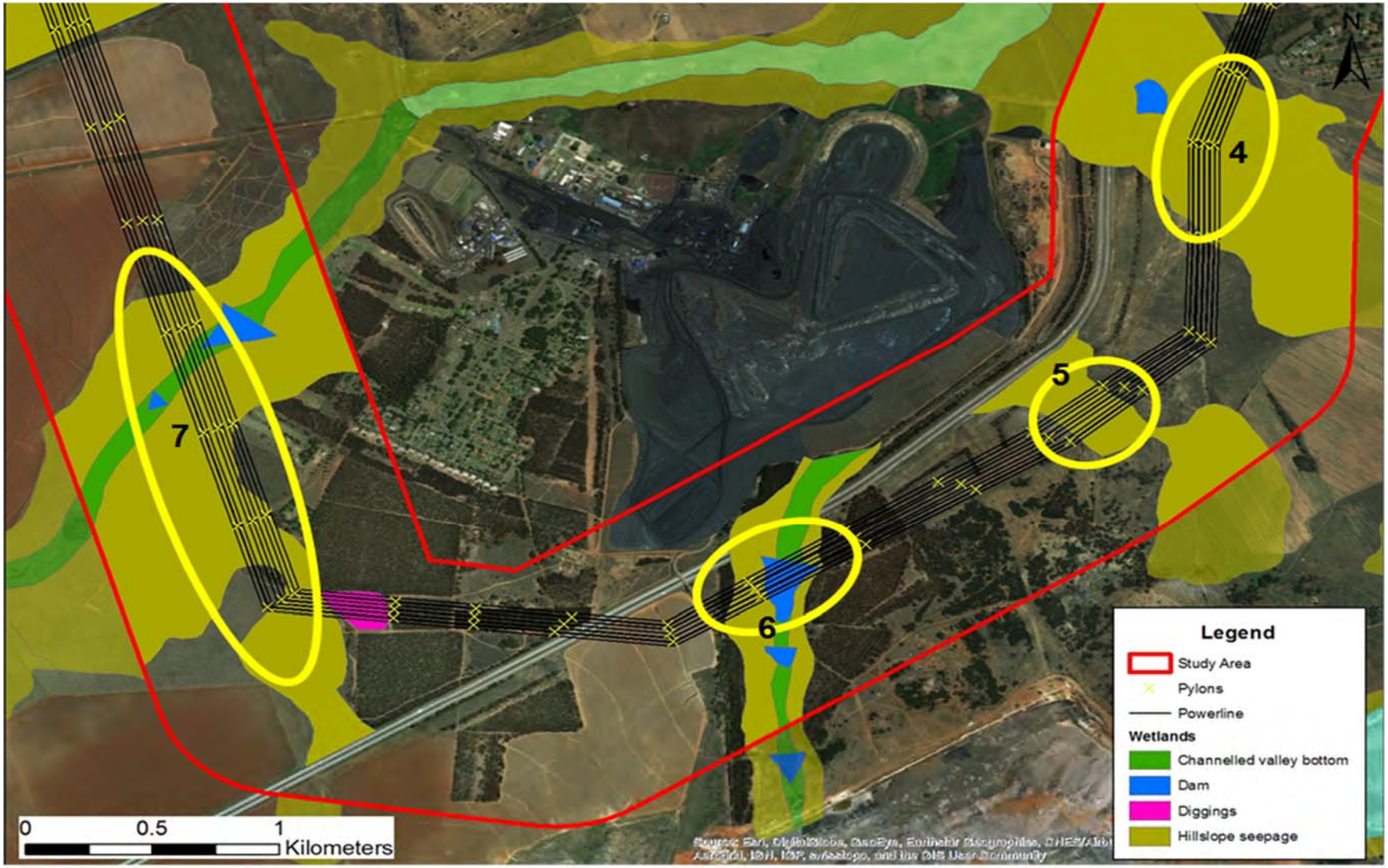
bordering the demolished mine village. A number of further disturbances associated with tracks/roads and historical infrastructure were observed within the wetland. F pylons are indicated as falling within the delineated wetland habitat, though at least 3 of these pylons will be located within an area currently invaded by alien trees.

Wetland Crossing 4

Crossing 4 affects a large hillslope seepage wetland draining into the Noupoortspruit wetland system, though the affected reach is separated from the Noupoortspruit by the N12 highway. Numerous disturbances associated with historical mining activities and ongoing agricultural activities have impacted on this wetland, while a number of linear infrastructures (including a public tar road, a coal conveyor and a long trench) also impact the wetland. The wetland is considered seasonal in nature and is characterised by secondary vegetation dominated by grass species such as Imperata cylindrica, Agrostis lachnantha and Eragrostis curvula. 8 pylons are proposed to be located within this wetland (Figure 5-31 and Figure 5-32).

srk consulting	**RELOCATION OF THREE 400KV POWER LINES** WETLAND HABITAT AT WETLAND CROSSING 4 AND 6	Project No. 512575

Figure 5-31: Photograph of wetland habitat at wetland crossing 4 (left) and wetland crossing 6 (right).



srk consulting	**RELOCATION OF THREE 400KV POWER LINES** MAP SHOWING WETLAND CROSSINGS 4 TO 7	Project No. 512575

Figure 5-32: Map showing wetland crossings 4 to 7

Wetland Crossing 5

This hillslope seepage wetland has also been historically impacted by coal mining activities. The 1:50 000 topographical maps indicate opencast mining in the central area of the hillslope seepage wetland (where the narrow constriction of the system occurs) as well as a shaft area in the complex. The disturbed nature of the wetland vegetation reflects these disturbances, as well as several tracks and trenches that traverse the wetland. The wetland drains towards the N12 highway; north of the highway flows enter a diversion around the Greenside MRD. No pylons will be located within this wetland.

Wetland Crossing 6

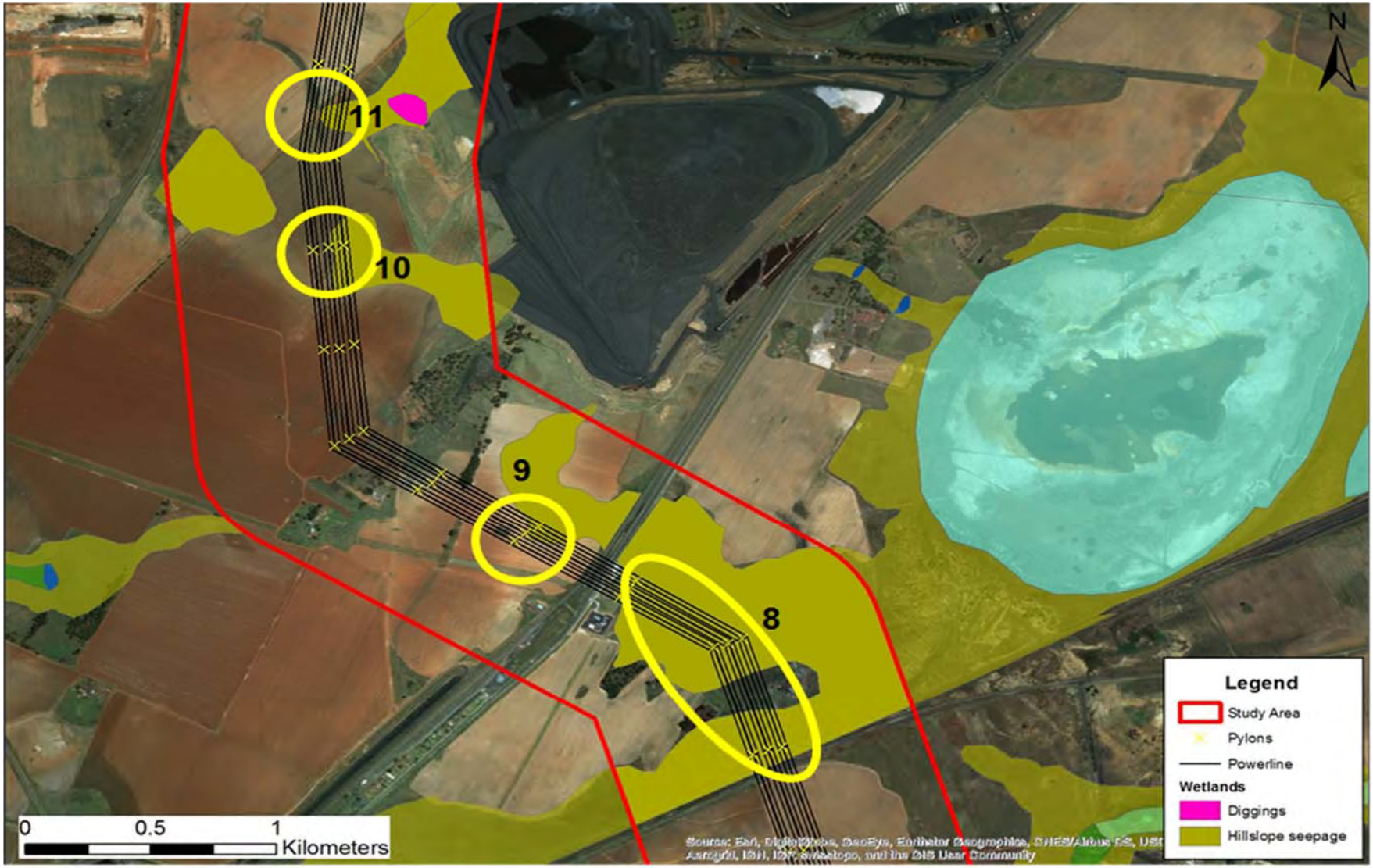
Two pylons in western hillslope seepage wetland in alien trees

Wetland Crossing 7

Thirteen pylons in wetland, most in disturbed areas associated with golf course, farmyard and alien trees

Wetland Crossing 8 (Figure 5-33 and Figure 5-34)

Figure 5-33: Photographs of wetland crossing 8 showing historic mining disturbances (top row) and wetland habitat associated with a small depression in the north of the wetland (left) and a weak channel in the south of the wetland (right).



srk consulting	**RELOCATION OF THREE 400KV POWER LINES** MAP SHOWING WETLAND CROSSINGS 8 TO 11	Project No. 512575

Figure 5-34: Map showing wetland crossings 8 to 11.

Wetland Crossing 9

A section of hillslope seepage wetland that drains in a south easterly direction towards the public tar road and railway line crossing, and then via wetland crossing 8 towards Clydesdale Pan. The affected reach of wetland is completely cultivated with no natural vegetation remaining. One pylon is expected to be located within the delineated wetland area, with a further two pylons in close proximity.

Wetland Crossing 10

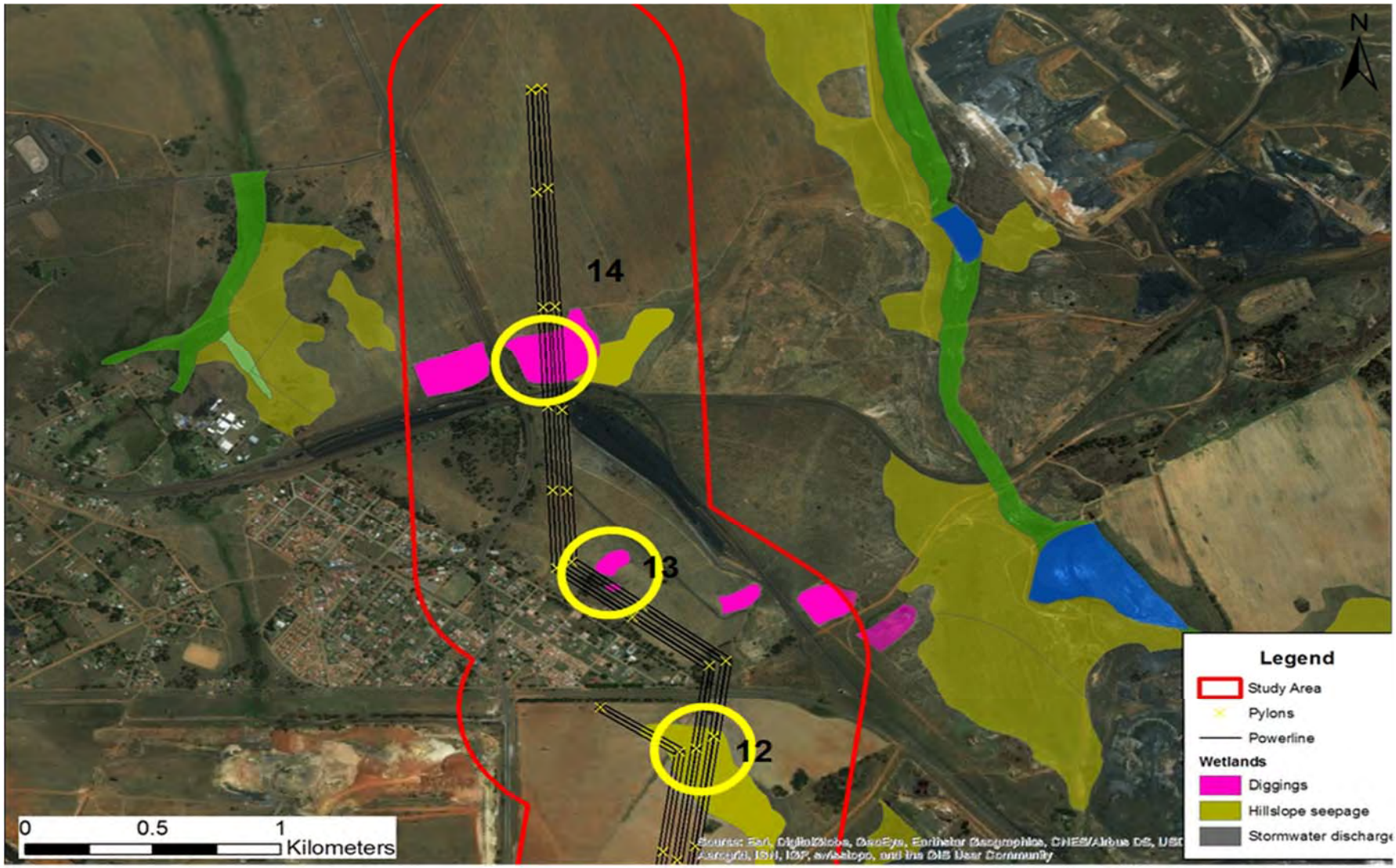
This wetland has been typed as a hillslope seepage wetland. It is an isolated system with no surface linkage to adjacent water resources. The affected reach of wetland is completely cultivated with no natural vegetation remaining. One pylon is expected to be located within the delineated wetland area, with a further two pylons in close proximity.

Wetland Crossing 11

This wetland forms the extreme upper reach of a hillslope seepage wetland. No pylons fall within the delineated wetland habitat. The wetland is surrounded by cultivated fields that extend marginally into the wetland. Downslope of the proposed power line crossing, the wetland drains into a deep, permanently water-filled excavation assumed to be derived from historical mining activity. The wetland drains towards the Blaauwkrans MRD which extends into the wetland habitat

Wetland Crossing 12

Another hillslope seepage wetland that is characterised by seasonal saturation of the soil profile. This system appears isolated with no surface linkage to surrounding water resources. Completely surrounded by cultivation, most of the wetland margins have been converted to maize fields. The central portions of the wetland support fairly intact vegetation consisting of a mosaic of grass and sedge species. Three pylons are proposed to be located within the delineated wetland area, though one of these falls within an area currently under cultivation (Figure 5-35 and Figure 5-36).



srk consulting

RELOCATION OF THREE 400KV POWER LINES
MAP SHOWING WETLAND CROSSINGS 12 TO 14

Project No. 512575

Figure 5-35: Map showing crossings 12 to 14.

Crossing 13

Not a wetland crossing. However, a number of aspects are highlighted:

- A shallow digging occurs within this area which supports some wetland species (e.g. Juncus effusus and Agrostis lachnantha)
- A small area of wetness associated with stormwater discharge from Clewer town was observed along the proposed power line route
- An informal residential dwelling was observed falling within the proposed power line servitude. This dwelling will likely need to be relocated.

srk consulting	**RELOCATION OF THREE 400KV POWER LINES** SHALLOW DIGGING AND STORMWATER DISCHARGE	Project No. 512575

Figure 5-36: Photographs showing the shallow digging (left) and stormwater discharge (right).

Crossing 14

Not a wetland crossing as such, but rather a crossing over an area characterised by historical diggings. Accumulation of water in the diggings following rainfall has resulted in these diggings supporting some wetland vegetation. No pylons are however proposed within the diggings.

Functional Assessment

Numerous functions are typically attributed to wetlands, which include nutrient removal (and more specifically nitrate removal), sediment trapping (and associated with this is the trapping of phosphates bound to iron as a component of the sediment), stream flow augmentation, flood attenuation, trapping of pollutants and erosion control. Many of these functions attributed to wetlands are wetland type specific and can be linked to the position of wetlands in the landscape as well as to the way in which water enters and flows through the wetland. Thus not all wetlands can be expected to perform all functions, or to perform these functions with the same efficiency.

WET-EcoServices is a tool developed to provide an initial, high-level, qualitative assessment of the goods and services that individual wetlands provide so as to aid informed planning and decision making (Kotze et al., 2009). In interpreting the results of the WET-EcoServices assessment, the following must be borne in mind. The level of services delivered is based on current as well as future potential benefits (i.e. a wetland might have high ability to perform a service such as trapping pollutants but is currently afforded little opportunity to perform the service due to a lack of pollutants within the wetland catchment, resulting in an intermediate score);

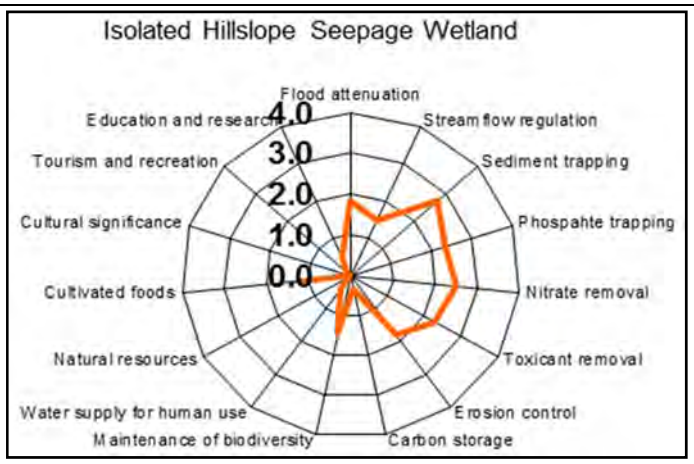
WET-EcoServices scores make no reference to the size of the wetland (i.e. a 3ha wetland and a 300ha wetland might both score 3 for flood attenuation. Given the size of the wetlands in question, the overall importance of flood attenuation performed by the 300ha wetland is obviously greater than for the 3ha wetland). Scores between different hydro-geomorphic wetland units (i.e. different wetland types) should not be compared directly

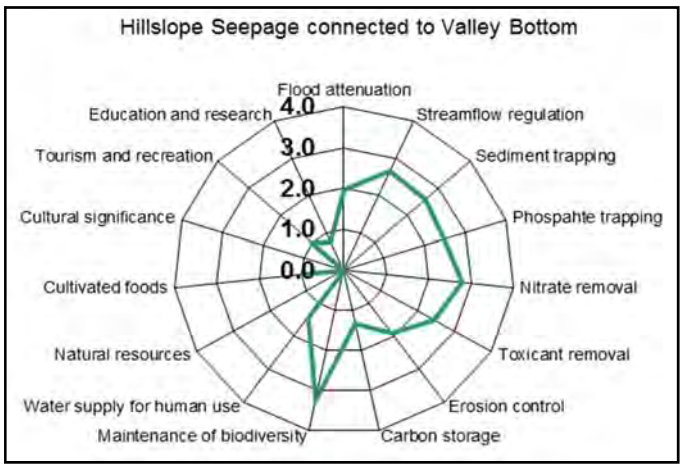
Hillslope seepage wetlands

As alluded to earlier, hillslope seepage wetlands are maintained by shallow sub-surface interflow, derived from rainwater. Rainfall infiltrates the soil profile, percolates through the soil until it reaches an impermeable layer (e.g. a plinthic horizon or the underlying sandstone), and then percolates laterally through the soil profile along the aquitard (resulting in the formation of a perched water table). Such a perched water table occurs across large areas of the Mpumalanga Highveld, not only within hillslope seepage wetlands, but also within terrestrial areas, only at greater depth. The hillslope seepage wetlands are merely the surface expression of this perched water table in those areas where a shallow soil profile results in the perched water table leading to saturation of the profile within 50cm of the soil surface. The importance of individual seepage wetlands in temporarily storing and then discharging flows to downslope wetlands (flow regulation) varies and depends on a number of factors. Generally, seepage wetlands associated with springs and located adjacent to terrestrial areas characterised by deep, well-drained soils are more likely to play an important role in flow regulation than seepage wetlands where the wetland and catchment are characterised by shallower soils. Such seepage wetlands are likely often maintained mostly by direct rainfall and lose most of their water to evapotranspiration, and surface run-off during large storm events. Hillslope seeps can support conditions that facilitate both sulphate and nitrate reduction as interflow emerges through the organically rich wetland soil profile, and are thus thought to contribute to water quality improvement and/or the provision of high quality water. The greatest importance of the hillslope seepage wetlands on site is thus taken to be the movement of clean water through the hillslope seepage wetlands and into the adjacent valley bottom wetlands, though the flow contribution from hillslope seepage wetlands to downslope wetlands was not quantified (Figure 5-37).

As hillslope seepage wetlands, for the most part, are dependent on the presence of an aquiclude, either a hard or soft plinthic horizon, they are not generally regarded as significant sites for groundwater recharge (Parsons, 2004). However, by retaining water in the landscape and then slowly releasing this water into adjacent valley bottom or floodplain wetlands, some hillslope seepage wetlands can contribute to stream flow augmentation, especially during the rainy season and early dry

season. From an overall water yield perspective there is evidence that seepage wetlands contribute to water loss. The longer the water is retained on or near the surface the more likely it is to be lost through evapo-transpiration (McCartney, 2000). Hillslope seepage wetlands are not generally considered to play an important role in flood attenuation, though early in the season, when still dry, the seeps have some capacity to retain water and thus reduce surface run-off. Later in the rainy season when the wetland soils are typically saturated, infiltration will decrease and surface run-off increase. Further flood attenuation can be provided by the surface roughness of the wetland vegetation; the greater the surface roughness of a wetland, the greater is the frictional resistance offered to the flow of water and the more effective the wetland will be in attenuating floods (Reppert et al., 1979). In terms of the hillslope seepage wetlands on site, the surface roughness is taken to be moderately low, given that most of the seepage wetlands are either cultivated of characterised by typical grassland vegetation, thus offering only slight resistance to flow.





srk consulting	**RELOCATION OF THREE 400KV POWER LINES** RESULTS OF THE WET ECOSERVICES ASSESSMENT	Project No. 512575

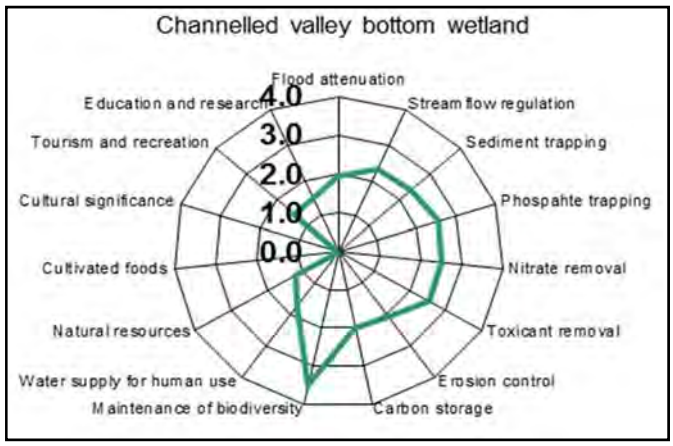
Figure 5-37: Radial plots showing the results of the WET-EcoServices assessment.

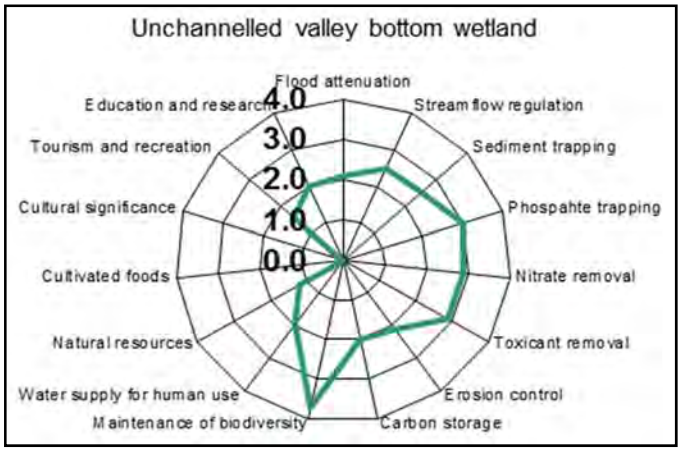
Valley bottom wetlands

The linear nature of valley bottom wetlands within the landscape and their connectivity to the larger drainage system provides the opportunity for these wetlands to play an important role as an ecological corridor allowing the movement and migration of fauna and flora between remaining natural areas within the landscape. Although modified in certain respects, the wetlands still provide a natural refuge for biodiversity, and within the study area and surroundings, the valley bottom wetlands with associated footslope seepage wetlands represent the most significant extent of remaining natural vegetation, further enhancing their importance from a biodiversity support function.

Channelled valley bottom wetlands, through the erosion of a channel through the wetland, indicate that sediment trapping is not always an important function of these wetlands, except where regular overtopping of the channel occurs and flows spread across the full width of the wetland. Under low and medium flows, transport of sediment through, and out, of the system are more likely to be the dominant processes. Erosion may be both vertical and/or lateral and reflect the attempts of the stream to reach equilibrium with the imposed hydrology. From a functional perspective channelled valley bottom wetlands can play a role in flood attenuation when flows over top the channel bank and spread out over a greater width, with the surface roughness provided by the vegetation further slowing down the flood flows. These wetlands are considered to play only a minor role in the improvement of water quality given the short contact period between the water and the soil and vegetation within the wetland.

Un-channelled valley bottom wetlands reflect conditions where surface flow velocities are such that they do not, under existing flow conditions, have sufficient energy to transport sediment to the extent that a channel is formed. In addition to the biodiversity associated with these systems it is expected that they play an important role in retaining water in the landscape as well as in contributing to influencing water quality through for example mineralisation of rain water. These wetlands could be seen to play an important role in nutrient removal, including ammonia, through adsorption onto clay particles. Water quality within the Noupoortspruit wetland has however been significantly impacted by mining activities within the wetland catchment. The large size of the unchannelled valley bottom wetland associated with the Noupoortspruit suggests that this wetland plays an important role in flood attenuation – the temporary storage of flood waters within the wetland (Figure 5-38).





srk consulting	**RELOCATION OF THREE 400KV POWER LINES** RESULTS OF THE WET ECOSERVICES ASSESSMENT	Project No. 512575

Figure 5-38: Radial plots showing the results of the WET-EcoServices assessment.

Present Ecological Status

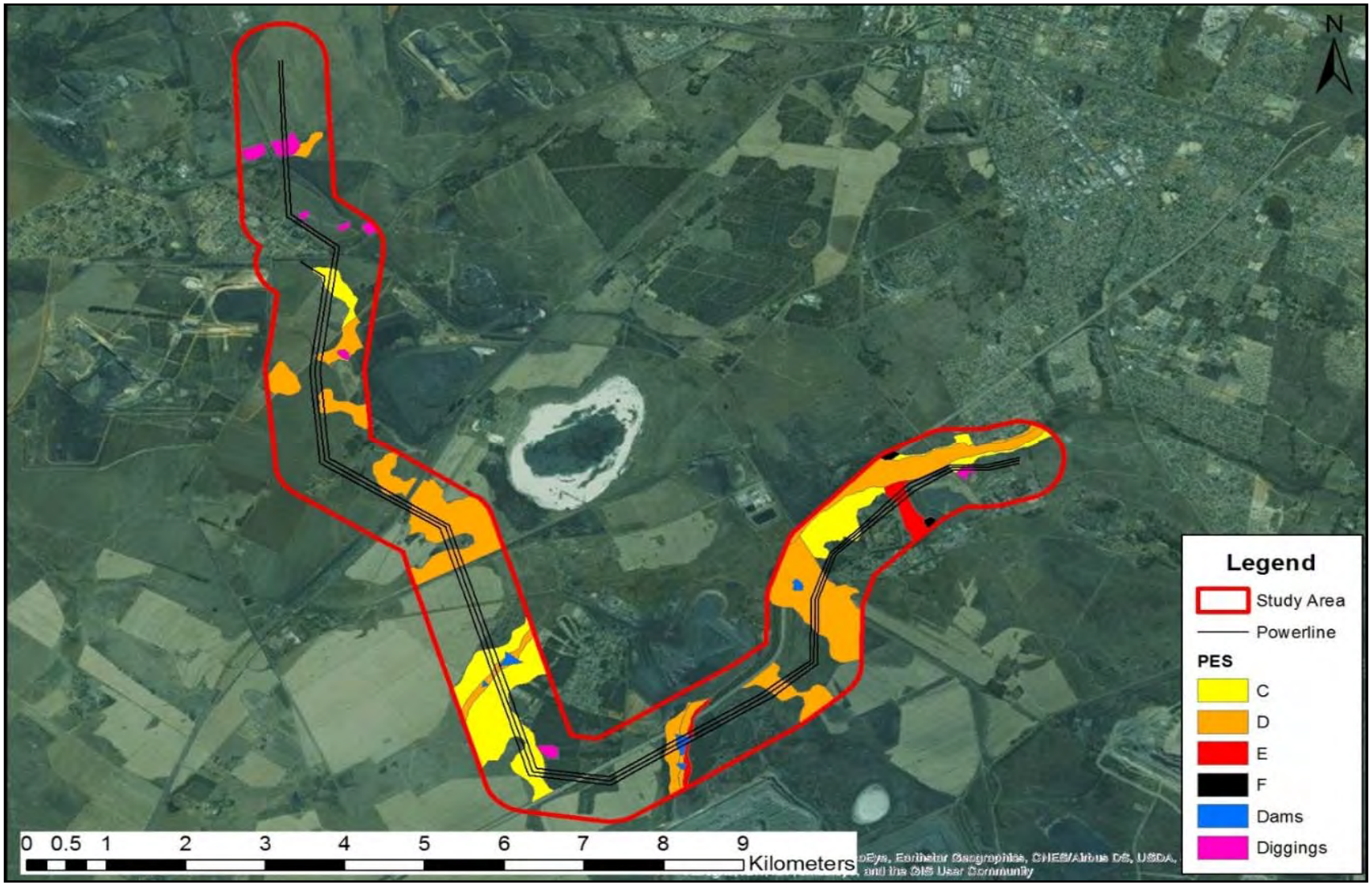
A WET-Health Level 1 assessment was undertaken for all of the wetlands that will be crossed by the proposed power lines. Results are shown in Table 5-15 and Figure 5-39. The bulk of the wetlands have been classified as largely modified, with two wetland systems classified as seriously modified. Wetland degradation is a result of changes in wetland hydrology brought about by land use changes within the wetland catchment and, in some cases, within the wetland itself. A number of the wetlands have been impacted by a variety of historical mining activities (Crossing 2, Crossing 4, Crossing 5, Crossing 6, Crossing 8) that have seriously altered the water inputs to and flow distribution within the wetlands. As a result of these hydrological changes the vegetation of these wetlands has also been altered, exacerbated by direct disturbance of wetland vegetation. Many of the hillslope seepage wetlands are characterised by secondary vegetation and dominated by pioneer species tolerant of disturbance. Alien vegetation in the form of Eucalyptus trees is prevalent in many of the wetlands, most severely in Crossing 6. Agricultural activities have also impacted significantly on a number of wetlands. Wetlands associated with crossings 9 and 10 have been cultivated virtually in their entirety, resulting in no natural vegetation remaining.

Table 5-15: Summarised results of the PES assessment.

ID	Wetland Type	Hydrology Impact Score	Geomorphology Impact Score	Vegetation Impact Score	Combined PES Score	PES Category
Crossing 1	Hillslope seepage	**4.0**	**0.5**	**3.4**	**2.8**	**C**
Crossing 2	Hillslope seepage	8.0	4.0	6.6	6.5	E
Crossing 3	Hillslope seepage	4.0	1.5	4.4	3.4	C
Crossing 4	Hillslope seepage	6.0	2.0	5.5	4.7	D
Crossing 5	Hillslope seepage	6.5	2.0	5.0	4.8	D
Crossing 6	Hillslope seepage (east)	9.5	2.0	7.0	6.6	E
	Channelled valley bottom	7.5	6.3	1.6	5.5	D
	Hillslope seepage (west)	6.5	2.0	3.4	4.3	D
Crossing 7	Hillslope seepage (south)	4.0	2.0	5.4	3.8	C
	Channelled valley bottom	6.0	7.4	2.3	5.3	D
	Hillslope seepage (north)	3.5	2.0	2.0	2.6	C
Crossing 8	Hillslope seepage	7.0	1.8	6.5	5.4	D
Crossing 9	Hillslope seepage	6.0	2.0	8.7	5.6	D
Crossing 10	Hillslope seepage	6.0	2.0	9.0	5.7	D
Crossing 11	Hillslope seepage	6.0	2.0	5.1	4.6	D
Crossing 12	Hillslope seepage	2.0	2.0	3.2	2.3	C

Table 5-16: Table showing the rating scale used for the PES assessment (from Macfarlane et al., 2009).

Description	Combined impact score	PES Category
Unmodified, natural.	0-0.9	A
Largely natural with few modifications. A slight change in ecosystem processes is discemable and a small loss of natural habitats and biota may have taken place	1-1.9	B
Moderately modified. A moderate change in ecosystem processes and loss of natural habitats taken place but the natural habitat remains predominantly intact	2-.39	C
Largely modified. A large change in ecosystem processes and loss of natural habitat and biota and has occurred	4-5.9	D
The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable	6.7-9	E
Modifications have reached a critical level and ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota	8-10	F



srk consulting

RELOCATION OF THREE 400KV POWER LINES
RESULTS OF THE PES ASSESSMENT

Project No.
512575

Figure 5-39: Map illustrating the results of the PES assessment.

Ecological importance and sensitivity

"*Ecological importance*" of a water resource is an expression of its importance to the maintenance of ecological diversity and functioning on local and wider scales. "Ecological sensitivity" refers to the system's ability to resist disturbances and its capability to recover from disturbance once it has occurred. In determining the EIS of a wetland, the following factors are considered:

- Biodiversity – i.e. the presence of rare and endangered species, populations of unique species, species richness, diversity of habitat types, and migration/breeding and feeding sites for wetland species
- Hydrological functionality – i.e. sensitivity to changes in the supporting hydrological regime and/or changes in water quality, Toxins and nitrate assimilation and sediment trapping
- Functionality – i.e. flood storage, energy dissipation and particulate/element removal
- Direct human benefit – i.e. human water use as a harvestable resource, cultivation and cultural heritage

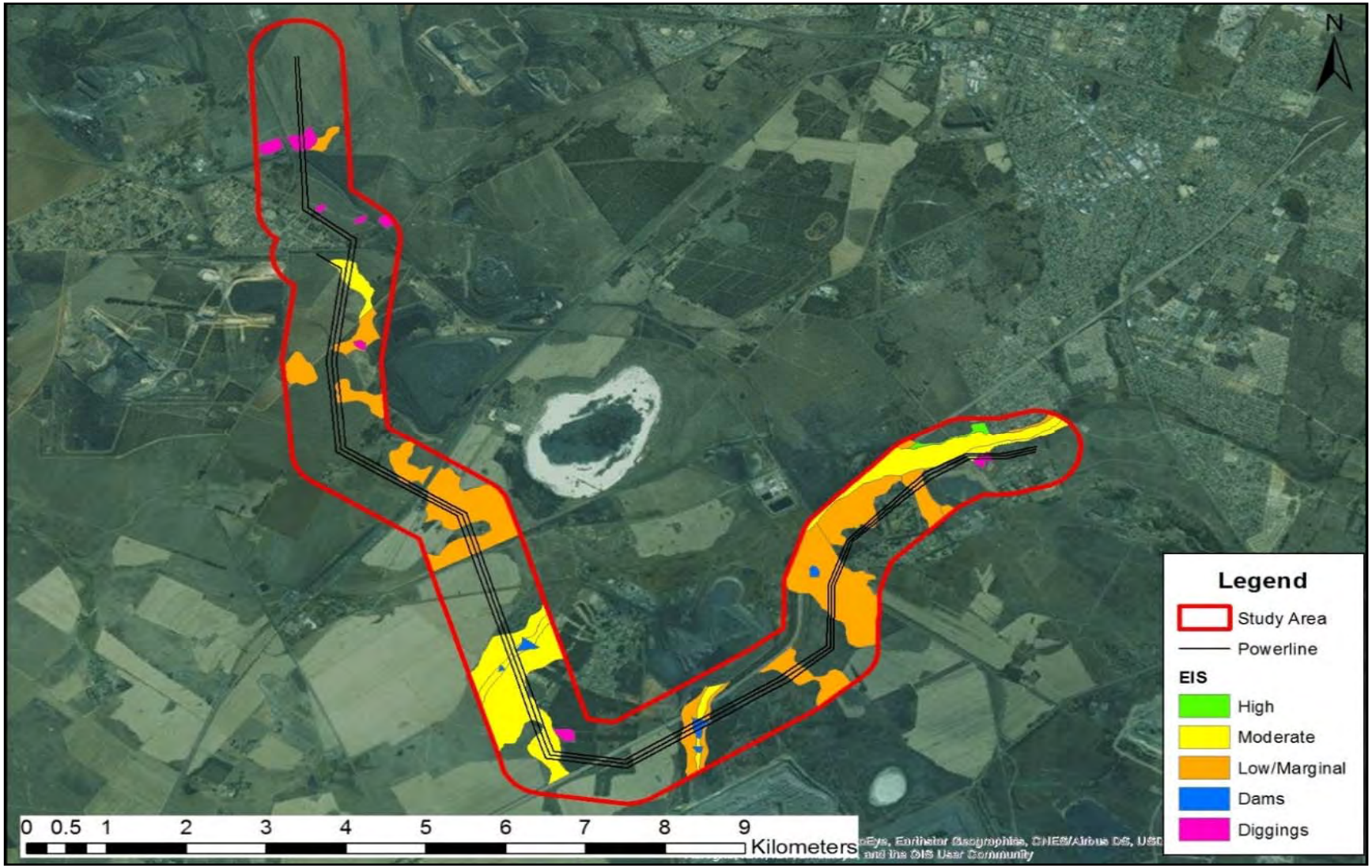
The wetlands within the study area form part of the Olifants River Primary catchment which is a heavily utilised and economically important catchment. Wetlands and rivers within the Olifants River Catchment upstream of Loskop Dam have been greatly impacted upon by various activities, which include mining, power stations, water abstraction, urbanization, agriculture etc. As a result of these impacts serious water quality and quantity concerns have been raised within the sub-catchment. Given this situation, and the fact that wetlands can support functions such as water purification and stream flow regulation, a high importance and conservation value is placed on all wetlands and rivers within the catchment that have as yet not been seriously modified. Within this context an EIS assessment was conducted for every hydro-geomorphic wetland unit identified within the study area. Further considerations that informed the EIS assessment include:

- The location of the study area within a vegetation type (Eastern Highveld Grassland) considered extensively transformed and threatened, having been classed as **Vulnerable**
- The wetland vegetation types of the area, Mesic Highveld Grassland Group 4, which is considered to be **Least Threatened and Not Protected**
- The presence of Critical Biodiversity Areas identified in the Mpumalanga Biodiversity Sector Plan
- The generally moderately to largely modified state of the wetlands and watercourse within the study area, with most of the wetland habitat considered largely modified.

It is these considerations that have informed the scoring of the systems in terms of their ecological importance and sensitivity. The results of the assessment and rankings based on our current understanding of the wetlands is summarised in Table 5-17, while an explanation of the scoring system is presented in Figure 5-40.

Table 5-17: Table showing the summarised results of the EIS assessment.

Wetland ID	HGM Type	Ecological Importance & Sensitivity Score	Hydro-Functional Importance	Direct Human Benefits	Overall Importance & Sensitivity
Crossing 1	Hillslope seepage	Moderate	Low/Marginal	Low/Marginal	**Moderate**
Crossing 2	Hillslope seepage	Low/Marginal	Low/Marginal	Low/Marginal	**Low/Marginal**
Crossing 3	Hillslope seepage	Low/Marginal	Low/Marginal	Low/Marginal	**Low/Marginal**
Crossing 4	Hillslope seepage	Low/Marginal	Low/Marginal	Low/Marginal	**Low/Marginal**
Crossing 5	Hillslope seepage	Low/Marginal	Low/Marginal	Low/Marginal	**Low/Marginal**
Crossing 6	Hillslope seepage (east)	Low/Marginal	Low/Marginal	Low/Marginal	**Low/Marginal**
	Channelled valley bottom	Moderate	Moderate	Low/Marginal	**Moderate**
	Hillslope seepage (west)	Low/Marginal	Low/Marginal	Low/Marginal	**Low/Marginal**
Crossing 7	Hillslope seepage (south)	Moderate	Low/Marginal	Low/Marginal	**Moderate**
	Channelled valley bottom	Moderate	Moderate	Low/Marginal	**Moderate**
	Hillslope seepage (north)	Moderate	Low/Marginal	Low/Marginal	**Moderate**
Crossing 8	Hillslope seepage	Low/Marginal	Low/Marginal	Low/Marginal	**Low/Marginal**
Crossing 9	Hillslope seepage	Low/Marginal	Low/Marginal	Low/Marginal	**Low/Marginal**
Crossing 10	Hillslope seepage	Low/Marginal	Low/Marginal	Low/Marginal	**Low/Marginal**
Crossing 11	Hillslope seepage	Low/Marginal	Low/Marginal	Low/Marginal	**Low/Marginal**
Crossing 12	Hillslope seepage	Moderate	Low/Marginal	Low/Marginal	**Moderate**



srk consulting	**RELOCATION OF THREE 400KV POWER LINES** RESULTS OF THE EIS ASSESSMENT	Project No. 512575

Figure 5-40: Map showing the results of the EIS assessment.

Table 5-18: Table explaining the scoring system used for the EIS assessment.

Ecological Importance and Sensitivity categories	Range of EIS score
Very high: Wetlands that are considered ecologically important and sensitive on a **national or even international** level. The biodiversity of these systems is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water of major rivers.	>3 and <=4
High: Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these systems may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.	>2 and <=3
Moderate: Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these systems is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers.	>1 and <=2
Low/marginal: Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these systems is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major rivers.	>0 and <=1

Ecological classification (Recommended Ecological Category)

The Recommended Ecological Category (REC) was determined based on the results of the PES and EIS assessments, as per the methodology proposed by Rountree et al. (2013). These REC's should be considered provisional and could be revised under a scenario where more detailed wetland reserve studies are undertaken of the affected wetlands (Table 5-19).

Table 5-19: Provisional Recommended Ecological Categories for the affected wetlands.

Wetland ID	HGM Type	PES Assessment Results	EIS Assessment Results	REC (Recommended Ecological Category)
Crossing 1	Hillslope seepage	**C**	**Moderate**	**C**
Crossing 2	Hillslope seepage	**E**	**Low/Marginal**	**D**
Crossing 3	Hillslope seepage	**C**	**Low/Marginal**	**C**
Crossing 4	Hillslope seepage	**D**	**Low/Marginal**	**D**
Crossing 5	Hillslope seepage	**D**	**Low/Marginal**	**D**
Crossing 6	Hillslope seepage (east)	**E**	**Low/Marginal**	**D**
	Channelled valley bottom	**D**	**Moderate**	**D**
	Hillslope seepage (west)	**D**	**Low/Marginal**	**D**
Crossing 7	Hillslope seepage (south)	**C**	**Moderate**	**C**
	Channelled valley bottom	**D**	**Moderate**	**D**
	Hillslope seepage (north)	**C**	**Moderate**	**C**
Crossing 8	Hillslope seepage	**D**	**Low/Marginal**	**D**
Crossing 9	Hillslope seepage	**D**	**Low/Marginal**	**D**
Crossing 10	Hillslope seepage	**D**	**Low/Marginal**	**D**
Crossing 11	Hillslope seepage	**D**	**Low/Marginal**	**D**
Crossing 12	Hillslope seepage	**C**	**Moderate**	**C**

5.1.10 Heritage

The heritage survey was conducted according to the accepted Heritage Impact Assessment (HIA) practices and was aimed at locating all possible objects, sites and features of cultural significance in the area of proposed development.

Public consultation was done as part of the heritage study. A site notice was placed close the MRD on 12 April 2017 (Figure 5-41). A newspaper notices was placed in the Witbank News on Friday 14 April 2017 (Figure 5-41). The public consultation period of 30 days therefore ends on 14 May. No comments related to heritage were received (**Appendix D 3** for Heritage Impact Assessment specialist report).

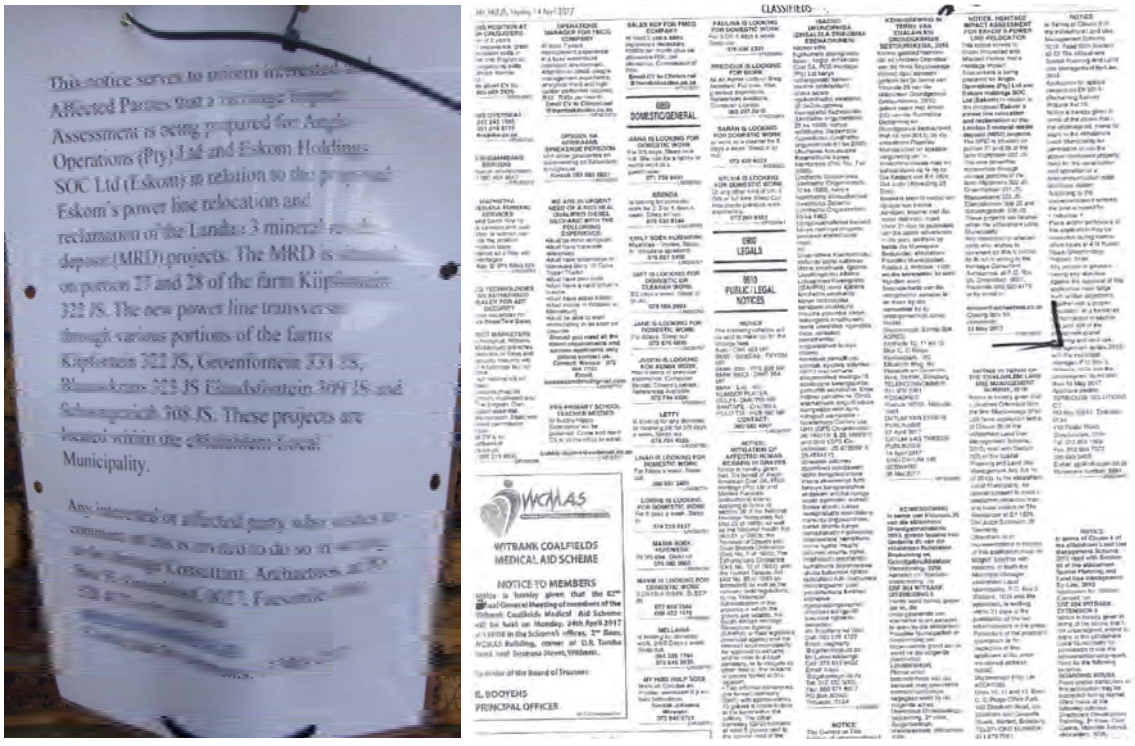


Figure 5-41: HIA site notice near MRD (left) and HIA Newspaper advert in the Witbank News (right)

The heritage survey was undertaken by doing a physical survey via off-road vehicle and on foot and covered as much as possible of the area to be studied (Figure 5-42). Unfortunately, some gates were closed restricting actions to sections of some of the routes, but even from a distance these seems to have had the same disturbed character as the rest. Certain factors, such as accessibility, density of vegetation, etc. may however influence the coverage. In this instance the under footing was extremely dense and the vegetation cover medium to high. Accordingly, both the horizontal and the vertical archaeological visibility was influenced negatively. The survey took 12 hours to complete.

srk consulting	**RELOCATION OF THREE 400KV POWER LINES** GPS TRACK OF SURVEYED AREA	Project No. 512575

Figure 5-42: GPS track of the surveyed area North reference is to the top

All sites, objects features and structures identified were documented according to the general minimum standards accepted by the archaeological profession. Co-ordinates of individual localities were determined by means of the GPS. The information was added to the description in order to facilitate the identification of each locality.

The surveyed area is mainly used for mining and therefore it is an almost entirely disturbed setting. Prior to mining the land use was mainly cattle and maize farming. As a result very little of the original natural vegetation remains in the project area. Pioneer species such as grass and weeds therefore dominate the environment. Exotic invader species such as black wattle are also found in isolated spots within the area. Clearly the surveyed area had been disturbed by recent human interventions. The proposed power lines starts at the MRD, which is a large mine impact in the area (Figure 5-43). It follows the N12 National road in a westerly direction, through an area consisting of dense disturbed vegetation, mainly consisting of pioneer species (Figure 5-44). It then jumps the N12 in a northern direction (Figure 5-45). The vegetation cover varies between areas with short grass and others with very dense and high vegetation (Figure 5-46 & Figure 5-47). The latter has a negative effect on both the horizontal as the vertical archaeological visibility. Apart from the above, other signs of disturbance are maize fields (Figure 5-48), roads and areas disturbed by mining activities (Figure 5-49).

The topography is relatively even. It does however fall towards the few perennial and non-perennial streams, which occurs in the surveyed area.

srk consulting	**RELOCATION OF THREE 400KV POWER LINES** VEGETATION VIEW ALONG PROPOSED POWER LINES ROUTE CLOSE TO THE MRD	Project No. 512575

Figure 5-43: View of vegetation along the proposed power lines route close to the MRD

srk consulting	**RELOCATION OF THREE 400KV POWER LINES** VEGETATION VIEW ALONG POWER LINES ADHACENT TO THE N12	Project No. 512575

Figure 5-44: View of vegetation along the power lines adjacent to the N12

srk consulting	**RELOCATION OF THREE 400KV POWER LINES** VEGETATION VIEW ALONG POWER LINES ROUTE WHERE IT JUMPS THE N12	Project No. 512575

Figure 5-45: View along power lines route where it jumps the N12

srk consulting	**RELOCATION OF THREE 400KV POWER LINES** VEGETATION VIEW OF PROPOSED POWER LINES TOWARDS THE NORTH OF THE N12	Project No. 512575

Figure 5-46: View along the proposed power lines route towards the north of the N12

srk consulting	**RELOCATION OF THREE 400KV POWER LINES** VEGETATION VIEW AT POINT WHERE THE PROPOSED POWER LINES ROUTE ENDS	Project No. 512575

Figure 5-47: View of vegetation at point where the proposed power lines route ends

srk consulting	**RELOCATION OF THREE 400KV POWER LINES** MAIZE CROPS ALONG THE CENTRAL SECTION OF THE PROPOSED POWER LINES	Project No. 512575

Figure 5-48: Maize crops along the central section of the proposed power lines route

srk consulting	**RELOCATION OF THREE 400KV POWER LINES** REMAINS OF FORMER MINING ACTIVITIES	Project No. 512575

Figure 5-49: Remains of former mining activities along the proposed power lines route.

The survey of the indicated area was completed successfully. As indicated no sites of cultural heritage significance were identified within the proposed project area.

5.2 Socio-economic environment

This section of the report describes the socio-economic trends of the project environment, prior to commencement of the proposed relocation of the power lines.

No social impact assessment was undertaken for this project. Baseline social data was taken from previous studies for other processes at Landau Colliery, which referenced Emalahleni Local Municipality (ELM's) Integrated Development Plan (IDP) for 2011-2012, the Community Survey 2007 Municipal Data on Household Services, and Statistics South Africa 2001 Census, Landau Resettlement Action Plan, 2017).

5.2.1 Mpumalanga Province

Population

The Mpumalanga Province has the fourth largest economy, based largely on the rich natural resources of the area. However, as with the rest of the South African economy, this growth rate has slowed down considerably (Mpumalanga Department of Economic Development, Environment and Tourism, 2009).

While the Mpumalanga Province, with 4.3 million residents, accounted for 8.0% of South Africa's population in 2014/5, it contributed 7.0% of the Gross Domestic Product. In 2014, the real economy (represented by agriculture, mining, manufacturing and construction) made up 40.0% of its output. The real economy sector was dominated by mining, at 22.0% of the provincial economy (StatsSA, 2016).

The population of 2.6 million in 1996 has grown to over 4 million in 2011, now representing approximately 8.0% of the South African population (StatsSA census, 2011). Table 5-20 provides the structure of this population. Black Africans are in the majority, representing 90.6% of the total population. ELM shows a similar pattern.

Table 5-20: Population structure of the Mpumalanga Province

Population Group	Male	Female	Total
Black	1 781 368	1 880 850	3 662 219
White	151 557	152 038	303 595
Coloured	18 149	18 462	36 611
Indian/Asian	16 165	11 753	27 917
Other	6 817	2 780	9 597
Total	**1 974 055**	**2 065 883**	**4 039 939**

Source: StatsSA, 2011

5.2.2 Nkangala District Municipality

The Nkangala District Municipality (NDM) has a population of 1 020 590 with the total number of households being 246 049. The NDM contributes 32.0% (overall) to the Mpumalanga Province's population and has a higher average annual population growth rate than the province (NDM Integrated Development Plan (IDP), 2016/2017).

5.2.3 Emalahleni Local Municipality

In 2011, the total population of ELM was 395 466, which has since increased to 455 225 in 2016 (The Local Government Handbook). By 2020, the population of ELM is expected to be 489 450. (ELM Profile, 2013).

The total number of households in ELM was 111 874 in 2011, and of these 27.9% were female headed. A quarter of the population were children below the age of 14, which contributed to the dependency

rate of 40%. The official unemployment rate for ELM was 27%, with the youth unemployment rate of 36% in 2011 (StatsSA, 2011).

The age and sex structure of the ELM shows an atypical pattern for a developing province such as Mpumalanga. In 2001, an equal size of the population occurred in the age groups between 0 to 4 years and 20 to 24 years, indicating a population stabilizing over time with stable levels of fertility. A typically aging population was determined for the ELM in 2001. In comparison, the pattern shown in 2007 has distortions in the middle ages with an unusually larger population of males compared to females between the ages of 20 and 34; this may be an indication of high economic activity within the ELM.

ELM has 34 849 people who depend on grants. The grant with the largest recipients is the child support grant followed by old age grants (ELM Draft IDP 2015-2016).

Mining is the dominant economic sector in the ELM, contributing to more than 46.0% of the Gross Value Add (GVA) of the municipality. Due to the labour intensive mining methods used in ELM, 28.0% of people are employed in local mines. All other economic sectors contribute less than 10.0% each of the Gross Value Add of LM. In 2011, ELM contributed to 2.4% of the National GVA.

Education

The provision of educational services to a population, in the ELM is higher compared to most municipalities in Mpumalanga province. In addition, improvement in educational levels was observed to occur between 2001 and 2007. About 14% of males and 15% of females over 20 years had no schooling in 2001. This was reduced to 8% for both males and females by 2007, which indicate favourable improvements in educational attainment over a period of 6 years. There was also a reduction in the percentage of persons with primary educational attainment in favour of higher educational levels. What is unexpected is the reduction in the percentage with Grade 12 between 2001 and 2007 for both males and females. This decline is not offset by more persons attaining qualifications higher than Matric, since the percentage with higher education hardly changed.

Employment

Employment opportunities are favourable in the ELM, roughly 61% for males and 38% for females, were employed in 2007. Previously specialist studies in the area indicate that there has been a reduction in the percentage unemployed in the district between 2001 and 2007 for both males and females. The decline is similar for males and females, although employment remains higher for males than for females.

About a third of females were unemployed in 2001 compared to 20% of males in economically active ages. By 2007, this was reduced to 18% for males and 27% for females. Also evident is that the improvements in employment are much more prominent for males rather than females by 2007. In general, the municipality has better employment opportunities in the district.

Access to water

The majority of households have access to safe water either through pipes to within the dwelling, or access it from a point outside the dwelling. There were some improvements in provision of piped water inside the dwelling between 2001 and 2007 (from 42% to 46%). Evidence suggests that the provision of basic services had focused its attention towards lowering the number accessing piped water from outside a dwelling. Not much change is observed from the other types of water sources, except for eliminating households that had unspecified water sources in 2001.

Access to sanitation

In 2001, over two thirds (75%) of households in the municipality either had a flushed toilet or pit latrine without ventilation. There is clear evidence of a local government campaign to replace pit latrines

without ventilations with those that are ventilated to promote safer sanitation facilities. By 2007, almost no households were using pit latrine without vent. Although the number of households with no toilet facility has declined between 2001 and 2007, the decline is small.

Access to electricity

Electricity was the leading source of energy for all uses; however, it declined somewhat between 2001 and 2007 in the ELM. In 2007, electricity use for heating and cooking was observed in 47% and 60% of households, respectively. Electricity use among households was not uniform, meaning even households with electricity do not choose to use it for all their energy needs. The other sources of cooking and heating energy are paraffin and coal, the use of which increased in 2007, while the use of electricity declined between 2001 and 2007 from 69% to 60%. The use of candles and paraffin for lighting surprisingly increased between 2001 and 2007, an unusual trend in all the Mpumalanga municipalities.

Dwelling type

The type of dwelling where a household resides is directly linked to well-being of household members. There is evidence that suggests that children under age 5 who reside in dwellings that have poor floor, wall and roof materials have higher prevalence of negative developmental outcomes. They have higher mortality during childhood, higher morbidity and lower school attendance. This is also because dwellings with poor building structures are often poor, have no access to other basic services, such as safe water and sanitation. The types of dwelling that prevailed in the municipality in 2007 were formal dwellings, such as houses. There was actually a decline in formal dwelling between the 6 year period, and an increase in informal dwellings.

Subsistence Farming

Subsistence farming is currently practised by some of the households in the area.

Crop farming

Some households cultivate crops. The crops cultivated include maize, beans, onions, potatoes and tomatoes. These are located around the homestead. During the census in December 2016, the households indicated that during the rainy seasons, they sold their surplus produce for cash, but had not been able to do so due to the drought in 2016.

Land Tenure

Security of tenure is one of the key considerations and goals of a resettlement process. Affected households do not have formal title deeds to their properties. However, they are protected under the Land Reform (Labour Tenants) Act 3 of 1996 (refer to Section 3 for additional detail). This is based on the fact that they have lived on the land for over twenty years.

5.2.4 Relocation of households

Three households directly adjacent to Clewer have been identified in the proposed power line servitude. The three households can be described as informal subsistence households.

Relocation of these households will be required prior to the commencement of construction. A Resettlement Action Plan is being undertaken to assess the relocation of the households. As part of the RAP livelihood restoration will be assessed. The relocation process is separate to this EIA.

Figure 5-50 below shows the location of the three households that will be relocated.

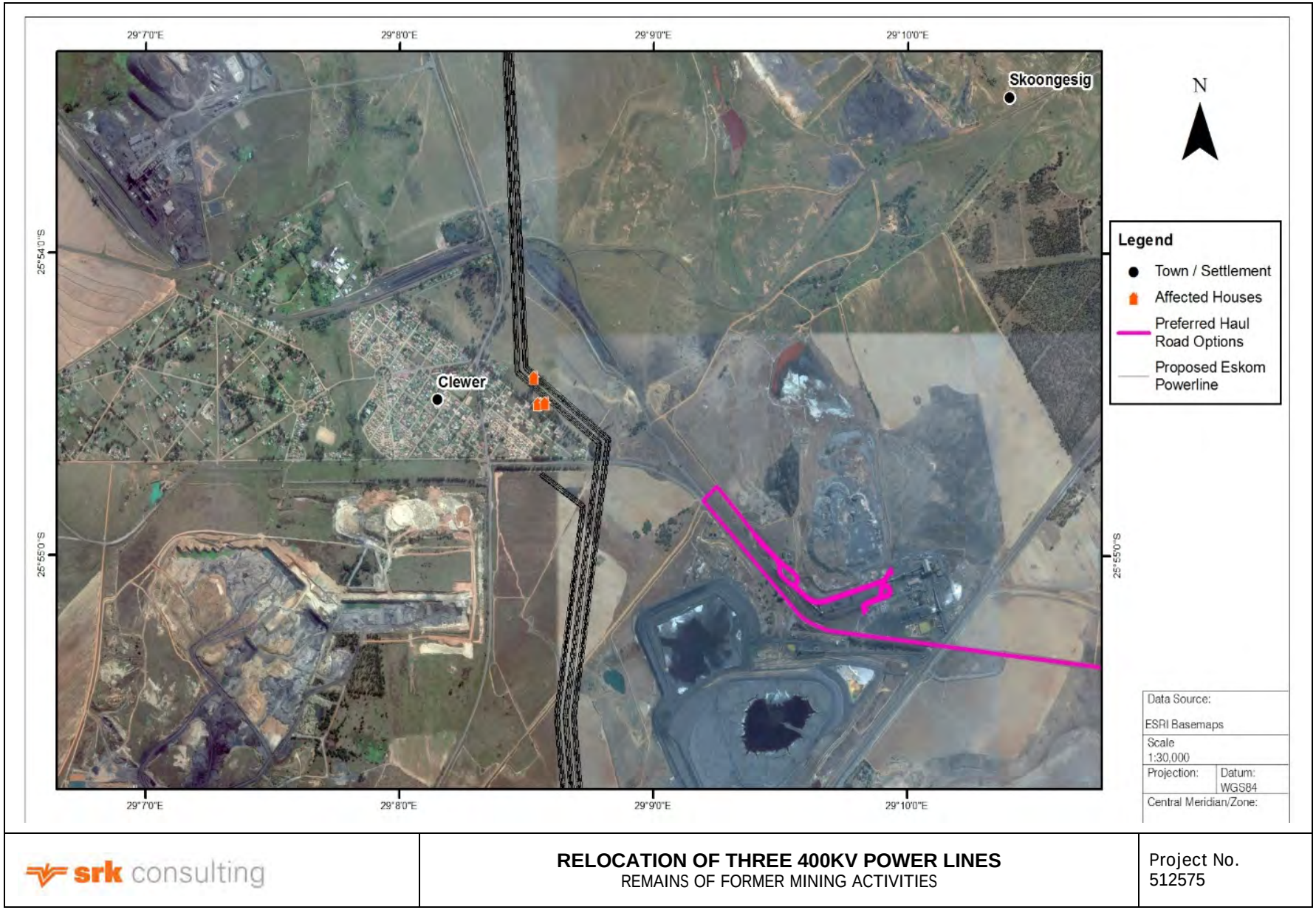


Figure 5-50: Affected houses map

6 Stakeholder Engagement

Stakeholder engagement forms a key component of the S&EIR process. The objectives of stakeholder engagement are outlined in this section, followed by a summary of the approach to be followed, in compliance with Chapter 6 of the EIA Regulations, 2014. The stakeholder engagement for the MRD and the relocation of the power line will be undertaken together as the power line transverses through the MRD (**Appendix C** for Stakeholder Engagement material).

6.1 Objectives and Approach to Stakeholder Engagement

The overall aim of stakeholder engagement is to ensure that all I&APs have adequate opportunity to provide input into the process and raise their comments and concerns. More specifically, the objectives of stakeholder engagement are to:

- Identify I&AP s and inform them about the proposed development and S&EIR process
- Provide stakeholders with the opportunity to participate effectively in the process and identify relevant issues and concerns
- Provide stakeholders with the opportunity to review documentation and assist in identifying mitigation and management options to address potential environmental issues.

6.2 Stakeholder Engagement Activities

The activities undertaken during the Pre-Application and Scoping Phases of the assessment are outlined in Figure 6-1 below.

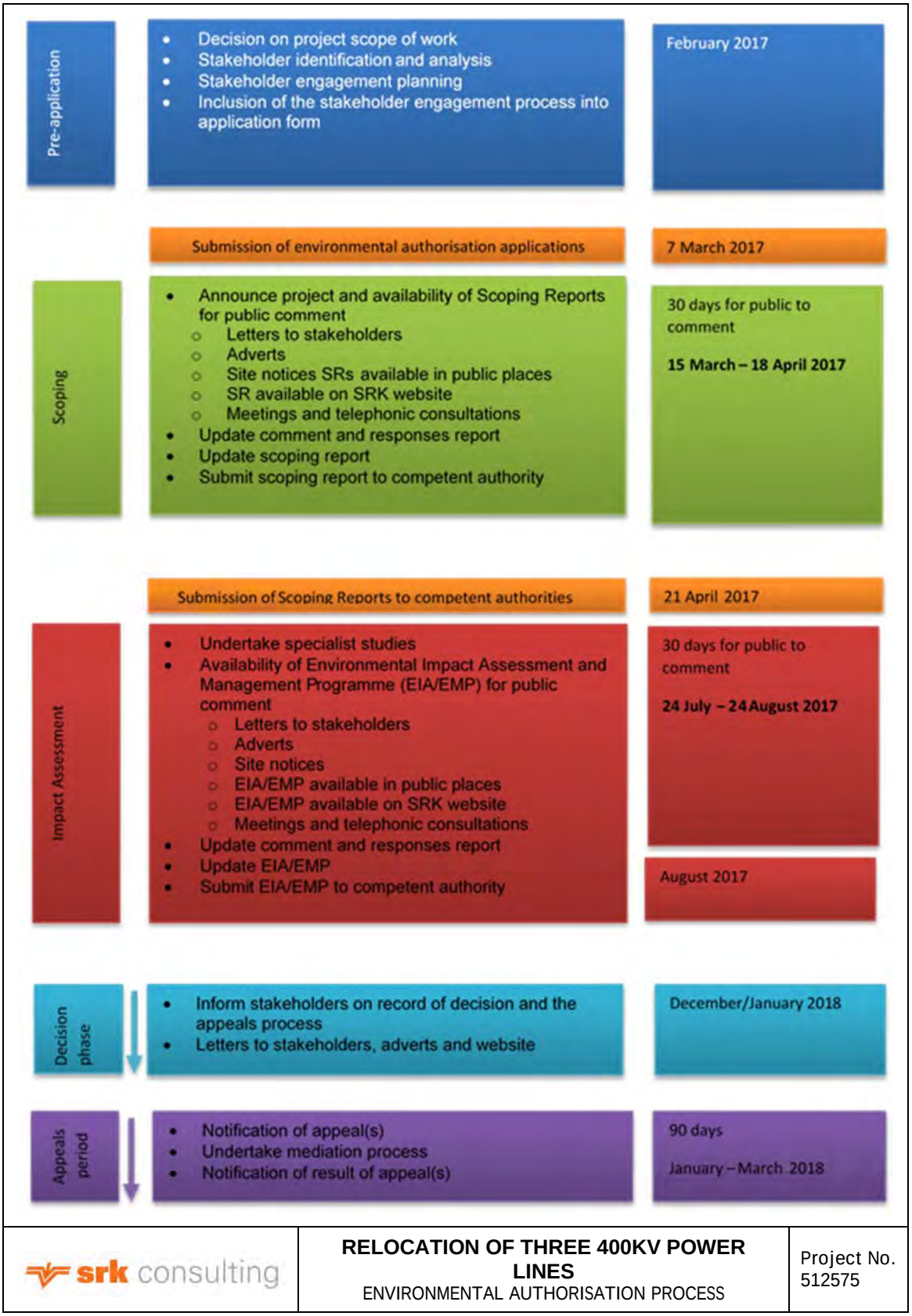


Figure 6-1: Environmental authorisation process for power line relocation projects

The key activities undertaken in the stakeholder engagement process during the Pre-Application and Scoping Phases are described further below.

6.2.1 Identification of key stakeholders

As required by the EIA Regulations, 2014, relevant local, provincial and national authorities, conservation bodies, local forums, representatives and surrounding land owners and occupants have been notified of the authorisation process and the release of the EIA Report for comment.

Relevant authorities (Organs of State) have been automatically registered as I&AP s. In accordance with the EIA Regulations, 2014, all other persons must request in writing to be placed on the register, submit written comments or attend meetings in order to be registered as stakeholders and included in future communication regarding the project. As specified in GN R 982, all persons who submit written comments, attend meetings or request in writing to be placed on the register will be registered as I&AP s, and advertisements advise that I&AP s register as such.

The stakeholder database will be updated throughout the process.

6.3 Pre-Application Phase

AOL has been identified as the landowner on which the power lines are situated. Other relevant authorities have been identified as stakeholders, including:

- District and local municipalities i.e, Nkangala District Municipality and eMahlahleni Local Municipality
- Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs (MDARDLEA)
- Department of Water and Sanitation (DWS)
- Mpumalanga Tourism and Parks Agency (MTPA)
- Department of Transport
- South African Heritage Resource Association (SAHRA).

The steps undertaken in this phase include:

- Identification of stakeholders
- Compilation of a stakeholder database. The stakeholder register is attached as **Appendix C 1**.

6.3.1 Meetings undertaken to date: Pre-Application Phase

The following meetings were undertaken as part of the pre-application phase:

- A meeting was held on 8 March 2017 and 10 March respectively with the eMahlahleni Local Municipality (ELM) and Ward Councillors to present the project. The minutes of these meeting (including the presentations) and attendance register are attached as **Appendix C 2**
- A pre application meeting was held on 14 March 2017 with the Department of Environmental Affairs (DEA) to present the project. The minutes of the meeting (including the presentation) and attendance register are attached as **Appendix C 2**
- A meeting was held on 24 March 2017 with lessee's on AOL land to present the project. The minutes and presentation of this meeting are included in **Appendix C 2**
- A project briefing meeting was held on 6 June 2017 with officials from the Spatial Planning Department of the eMahlahleni Local Municipality that did not attend the meeting that took place on 8 March 2017. Minutes of this meeting (including the presentation) and the attendance register are attached as **Appendix C 2.**

6.4 Scoping Phase

The following activities formed part of the scoping phase:

- A Background Information Letter and comment sheet were distributed on 15 March 2017 to identified stakeholders in English via email communication. Stakeholders were invited to register as I&APs and comment on the Scoping Report that was available for a public comment period of 30 days from Wednesday, 15 March to Tuesday 18 April 2017. The letter was also available in isiZulu and in Afrikaans upon request. Copies of this letter and comment sheet are attached as **Appendix C 3**
- Availability of the Scoping Report and the public meeting on 7 April 2017 was advertised in the Witbank News in Afrikaans, English and isiZulu on 16 March 2017(proof of publication is attached in **Appendix C 4**), including the public venues where the report was available for public viewing. The public venues were as follows:
  - eMalahleni Public Library
  - Matimba Resource Centre
  - Clewer Post Office
  - Tasbet Park Total Garage
  - Greenside Colliery
  - North and South Union Offices
  - eMalahleni Local Municipality (reception and spatial planning).
- Site notices were placed along the power line route (in English, Afrikaans and isiZulu) and in a number of public venues (refer to photos in **Appendix C 5**.
- A public meeting was scheduled for 7 April 2017 at 14:00 at the Matimba Hall in Matimba Village. The public meeting was advertised as follows:
  - Loud hailing to announce the date of the public meeting and to inform communities that bus transportation were to be provided to stakeholder to attend the public meeting took place on Saturday 25 March 2017 in the following areas:
    - Clewer
    - Tasbet Park 2,3
    - Masakhane
    - Mgewane.
  - A thousand copies of a flyer (in isiZulu) providing the date of the public meeting and the pick-up points where bus transport were available to the public meeting was distributed to communities during the loud hailing process. A copy of the flyer (in English and isiZulu is attached as **Appendix C 7**). The pick-up points announced in the flyer were as follows:
    - In front of Clewer Shopping Centre
    - Mgewane grounds
    - Filcor Total Garage in Tasbet Park
    - Greenside Colliery Security Gate
    - Masakhane Garage.
  - Notification of the public meeting was also broadcasted on the Emahlaheni FM Radio station in isiZulu at the following times:
    - Tuesday 4 April 2017 (at peak time between 6 and 9am)
    - Wednesday 5 April 2017 (at peak time between 3 and 6pm)
    - Thursday 6 April 2017 (during family hour between 7 and 10pm). A copy of the text in English and isiZulu of the radio advert is attached as **Appendix C 6**.

The Scoping Report was also be made available online on the SRK website at the following link: http://www.srk.co.za/en/za-environmental-authorisation-mrd-reclamation-and-powerline-relocation

- The public meeting had to be cancelled on 7 April 2017 due to unforeseen circumstances, as there was planned protest action by the eMahlahleni community at Greenside and Khwezela Colleries. It was decided by AOL Project Management to cancel the public meeting for the safety of employees and the public at large. Due to the project time schedule for submission of the Scoping Report in mid-April, it was not possible to re-schedule the public meeting prior to submission of the Scoping Report to the competent authority. A public meeting will however be scheduled during the EIA/EMP phase. Stakeholders were notified of the cancellation of the public meeting as follows:
  - Notices were placed at the Matimba Hall venue (see photos of cancellation attached as **Appendix C 8**);
  - Key stakeholders such as ward councillors were notified telephonically; and
  - Emails and sms notifications were sent to all stakeholders on the database. **Appendix C 8** for a copy of the email correspondence.
  - A formal letter was sent to the DEA on 19 April 2017 to notify them that the public meeting had to be cancelled. Refer to **Appendix C 8** for a copy of this letter.

6.5 Impact Assessment Phase

The following engagement activities were conducted as part of the impact assessment phase:

- A letter informing stakeholders of the availability of the EIA Reports for public comment was distributed on 21 July 2017 to identified stakeholders in English via email communication. Stakeholders were informed that the EIA Reports are available for a public comment period of 30 days from **Monday, 24 July to Wednesday, 24 August 2017**. The letter was also available in isiZulu and in Afrikaans upon request. Copies of this letter and comment sheet are attached as **Appendix C 9.**
- Availability of the EIA Reports and the public meeting on Friday 11 August 2017 will be advertised in the Witbank News in Afrikaans, English and isiZulu on Thursday, 27 July 2017 (adverts are attached in **Appendix C 12**), including the public venues where the reports will be available for public viewing. The public venues were as follows:
  - eMalahleni Public Library
  - Landau Recreation Club
  - Clewer Post Office
  - Greenside Colliery
  - North and South Union Offices
  - eMalahleni Local Municipality (reception and spatial planning).
- A meeting with the Emahlahleni Local Municipality (including councillors) and with landowners and lessee's will be held on Wednesday 26 July 2017 at 10:30 and 13:00 respectively.
- A public meeting is scheduled for Friday 11 August 2017 at 13:00 at the Witbank Golf Club. The public meeting will be advertised, in addition to newspaper advertisements, as follows:
  - Loud hailing to announce the date of the public meeting and to inform communities that bus transportation will be provided to stakeholder to attend the public meeting will take place on Saturday 5 August 2017 in the following areas:
    - Clewer
    - Tasbet Park 2,3

- Masakhane
- Mgewane

- A thousand copies of a flyer (in isiZulu) providing the date of the public meeting and the pick-up points where bus transport will be available to the public meeting will be distributed to communities during the loud hailing process. A copy of the flyer (in English and isiZulu is attached as **Appendix C 10**). The pick-up points announced in the flyer are as follows:
  - In front of Clewer Shopping Centre
  - Ngwane grounds
  - Filcor Total Garage in Tasbet Park
  - Greenside Colliery Security Gate
  - Masakhane Garage
- Notification of the public meeting will also be broadcasted on the Emahlaheni FM Radio station in isiZulu at the following times:
  - Monday 7 August 2017 (at peak time between 6 and 9am)
  - Tuesday 8 August 2017 (at peak time between 3 and 6pm). A copy of the text in English and isiZulu of the radio advert is attached as **Appendix C 11**.

The EIA Reports will also be made available online on the SRK website at the following link: http://www.srk.co.za/en/za-environmental-authorisation-mrd-reclamation-and-powerline-relocation

6.6 Decision-making phase

Stakeholders will be informed of the authorities via email, post or sms. Stakeholders will also be informed of the appeals process and the associated timeframes.

The steps to be undertaken in this phase include:

- Inform stakeholders on record of decision and the appeals process
- Letters to stakeholders, adverts and documents available of the SRK website.

Input of stakeholder comment and responses into the EIA and EMP Report for submission to authorities. Table 6-1 below.

Table 6-1: Summary of issues raised by I&APs during the scoping and EIA phases

Interested and Affected Parties		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report
AFFECTED PARTIES					
Lawful occupier/s of the land					
		10 March 2017 Mpumelo Maseko	Will there be socio-economic opportunities for people as a result of the project, and for Small, Medium and Micro-sized Enterprise (SMME).	There will possibly be some unskilled labour opportunities during the construction phase of the proposed project. The number of construction workers expected during the construction phase will be determined once the contractor has been appointed by Eskom	Section 4.5
		10 March 2017 Beauty Shabangu/ Mpumelo Maseko	Transport must be provided to residents to attend the planned public meeting. It is suggested that residents from the affected wards be accommodated.	Yes transport to the public meeting will be arranged for the directly affected communities, including members from Clewer, Tasbet Park, Greenside Village and Mahlangu Traditional Authority.	Section 6
Municipality	**x**	8 March 2017 Wonderboy Molula	Why are the MRD and power line projects done together and not separately?	The environmental authorisation processes are run separately and the associated documentation (Scoping Report and EIA/EMP) is submitted to different authorities (MRD – DMR and power line to DEA). The public participation process however is combined as the stakeholders are the same for both projects and the projects are linked. This is to avoid stakeholder fatigue.	Section 1
		8 March 2017 Wonderboy Molula	Why could the power line route not have circumvented the MRD, so that reclamation of the MRD would not have been necessary?	Several alternative power line routes were investigated as part of the project's pre-feasibility phase. Other options were eliminated due to historical shallow mining, existing infrastructure, future mine plans and sensitive environments. Based on the alternative assessment the preferred powerline route cuts through the MRD. In addition, reclamation of the MRD has limited economic benefit to AOL.	Section 4

Interested and Affected Parties		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report
		8 March 2017 Sandile Maseko	A risk analysis for the project needs to be undertaken to ensure environmental safety, especially in light of the sinkholes and underground fires that may result from the project.	Eskom/ Anglo will appoint the appropriate contractor to undertake work in sinkhole areas. The appointed contractor will undertake a survey and risk assessment prior to any work being undertaken in sinkhole area.	Appendix D1 and D4
		8 March 2017 Nonkululeko Mthombeni	We recommend that a copy of the Scoping Report be placed at the municipality for stakeholders to access	A copy of the Scoping Report will be placed at the reception and spatial planning office of eMalahleni Local Municipality.	Section 6
		8 March 2017 Sandile Maseko	Will transport be afforded to affected residents in the area to the public meeting to be held on 7 April 2017?	Yes transport to the public meeting will be arranged for the directly affected communities, including members from Clewer, Tasbet Park, Greenside Village and Mahlangu Traditional Authority.	Section 6
		8 March 2017 Sandile Maseko	Which wards will be affected by the project?	Ward, 9, 17, 19 and 21.	Section 6
Organs of state (Responsible for Infrastructure that may be affected Roads Department, Eskom, Telkom, DWS					
Communities					
Dept. Land Affairs					
Traditional Leaders					
Dept. Environmental Affairs		14 March 2017 Lerato Mokoena	Please submit an additional hard copy and electronic copy of the draft Scoping Report that is going out for public comment be submitted to DEA for review and comment.	An additional copy of the public comment draft Scoping Report was submitted to DEA on 15 March 2017	Section 6
	x	14 March 2017 Lerato Mokoena	Has the public holidays in March and April been taken into consideration during the 30 day public review period.	As there as three public holidays during the 30 day public comment period for the Scoping Report, the public review period will extend from 15 March – 18 April 2017.	Section 6

Interested and Affected Parties		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report
		14 March 2017 Lerato Mokoena	Why has specialist studies not commenced?	As the proposed power line route runs through Anglo Operations Limited (AOL) Khwezela Colliery Mining Right area and EMP boundary, a number of special studies and baseline information is available for the area. The existing specialist studies were reviewed, following by the compilation of a gap analysis to determine what additional specialist work is required specifically for the project. The proposed specialist study baseline is detailed in Section 5.	Section 5
		14 March 2017 Lerato Mokoena Constance Musemburi	Has the decommissioning of the power line route been taken into consideration.	Yes it has refer to section 4.6.3 for decommissioning process and Section 7.7 for impacts and mitigation measures associated with the decommissioning of the existing power line.	Section 4.6.3 and Section 7.7
		14 March 2017 Constance Musemburi	All listed activities included in the application form and Scoping Report need to be considered in the project description. All stakeholder engagement comments need to be sufficiently address in the Scoping Report and Environmental Impact Report (EIR).	It was confirmed that the triggered listed activities have been included in the project description and that they will be further described in the EIR. In addition each of the stakeholder engagement comments received during the Scoping and EIA/EMP phases will be capture in the Scoping report and EIR and will be sufficiently addressed (see section 4).	Section 2
		19 April 2017 Sebelo Malaza	Please ensure that all relevant listed activities are applied for, are specific and that it can be linked to the development activity or infrastructure as described in the project description		
		19 April 2017 Sebelo Malaza	If the activities applied for in the application form differ from those mentioned in the final SR, an amended application form must be submitted. Please note that the Department's application form template has been amended and can be downloaded from the following link https://www.environment.gov.za/documents/forms	The Amendment Listed Activities dated 7 April 2017 (GNR 324, GNR 325, GNR 326 and GNR 327) have been included in Table 2 1:NEMA listed activities applicable to the project	Section 2

Interested and Affected Parties		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report
		19 April 2017 Sebelo Malaza	Please ensure that all issues raised and comments received during the circulation of the draft SR from registered I&APs and organs of state which have jurisdiction in respect of the proposed activity are adequately addressed in the final SR. Proof of correspondence with the various stakeholders must be included in the final SR. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments. The Public Participation Process must be conducted in terms of Regulations 39, 40, 41, 42, 43 & 44 of the EIA Regulations 2014.	This has been addressed in the Stakeholder Section of this report	Section 6
		19 April 2017 Sebelo Malaza	Please provide a description of any identified alternatives for the proposed activity that are feasible and reasonable, including the advantages and disadvantages that the proposed activity or alternatives will have on the environment and on the community that may be affected by the activity as per Appendix 2 (1) (c) (d) and 2 (h) of GN R.982 of 2014. Alternatively, you should submit written proof of an investigation and motivation if no reasonable or feasible alternatives exist in terms of Appendix 2 (2)(x)(xi).	Alternatives have also been assessed.	Section 4 of
		19 April 2017 Sebelo Malaza	In accordance with Appendix 2 (2) (a) of the EIA Regulations 2014, the details of- (i) the EAP who prepared the report; and (ii) the expertise of the EAP to carry out Scoping and Environmental Impact assessment procedures; must be submitted	EAP details provided in Section 1.6	Section 1.6
		19 April 2017 Sebelo Malaza	Please ensure that the final SR includes a legible site layout map; an environmental sensitivity map indicating all environmental sensitive areas and features; a map combining a layout map superimposed (overlain) on the environmental sensitivity map; and a regional map of the area	Locality Map shown in Figure 1.3	Figure 1.3.

Interested and Affected Parties		Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report
Other Competent Authorities affected		6 March 2017 Themba Mazibuko DMR	How was the alternatives for the power line assessed?	Alternatives have also been assessed.	Section 4
OTHER AFFECTED PARTIES					
Department of Water and Sanitation		Acting CEO Olifants Proto CMA on 29 May 2017	The applicant shall conduct a preliminary legal assessment to identify all the water use activities associated with the proposed project that will require authorization by the DWS and the applicant is hereby referred to Section 22 (1) of the National Water Act, 1998 (Act 36 of 1998). Therefore any other water use related activities associated with this project that are not permissible as indicated on Section 22 (1) of the National Water Act, 1998 (Act 36 of 1998) shall have to be authorized by the DWS prior to such water use activities taking place and the applicant is requested to liaise with the DWS for guidance on the requirements for such an authorization.	Section 22(1) refers to using water only when you are authorised to do so. Based on this we have submitted a General Authorisation application in this regard.	GA submitted to DWS on 31 May 2017 and approved on 4 July 2017.
			Flood Lines: the map location of the proposed operation showing the 1:100 year flood-line in terms of section 144 of the National Water Act, 1998 (Act No. 36 of 1998) shall be submitted to the DWS.	We have included a map indicating the 500m buffer area from the wetlands. We did not submit a map showing a 1:100 year floodline.	Included in the GA
			Stormwater Management: The applicant should ensure that adequate stormwater control and management must be practiced to ensure that contaminants are not introduced into water resources during the developmental and operational phases of the proposed project.	This was not included as it is a requirement for a licence	Table 8.1 – Table 8.3
			Dust: The applicant is requested to provide the Department with the source, quality and estimated quantity of the water that will be used for dust suppression during the developmental phase of the project.	No information on dust suppression was included in the GA application.	Table 8.1 – Table 8.3 for dust suppression measures

Interested and Affected Parties	Date Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report
		Water Uses: If the activity will involve river crossing the applicant should submit Section 21 (c) and (i) forms together with supplementary forms to the Department. A wetland study should also be conducted. The applicant should also note that abstraction of water from a water resource is regarded as a water use, if such activity will be conducted, the applicant should submit Section 21 (a) forms to the Department	Section 21 (c) and (i) water uses forms were submitted. A supplementary form was not submitted, DWS advised that it is not necessary to submit it when applying for a GA.	Appendix 5 No abstraction of water
		Sanitation: The Applicant shall ensure that no sanitary system is located within a horizontal distance of 100 metres from any watercourses. Therefore reasonable measures shall have to be taken to prevent the potential pollution of the ground and surface water resources due to the proposed onsite sanitation facilities.	This information was also not included.	Table 8.1 – Table 8.3 for impacts associated with contractor camps
		Potable water supply: Source of potable water during construction phase should be indicated. The Applicant is referred to Section 19 (1) of the National Water Act, 1998 (Act No. 36 of 1998), and to report any pollution incidents originating from the proposed project to the Provincial Office of DWS within 24 hours. Therefore the Applicant shall provide clarity on the above-mentioned issues to the Department for recommendations. Please do not hesitate to contact the Department Provincial Office should there be any queries.		Table 8.1 – Table 8.3 impacts associated with contractor camps

7 Potential environmental and social Impacts (nature, significant, extent, duration, methodology)

7.1 Introduction

This section of the report describes the assessment of environmental and social impacts associated with the activities of the project. The section starts with an overview of the impact assessment, describing the significance of biophysical and sociological impacts. Recommended management measures are presented for each impact and these are discussed in more detail in the EMP (Refer to Section 8).

7.2 Impact assessment methodology

The impact assessment has been conducted in an integrated manner that links the biophysical components with the socio-economic components of the environment. The impact assessment is divided into issue identification, impact definition, and impact evaluation. Iteration of these parts occurs in each stage of an EIA process to varying degrees.

The basic elements used in the evaluation of impact significance are described in Table 7-1 and the characteristics that are used to describe the consequence of an impact are outlined in Table 7-2.

Table 7-1: Key elements in the evaluation of impact significance

Element	Description	Questions applied to the test of significance
Consequence	An impact or effect can be described as the change in an environmental parameter, which results from a particular project activity or intervention. Here, the term "consequence" refers to: (a) The sensitivity of the receiving environment, including its capacity to accommodate the kinds of changes the project may bring about. (b) The type of change and the key characteristics of the change (these are magnitude, extent and duration). (c) The importance of the change (the level of public concern/ value attached to environment by the stakeholders and the change effected by the project). The following should be considered in the determination of impact consequence: (a) Standards and guidelines (thresholds). (b) Scientific evidence and professional judgment. (c) Points of reference from comparable cases. (d) Levels of stakeholder concern.	Will there be a change in the biophysical and/or social environment? Is the change of consequence (of any importance)?
Probability	Likelihood/chances of an impact occurring.	What is the likelihood of the change occurring?
Effectiveness of the management measures	The significance of the impact needs to be determined both without management measures and with management measures. The significance of the unmanaged impact needs to be determined so there is an appreciation of what could occur in the absence of management measures and of the effectiveness of the proposed management measures.	Will the management measures reduce the impact to an acceptable level?
Uncertainty/ Confidence	Uncertainty in impact prediction and the effectiveness of the proposed management measures. Sources of uncertainty in impact prediction include: (a) Scientific uncertainty – limited understanding of an ecosystem (or affected stakeholders) and the processes that govern change. (b) Data uncertainty – restrictions introduced by incomplete, contradictory or incomparable information, or by insufficient measurement techniques. (c) Policy uncertainty – unclear or disputed objectives, standards or guidelines. There are a number of approaches that can be used to address uncertainty in impact prediction, including: (a) 'Best' and 'worst' case prediction to illustrate the spread of uncertainty. (b) Attaching confidence limits to impact predictions. (c) Sensitivity analysis to determine the effect of small changes in impact magnitude.	What is the degree of confidence in the significance ascribed to the impact?

Table 7-2: Characteristics used to describe impacts and impact consequence

Characteristics used to describe consequence	Sub-components	Terms used to describe the characteristic
Type		Biophysical, social or economic
Nature		Direct or indirect, cumulative etc.
Status		Positive (a benefit), negative (a cost) or neutral
Phase of project		During pre-construction (if applicable), construction, operation, decommissioning or post closure
Timing		Immediate, delayed
Magnitude	**Sensitivity of the receiving environment/ receptors**	High, medium or low sensitivity Low capacity to accommodate the change (impact)/ tolerant of the proposed change
	Severity/ intensity (degree of change measured against thresholds and/or professional judgment)	Gravity/ seriousness of the impact Intensity/ influence/ power/ strength
	Level of stakeholder concern	High, medium or low levels of concern All or some stakeholders are concerned about the change
Spatial extent or population affected The area/population affected by the impact The boundaries at local and regional extents will be different for biophysical and social impacts.		Area/ volume covered, distribution, population Site/Local (social impacts should distinguish between site and local), regional, national or international
Duration (and reversibility / sustainability) Length of time over which an impact occurs and potential for recovery of the endpoint from the impact		Short term, long term Intermittent, continuous Reversible, irreversibility (negative impacts) Sustainable, unsustainable (positive impacts) Temporary, permanent
Confidence		**High, Medium, Low**

Impact significance rating

Practicable management measures will be recommended that avoid, and if avoidance is not possible, then reduce, restore, compensate/offset negative impacts, enhance positive impacts and assist project design. The impact significance rating system is presented in Table 7-3 and involves four parts:

- Part A: Defines impact consequence using the three primary impact characteristics of magnitude, spatial scale and duration
- Part B: Uses the matrix to determine a rating for impact consequence based on the definitions identified in Part A
- Part C: Uses the matrix to determine the impact significance rating, which is a function of the impact consequence rating (from Part B) and the probability of occurrence and
- Part D: Defines the Confidence level.

Table 7-3: Method for rating the significance of impacts

PART A: DEFINING CONSEQUENCE IN TERMS OF MAGNITUDE, DURATION AND SPATIAL SCALE *Use these definitions to define the consequence in Part B*		
Impact characteristics	**Definition**	**Criteria**
MAGNITUDE	Major -	Substantial deterioration or harm to receptors; receiving environment has an inherent value to stakeholders; receptors of impact are of conservation importance; or identified threshold often exceeded
	Moderate -	Moderate/measurable deterioration or harm to receptors; receiving environment moderately sensitive; or identified threshold occasionally exceeded
	Minor -	Minor deterioration (nuisance or minor deterioration) or harm to receptors; change to receiving environment not measurable; or identified threshold never exceeded
	Minor +	Minor improvement; change not measurable; or threshold never exceeded
	Moderate +	Moderate improvement; within or better than the threshold; or no observed reaction
	Major +	Substantial improvement; within or better than the threshold; or favourable publicity
SPATIAL SCALE OR POPULATION	Site or local	Site specific or confined to the immediate project area
	Regional	May be defined in various ways, e.g. cadastral, catchment, topographic
	National/ International	Nationally or beyond
DURATION	Short term	Up to 18 months.
	Medium term	18 months to 5 years
	Long term	Longer than 5 years

PART B: DETERMINING CONSEQUENCE RATING ***Rate consequence based on definition of magnitude, spatial extent and duration***					
			SPATIAL SCALE/ POPULATION		
			Site or Local	**Regional**	**National/ international**
MAGNITUDE					
Minor	**DURATION**	**Long term**	Medium	Medium	High
		Medium term	Low	Low	Medium
		Short term	Low	Low	Medium
Moderate	**DURATION**	**Long term**	Medium	High	High
		Medium term	Medium	Medium	High
		Short term	Low	Medium	Medium
Major	**DURATION**	**Long term**	High	High	High
		Medium term	Medium	Medium	High
		Short term	Medium	Medium	High
PART C: DETERMINING SIGNIFICANCE RATING ***Rate significance based on consequence and probability***					
			CONSEQUENCE		
			Low	**Medium**	**High**
PROBABILITY (of exposure to impacts)		Definite	Medium	Medium	High
		Possible	Low	Medium	High
		Unlikely	Low	Low	Medium

Notes: + denotes a positive impact.

Using the matrix, the significance of each described impact is initially rated. This rating assumes the management measures inherent in the project design are in place.

Management recommendations and post management significance

Practicable **management measures** were then suggested:

"Recommendations for management should focus on *avoidance, and if avoidance is not possible, then to reduce, restore, compensate/offset negative impacts*, enhance positive impacts and assist project design."

The significance of impacts was then re-assessed **with** assumed management measures in place ("**after management**"). Specialists also recommended and described appropriate **monitoring** and review programs to track the efficacy of management measures.

An example of the table used to report the significance rating for each impact before and after the implementation of mitigation / management measures, and listing these measures, is provided as Table 7-4.

Table 7-4: Impact significance rating and mitigation measures for the Impact

Activity: XXXX								
Project phase: XXXX								
Impact Summary: XXXXX								
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**Significance**	**+ /-**	**Confidence**
Before Management	*Moderate*	*Long term*	*Site / local*	***Medium***	*Possible*	***Medium***	*-*	*Medium*
Management Measures:								
After Management	*Minor*	*Short term*	*Site / local*	***Low***	*Unlikely*	***Low***	*-*	*Medium*

7.3 Project phases for the proposed power line

The project will be undertaken in three phases, namely:

- Pre-construction and Construction phase
- Maintenance and Operational phase
- Decommissioning phase (this EIA will only addressed the decommissioning on the existing power lines).

Activities proposed during each of these phases are detailed below.

7.4 Biophysical Impacts: Construction Phase

Construction Phase Activities

The proposed construction of the three 400kV power lines involves the following construction activities:

- Perimeter Fence and Security
- Vegetation Clearance
- Surveying (Pegging of tower positions)
- Construction camp establishment
- Setting Out Of Towers
- Foundation Excavations
- Tower Site Information
- Foundation Construction Survey
- Foundation Site Information
- Excavation of foundation
- Foundation Preparation
- Foundation Installation
- Foundation Setting
- Concrete Placing
- Backfilling
- Site Restoration
- Tower Assembly and Erection
- Stringing of Phase and Earth Conductors

- Puller and Tensioner Site Information
- Installation of Pilot Cables
- Stringing Operation
- Regulating and Sagging
  The detailed project description is presented in section 4.

The following sections covers the biophysical aspects of the pre-construction and construction phases. Impacts that will be impacted by the power line has been rated, whilst impacts that will not be impacted by the power line has been mentioned but not rated.

7.4.1 Topography

No impacts expected during the pre-construction and construction phase of the proposed power line.

7.4.2 Biodiversity

The pre-construction and construction phase of the proposed power line is anticipated to have direct impacts on floral and faunal habitat and ecological integrity, loss of diversity and SCC. The significance of the aforementioned impacts on the terrestrial ecology of the receiving environment is summarised in the table below.

Impact B1: Loss of faunal and floral habitat, diversity and SCC

Site clearing within wetland habitat will result in permanent removal of floral habitat considered to be of increased ecological importance and sensitivity. Although the vegetation within this habitat unit has been disturbed as a result of surrounding mining and agricultural activities and severe alien and invasive plant infestation, these areas still provide habitat to support a number of indigenous and SCC floral species such as Crinum bulbispermum, which were found within this habitat unit.

The transformed fauna habitat unit has also been significantly disturbed as a result of historic and on-going mining and agricultural activities. The terrestrial ecology within this habitat unit is therefore largely transformed and placement of infrastructure within this habitat unit will most likely have a low impact significance.

With the implementation of mitigation measures, the impact significance may be reduced for all habitat units.

Table 7-5: Impact B1: Loss of faunal and floral habitat, diversity and SCC

Activity	Construction of the new power line route							
Project phase	Pre-construction and construction phase							
Impact Summary	Floral and faunal SCC, habitat and diversity loss caused by alteration to habitat.							
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Before Management	*Major*	*Long*	*Site or Local*	***High***	*Definite*	***High***	-	*Medium*
Proposed mitigation and management measures: • Avoid disturbance of wetland habitat unit during the determination of the location of the contractor camp (location of contractor camp to be determined by Eskom appointed contractor) • Installation of bird flappers at delineated wetland areas. Special bird flappers will be installed on the power lines to deter birds from flying into the power lines • Construction footprint to be demarcated as per the construction phase conditions outlined in section 4 in order to ensure that all construction activities remain within this footprint • Construction vehicles will be restricted to travel only on designated roadways to limit the ecological footprint of the proposed development • Implementation of the appropriate measures included in Eskom's Transmission Vegetation Management Guideline, which include the relation of identified floral SCC and obtain the relevant permits, if required. • Prohibit the collection of plant material for medicinal purposes and fire wood • Rehabilitation measures must be implemented in areas where the soil surface was disturbed as Alien and Invasive Plants will promoted by these activities and faunal habitat will be lost due to encroachment of these species.								
After Management	*Moderate*	*Medium term*	*Local*	***Medium***	*Possible*	***Medium***	-	*Medium*

7.4.3 Soils and land capability

The construction phase of the proposed development is anticipated to have direct impacts on soil compaction, soil erosion, and potential soil contamination, as discussed in the following subsections.

Impact S1: Increase soil erosion

The parameters determining the extent and severity of soil erosion are highly complex, with water and wind as the main geomorphic agents. Soil erosion is largely dependent on land use and soil management and is generally accelerated by human activities. In absence of detailed South African guidelines on erosion classification, the erosion potential and interpretation are based on field observations and the observed soil profile characteristics. In general, soils with a high clay content have a high water retention capacity and less prone to erosion in comparison to sandy textured soils, which in contrast are more susceptible to erosion.

The proposed power line traverses relatively flat to gently sloping terrain, which generally limits the erosion hazard, and the physical soil properties therefore take dominance over slope gradient as a determining criterion for anticipated erosion risk. Although the majority of the identified soils display moderately low susceptibility to erosion under current (undisturbed) veld conditions, their susceptibility to erosion will be largely increased once the vegetation is cleared for construction activities, and the soils will inevitably be exposed to wind and stormwater.

The soil erosion impact is considered to be low for most of the identified soils that are commonly associated with wetlands such as the Westleigh, Katspruit, and the Avalon/Bainsvlei soil forms. This is attributed to their typically higher clay content, which offers a considerable degree of aggregate stability against erosion. In addition, soil erosion impact is considered to be moderate for the Hutton/Clovelly/Griffin and Glencoe soil forms due to the weakly developed “apedal” structure in the upper solum. However, all of the identified soils are considered to be evenly susceptible to dust emission where conducive windy conditions occur once the vegetation is cleared during construction activities. As such, the significance of this impact will be largely similar for all identified soils, as illustrated on the impact rating table below.

Table 7-6: Impact S1: Increase soil erosion

Activity	Clearing of power line servitude footprint							
Project phase	Pre-construction and construction phase							
Impact Summary	Soils exposed to erosion and dust emission following removal of protective vegetal cover							
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Before Management	*Minor*	*Short*	*Site*	***Low***	*Definite*	***Medium***	-	*High*
Proposed mitigation and management measures: • Construction footprint to be demarcated as per the construction phase conditions outlined in section 4 in order to ensure that all construction activities remain within this footprint • A regulated speed limit of ≤ 40 km per hour will be maintained to minimise dust generation during the construction activities • Regular dust suppression along the road during the construction phase, especially when strong wind conditions are predicted according to the local weather forecast • All disturbed areas can be re-vegetated with an indigenous grass mix to re-establish a protective grass strip within the power line servitude to minimize soil erosion and dust emission • Temporary erosion control measures will be used to protect the disturbed soils until adequate vegetation has established • Restricted access to prevent weed infestation particularly on the cultivated maize fields by implementing appropriate herbicide(s) to control the grass strip.								
After Management	*Minor*	*Short*	*Site*	***Low***	*Possible*	***Low***	-	*High*

Impact S2: Loss of soil resource due to soil compaction

Heavy equipment traffic during construction activities is anticipated to cause significant soil compaction. The severity of this impact is anticipated to be significant for wetland soils such as the Westleigh, Katspruit, and the Avalon/Bainsvlei soil forms due to the inherently high clay content of these soils. Whereas, on the contrary, soils with a relatively shallow bedrock such as the Glencoe soil forms are anticipated to be less impaired due to the resistance offered by the underlying bedrock.

Table 7-7: Impact S2: Loss of soil resource due to soil compaction

Activity	Vehicular traffic and construction activities							
Project phase	Construction phase							
Impact Summary	Compression from mechanic construction implements and vehicle traffic may cause severe and potentially irreversible soil compaction particularly for the identified wetland soils							
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Before Management	*Moderate*	*Long*	*Local*	***Medium***	*Definite*	***Medium***	-	*High*
Proposed mitigation and management measures: • All vehicular traffic should be restricted to the existing access roads and the proposed power line servitude as far as practically possible • A regulated speed limit of ≤ 40 km per hour will be maintained to minimise dust generation during the construction activities • Direct surface disturbance of the identified wetland soils including the Katspruit, Westleigh, and the Avalon/Bainsvlei soil forms can be avoided for construction roads and placement of contractors camp to minimise the intensity of compaction due to the susceptibility of these soils to prolonged waterlogging conditions (inundation) • Disturbed soils can be lightly ripped to at least 25 cm bgs to alleviate compaction prior to re-vegetation.								
After Management	*Moderate*	*Short*	*Local*	***Low***	*Possible*	***Low***	-	*High*

Impact S3: Soil contamination

All the identified soils are considered to be equally predisposed to potential contamination, as contamination sources are generally unpredictable and often occur as incidental spills or leak for construction developments. The significance of soil contamination is considered to be medium-high for all identified soils, largely depending on the nature, volume and/or concentration of the contaminant of concern.

Table 7-8: Impact S3: Soil contamination

Activity	Incidental Spills and/or leaks of potentially hazardous substances							
Project phase	Construction phase							
Impact Summary	Soil contact with potentially hazardous or toxic substances as a result of construction activities.							
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Before Management	*Moderate*	*Short*	*Local*	***Medium***	*Possible*	***Medium***	-	*High*
Proposed mitigation and management measures: • Eskom's spill prevention and emergency spill response plan, as well as dust suppression, and fire prevention plans will be implemented during the construction phase • An Eskom emergency response contingency plan will be implemented to address clean-up measures should a spill and/or a leak occur • Spill kits will be provided for onsite spill clearing • All potential contaminants and hazardous substances (e.g. hydrocarbons, cement, waste collection and storage areas etc.) will be located on bunded areas to capture and spills and leaks • Waste associated with construction phase activities will be stored and removed as per Eskom Environmental Management Policy and Environmental Management Programme.								
After Management	*Minor*	*Short*	*Local*	***Low***	*Possible*	***Low***	-	*High*

Impact L1: Loss of agricultural land capability

The anticipated land capability impacts include temporal withdrawal of land from agricultural uses, particularly such as cultivation and livestock grazing. Potential land capability loss is anticipated to be significant for the arable (class II) soils including the Hutton/Clovelly soil forms, attributed to the inherently high land capacity. However, the proposed power line infrastructure is not anticipated to result in significant land fragmentation, and is therefore not anticipated to create a barrier to grazing livestock and/or obstruct access to agricultural implements such as ploughing and/or harvesting equipment.

The overall land capability loss is therefore anticipated to be relatively low for all the identified soil forms since this impact is considered to be temporary, and the existing land uses will be to resume during the operational phase of the power line infrastructure.

Table 7-9: Impact L1: Loss of Agricultural Land Capability

Activity	Vegetation clearance and associated physical construction activities							
Project phase	Construction phase							
Impact Summary	Land fragmentation, cessation of agricultural production and/or livestock grazing							
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Before Management	*Moderate*	*Short*	*Local*	***Medium***	*Definite*	***Medium***	-	*Medium*
Proposed mitigation and management measures: • Vegetation should be cleared only within areas of construction and not along the power line route • Restrict all intrusive surface disturbance to the localized vicinity of the power line support towers as far as practically possible in order to allow the prevailing land uses to continue with their operations, where feasible • Disturbed soils can be lightly ripped to at least 30 cm to alleviate soil compaction and subsequently re-vegetated with indigenous grass to alleviate soil compaction and minimize erosion • Lessees along the power line route need to notified at minimum six months prior to commencement of construction • A dedicated communication channel will be established by Eskom to ensure a clear line of communication between Eskom and land users • The recommended ripping and re-vegetation can be implemented concurrently in 3-5km km intervals on the subsections where construction works are complete.								
After Management	*Minor*	*Short*	*Local*	***Low***	*Possible*	***Low***	-	*Medium*

7.4.4 Wetlands

As described in Section 5, 12 wetland crossings have been identified along the proposed power line routes. Three of these wetlands will be clear spanned, making direct impacts to these wetlands unlikely. At the other nine crossings a total of 44 pylons will be located within delineated wetland habitat. These 44 pylons will be the focus of the impact assessment. In addition construction camps will be established, although the exact location of such construction camps have not yet been finalised, however it will be located outside the delineated wetlands.

Impact W1: Loss and disturbance of wetland habitat due to clearing of vegetation along the power line route

Access to wetlands to clear vegetation in preparation for construction activities. This is likely to lead to disturbance of wetland vegetation and fauna. Vehicle ruts that form along the route could create preferential flow paths that increase erosion risk and lead to gully erosion. Gully erosion has as a consequence the local lowering of the perched water table within the wetland, leading to desiccation and habitat degradation. Where channels are crossed in valley bottom wetlands damage to channel banks could occur, further increasing erosion risk. Disturbance and degradation of wetland habitat creates opportunities for invasion by invasive and alien species. The overall impact associated with clearing of vegetation within the wetlands is anticipated to be relatively low as the impact will be temporary and the wetlands along the power line route are currently moderately to largely transformed.

Table 7-10: Impact W1: Loss and disturbance of wetland habitat due to clearing of vegetation along the power line route

Activity	Clearing wetland vegetation along power line for the construction of the pylons and servitude along the route							
Project phase	Preconstruction and Construction							
Impact Summary	Access to wetlands and clearing of vegetation will lead to disturbance of wetland vegetation and fauna, increased risk of erosion along vehicle ruts that form preferential flow paths, damage to channel banks and increased risk of colonisation by invasive and alien species.							
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Before Management	*Major*	*Short-term*	*Site*	***Medium***	*Definite*	***Medium***	-	*High*
Proposed mitigation and management measures: • Vegetation clearing will be kept to the absolute minimum servitude required for safe operation of the power line • Vegetation clearing will be limited to removal of alien trees and mowing of grass and reeds • Complete removal of vegetation will be avoided, except in direct excavation footprints • No driving through wetland/stream channels and saturated soils unless existing crossings are utilised. • Access routes to the power line servitude will make use of existing roads and farm tracks as far as possible • Where new access tracks into wetlands will be made, the shortest possible route through the wetland will be followed and ideally run perpendicular to the direction of flow in the wetland. Where ruts are created these will be rehabilitated to prevent formation of preferential flow paths • All alien invasive tree species will be removed from the power line servitude, with follow-up treatment/clearing to ensure clearing is successful • Surface runoff along the access routes will not lead to erosion • Prior to the commencement of any excavations, the required disturbance footprint will be demarcated and all activities will be located within the demarcated area. No vegetation disturbance to take place outside the demarcated area • On completion of construction at each pylon the site will be left clean and free from all debris, hydrocarbons and waste, and all excavations filled appropriately • All excavations on site will be fully backfilled. Material to be replaced in excavation in correct order, i.e. material excavated from the bottom of the excavation will be placed at the bottom and topsoil must be placed on surface. No subsoil to be placed on surface.								
After Management	*Minor*	*Short-term*	*Site*	***Low***	*Possible*	***Low***	-	*High*

Impact W2: Loss and disturbance of wetland habitats due to construction camp establishment

The exact location of the construction camp/camps is currently not known. It is proposed that the construction camp/camps will be located outside delineated wetland areas.

Establishment of the construction camp/camps in close proximity to wetlands and clearing of vegetation will lead to disturbance of wetland vegetation and fauna, increased sedimentation in wetlands due to sediment-rich runoff from the construction camp, risk of water quality deterioration due to surface run-off from the construction camp, increased hunting/poaching of wildlife within adjacent wetlands, and increased risk of colonisation by invasive and alien species. The overall impact associated with construction of the contractors camp adjacent to the wetlands is anticipated to be relatively low as the impact will be temporary and the wetlands along the power line are currently moderately to largely transformed.

Table 7-11: Impact W2: Loss and disturbance of wetland habitats due to construction camp establishment

Activity	Construction camp establishment							
Project phase	Preconstruction and construction							
Impact Summary	Establishment of the construction camp/camps in close proximity to wetlands and clearing of vegetation will lead to disturbance of wetland vegetation and fauna, increased sedimentation in wetlands due to sediment-rich runoff from the construction camp, risk of water quality deterioration due to surface run-off from the construction camp, increased hunting/poaching of wildlife within adjacent wetlands, and increased risk of colonisation by invasive and alien species.							
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Before Management	*Major*	*Short-term*	*Local*	***Medium***	*Definite*	***Medium***	-	*Medium*
Proposed mitigation and management measures: • All construction camps will be located outside delineated wetland areas and a minimum distance of 100m from delineated wetland areas, ideally on previously disturbed areas • Vegetation clearing will be kept to the absolute minimum area required for the construction camp/camps. • Where possible, grass cover will be maintained within the construction camp/camps • A stormwater management plan which incorporates sediment controls will be developed and implemented for each construction camp. Stormwater to be discharged in an environmentally sensitive manner, ideally into a well-vegetated area • All potential contaminants and hazardous substances (e.g. hydrocarbons, cement, waste collection and storage areas etc.) will be located on bunded areas to capture and spills and leaks • Institute environmental best practice guidelines as per the DWA Integrated Environmental Management Series for Construction Activities • No hunting or setting of traps/snares will be allowed in adjacent wetland areas • The construction camp footprint will be fully rehabilitated following completion of construction activities. All waste and contaminated material will be removed from site, soil compaction will be alleviated and the footprint re-vegetated with locally occurring indigenous grass species.							
After Management	*Minor*	*Short-term*	*Site*	***Low***	*Definite*	***Low***	-	*Medium*

Impact W3: Loss and disturbance of wetland habitats due to increased sediment transport into wetlands

In addition to disturbances caused to wetlands due to access into the wetlands by machinery and vehicles, the uncontrolled use and incorrect disposal of cement on site could lead to water quality deterioration in receiving water resources. Deteriorating water quality will impact on aquatic fauna, with sensitive species likely to be lost. The overall impact associated with concrete work associated with construction activities adjacent to the wetlands is anticipated to be relatively low as the impact will be temporary and the wetlands along the power line are currently moderately to largely transformed.

Table 7-12: Impact W3: Loss and disturbance of wetland habitats due to increased sediment transport into wetlands

Activity	Undertake concrete work							
Project phase	Preconstruction and Construction							
Impact Summary	Access to wetlands could lead to disturbance of wetland fauna and flora. Use of cement on site could lead to deterioration in water quality.							
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Before Management	*Moderate*	*Short-term*	*Site*	***Low***	*Possible*	***Low***	-	*High*
Proposed mitigation and management measures: • Institute environmental best practice guidelines as per the DWA Integrated Environmental Management Series for Construction Activities • Dispose of all soil contaminated due to concrete mixing and use as per Eskom Environmental Management Policy and Environmental Management Programme • Waste will be stored on site in clearly marked containers in a demarcated area. All waste must be disposed of offsite.								
After Management	*Minor*	*Short-term*	*Site*	***Low***	*Possible*	***Low***	-	*High*

Impact W4: Loss and disturbance of wetland habitats due to stringing transmission cables

Access into wetland area to string transmission cables will require vehicles and machinery to access the wetlands. This is likely to lead to disturbance of wetland vegetation and fauna. Vehicle ruts that form along the route could create preferential flow paths that increase erosion risk and lead to gully erosion. Gully erosion has as a consequence the local lowering of the perched water table within the wetland, leading to desiccation and habitat degradation. Where channels are crossed in valley bottom wetlands damage to channel banks could occur, further increasing erosion risk. Disturbance and degradation of wetland habitat creates opportunities for invasion by invasive and alien species.

The overall impact associated with stringing transmission cables on the wetlands is anticipated to be relatively low as the impact will be temporary and the wetlands along the power line route are currently moderately to largely transformed.

Table 7-13: Impact W4: Loss and disturbance of wetland habitats due to stringing transmission cables

Activity	String transmission cables							
Project phase	Construction							
Impact Summary	Access to wetlands to string transmission cables could lead to disturbance of wetland vegetation and fauna, increased risk of erosion along vehicle ruts that form preferential flow paths, and damage to channel banks.							
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Before Management	*Major*	*Short-term*	*Site*	***Medium***	*Definite*	***Medium***	-	*Medium*
Proposed mitigation and management measures: • Existing access routes and disturbed areas will be utilised as far as possible to access pylon locations. Where no existing tracks are available, a single access track to each pylon location should be used • Access tracks through wetland areas should ideally run parallel to the contour to limit the formation of preferential flow paths that could lead to erosion. Accessing pylon locations along routes perpendicular to the contour should be avoided, unless along existing tracks • Surface runoff along the access routes should not lead to erosion. Where ruts have formed and remain following completion of construction activities, these will be plugged with regular shallow soil berms to prevent a preferential flow paths forming along the vehicle ruts • Stringing locations should be outside delineated wetland areas if at all possible • No driving through wetland/stream channels unless existing crossings are utilised • No driving through saturated soils.								
After Management	*Moderate*	*Short-term*	*Site*	***Low***	*Possible*	***Low***	-	*Medium*

7.4.5 Air Quality

No impacts expected during the pre-construction and construction phase of the proposed power line.

7.4.6 Traffic

Impact T1: Increased generation of traffic on existing road network

During the pre-construction and construction phase there will be additional construction vehicles on site. The construction vehicles will be transporting abnormal loads including machinery, steel structures and other infrastructure. Where possible existing access routes will be used to enter the site for construction.

The impact associated with the increase in traffic will be low as this activity will be limited to the construction phase.

Table 7-14: Impact T1: Increased generation of traffic on existing road network

Activity	Construction vehicles onsite during the construction of new power line							
Project phase	Construction							
Impact Summary	There will be construction vehicles on site during the construction of the new power line, which pose a risk of accidents and injury to other road uses and pedestrians							
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Before Management	*Moderate*	*Long*	*Site or Local*	***Medium***	*Definite*	***Medium***	-	*High*
Proposed mitigation and management measures: • The speed limit will be 40km/h on all roads running through and accessing the study area • Construction vehicles will be restricted to travel only on designated roadways • Appropriate road signage will be erected during the construction phase • Transportation of abnormal loads as per Eskom's Traffic Management Plan • Construction vehicles will only operate during daytime hours.								
After Management	*Minor*	*Medium-term*	*Local*	***Low***	*Possible*	***Low***	-	*High*

7.4.7 Surface Water

No impacts expected during the pre-construction and construction phase of the proposed power line. Impacts that are associated with water course channel disturbance is included under the wetlands impacts (See Section 7.3.4).

7.4.8 Groundwater

No impacts expected during the pre-construction and construction phase of the proposed power line.

7.4.9 Noise

Impact N1: General rise in the ambient noise levels caused by construction vehicles and activities

During the pre-construction and construction phase there will be noise generated from the construction vehicles and the construction activities. Increased noise levels will be limited to the construction phase and footprint. The proposed power line route will be located in an area considered rural, with the predominate land use being mining and agricultural.

The noise impact associated with the construction phase is anticipated to be low as construction activities will be limited to daytime hours and there are limited households along the proposed power line route.

Table 7-15: Impact N1: General rise in the ambient noise levels caused by construction vehicles and activities

Activity	Construction vehicles and activities onsite during the construction of new power line							
Project phase	Construction							
Impact Summary	The presence of construction vehicles and related activities on site during the construction phase will generate noise and pose a nuisance to nearby sensitive receptors							
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Before Management	*Moderate*	*Long*	*Site or Local*	***Medium***	*Definite*	***Medium***	-	*High*
Proposed mitigation and management measures: • The speed limit will be 40km/h on all roads running through and accessing the study area • Contractor camp will be located at least 500m from the nearest community • Equipment/ machinery to be used must comply with manufacturers specifications acceptable noise levels; • Ensure high level of equipment maintenance, especially intake and exhaust mufflers • Maintain a complaints and grievance register and act promptly to complaints regarding noise • Construction vehicles will be restricted to travel only on designated of the proposed development • Construction vehicles and activities will only operate during daytime hours.								
After Management	*Minor*	*Medium-term*	*Local*	***Low***	*Possible*	***Low***	-	*High*

7.4.10 Visual

No impacts expected during the pre-construction and construction phase of the proposed power line, as the proposed new power line will be erected in a brownfields area with expensive mining and agricultural activities.

7.4.11 Heritage

Impact H1: Possible archaeological and/or historical sites, features or artifacts that could be found during site clearing

No archaeological features where identified during the HIA. However the impact is considered relatively low as the subterranean presence of archaeological and/or historical sites, features or artefacts is always a distinct possibility. Due to the density of vegetation it also is possible that some sites may only identified during the construction phases

Table 7-16: Impact H1: Possible archaeological and/or historical sites, features or artifacts that could be found during site clearing

Activity	Site clearing							
Project phase	Preconstruction and Construction							
Impact Summary	Whilst clearing vegetation for the construction of the proposed power line, it is possible that archaeological and/or historical sites, features or artefacts could be found. In the event that this happens, the Chance Find Procedure should be followed.							
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Before Management	*Minor*	*Short-team*	*Site*	***Low***	*Possible*	***Low***	-	*High*
Proposed mitigation and management measures: In the event that historical and archaeological artefacts are found during the construction phase, a Chance Find Procedure should be followed. The key steps in this process would be as follows: • Upon finding any archaeological or historical material all work at the affected area must cease • The area will be demarcated in order to prevent any further work there until an investigation has been completed • An archaeologist will be contacted immediately to provide advice on the matter • Should it be a minor issue, the archaeologist will decide on future action, which could include adapting the HIA or not. Depending on the nature of the find, it may include a site visit • SAHRA's APM Unit will be notified • If needed the necessary permit will be applied for with SAHRA. This will be done in conjunction with the appointed archaeologist • The removal of such archaeological material will be done by the archaeologist in lieu of the approval given by SAHRA, including any conditions stipulated by the latter • Work on site will only continue after removal of the archaeological/ historical material was done • Operating controls and monitoring will be aimed at the possible unearthing of such features. Care should therefore be taken when development commences that if any of these are discovered, a qualified archaeologist be called in to investigate the occurrence.								
After Management	*Minor*	*Short-term*	*Site*	***Low***	*Unlikely*	***Low***	-	*Medium*

7.5 Socioeconomic Impacts

Impact S1: Loss of land for servitude use and agricultural production

The loss of land for servitude and production is address under the land capability section 7.3.3.

Impacts S2: Perceptions around job creation, increased expectations around employment opportunities

In light of the Emalahleni Local Municipality having high unemployment levels, expectations will be created around employment opportunities for the proposed project. Employment can become a sensitive issue, particularly the concern over local labour.

The number of constructions workers will only be confirmed during the construction phase once Eskom has appointed a contractor. It is however anticipated that relatively few job opportunities will be created for the duration of the construction phase of the proposed project based on the current scope of work..

The overall impact associated with employments opportunities will be low as a result of limited job prospects for the proposed project. Job opportunities will be restricted to the construction phase.

Table 7-17: Impacts S2: Perceptions around job creation, increased expectations around employment opportunities

Activity	Construction of power line							
Project phase	Preconstruction and Construction							
Impact Summary	With the construction of the proposed power line there will be perceptions around job creation, with an increased in expectations around employment opportunities							
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Before Management	*Moderate*	*Medium-team*	*Site*	***Moderate***	*Possible*	***Medium***	-	*Low*
Proposed mitigation and management measures: • Management of employment expectations through distribution of appropriate and timely information • Communication with community and job-seekers regarding actual project start dates and available job opportunities • Undertake a skills assessment of the local area to ascertain the employability of locals • Do not employ at the contractor camps, ensure there is an employment procedure in place and known to work seekers • Adhere to Eskom's employment standards regarding the employment of local versus regional workers; and • Ensure that contractors adhere to Eskom employment standards.								
After Management	*Moderate*	*Medium-term*	*Site*	***Low***	*Unlikely*	***Low***	-	*Low*

Impact S3: Improved national power supply services

The relocation of the existing three 400kV Eskom power lines is due to safety concerns with the formation of sinkholes and spontaneous combustion forming as a result of shallow historical mining. There is therefore a high risk of structures collapsing, which could result in disruption in continued power supply to the National Grid. Access to the power lines for maintenance purposes is also a concern. The relocation of the power line will elevate disruptions of power to the national grid as well as improve access to maintenance. As a result the impact associated with the relocation of the proposed power line is positive and high.

Table 7-18: Impacts S3: Improved national power supply services

Activity	Relocation of the power line							
Project phase	Preconstruction and Construction							
Impact Summary	With the construction of the proposed power line there will be an improved national power supply.							
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Before Management	*Major*	*Long-team*	*National*	***High***	*Possible*	***High***	-	*High*
Proposed mitigation and management measures: • Undertake civil and mining geotechnical assessment and associated specialist studies to determine the most appropriate route to prevent impacts on the proposed power route due to subsidence • Undertake regular inspections and maintenance along the route • Relocate the power line.								
After Management	*Major*	*Long-term*	*National*	***High***	*Definite*	***High***	+	*High*

Impact S4: Permanent loss of land and land linked livelihoods along the proposed power line

Three households (See Section 5) directly adjacent to Clewer have been identified in the proposed power line servitude. The three households can be described as informal subsistence households.

Relocation of these households will be required prior to the commencement of construction. A Resettlement Action Plan is being undertaken to assess the relocation of the households. As part of the RAP livelihood restoration will be assessed. The relocation process is separate to this EIA.

The impact associated with the permanent loss of land and land linked livelihoods along the proposed power line as a result of the relocation of the three households is considered to be low due to the undertaking of the RAP process.

Table 7-19: Impacts S4: Permanent loss of land and land linked livelihoods along the proposed power line

Activity	Relocation of three households adjacent to Clewer							
Project phase	Preconstruction and Construction							
Impact Summary	Permanent loss of land and land linked livelihoods along the proposed power line							
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Before Management	*Moderate*	*Medium-team*	*Site*	***Medium***	*Possible*	***Medium***	-	*Low*
Proposed mitigation and management measures: • Clarify compensation rules that apply to land and subsistence farming within the power line servitude and communicate these measures to the affected households • Undertake and implement appropriate compensation and livelihoods restoration (where necessary) under a Resettlement Action Plan.								
After Management	*Moderate*	*Short-term*	*Site*	***Low***	*Unlikely*	***Low***	-	*Low*

7.6 Operation and Maintenance Phase: Biophysical impacts

Operational and Maintenance Phase Activities

The proposed construction of the three-400kV power lines involves the following operational and maintenance activities:

- Maintenance
- Servitude Maintenance
- Live Line Maintenance
- Maintenance Management Systems.

A detailed project description is provided in section 4.

7.6.1 Topography

No impacts expected during the operational and maintenance phases of the proposed power line.

7.6.2 Biodiversity

The operational and maintenance phases of the proposed development is anticipated to have direct impacts on floral and faunal habitat and ecological integrity, loss of diversity and SCC. The significance of the aforementioned impacts on the terrestrial ecology of the receiving environment is summarised in the table below.

Impact B2: Loss of faunal and floral habitat, diversity and SCC

Regular clearing/mowing of vegetation along the power line route during operation will require vehicles and machinery to access the power line servitude, including access into wetland areas. This is likely to lead to disturbance of vegetation and fauna, especially if vehicles venture off defined tracks and access routes. Vehicle ruts that form along the route could create preferential flow paths that increase erosion risk and lead to gully erosion. Disturbance and degradation of flora habitat creates opportunities for invasion by invasive and alien species. Increased risk of collision of vehicles with faunal species, including possible avifaunal SCC collision with the proposed power line alignment.

The impact associated with the loss of faunal and floral habitat along the proposed power line as a result of the operation and maintenance of the power line is considered to be medium due to the impacts on the avifauna. This impact should be reviewed during the operational phase once the appropriate avifauna management measures have been implemented and results recorded.

Activity	Operation and maintenance of new power line Switching the line on, operation of new power line and undertake line inspections							
Project phase	Operation and Maintenance							
Impact Summary	Increased risk of collision of avifaunal SCC and floral and faunal SCC, habitat and diversity loss caused by clearing vegetation within the power line servitude during the operation as well as maintenance of the power line							
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Before Management	*Moderate*	*Long*	*Site or Local*	***Medium***	*Definite*	***Medium***	-	*Medium*
Proposed mitigation and management measures: • Vegetation clearing must be kept to the absolute minimum servitude required for safe operation of the power line • Proliferation of alien and invasive species is expected within any disturbed areas. These species will be controlled by the implementation of the appropriate measures included in Eskom's Transmission Vegetation Management Guideline for the eradication of alien and invasive species • Complete removal of vegetation must be avoided • No driving through wetland/stream channels unless existing crossings are utilised • Install appropriate bird flappers and identified locations along the power line • Periodic walk down of the power line to inspect the route for any possible avifaunal casualties • When any casualties are observed, a qualified avifaunal specialist must be contacted to assist with the placement of suitable and/or additional bird flappers on the power line • The speed limit will be 40km/h on all roads running through and accessing the study area, to minimise the risk of vehicle collisions with faunal species • Maintenance vehicles will be restricted to travel only on designated roadways to limit the ecological footprint of the proposed development.								
After Management	*Moderate*	*Medium-term*	*Local*	***Medium***	*Possible*	***Medium***	-	*Medium*

7.6.3 Soils and Land Capability

Impact S4: Residual land capability losses

During the operational phase pre-construction land use practices will be able to resume, with exception of the relocated households. In addition the proposed power line is not anticipated to pose any restrictions to the mobility of agricultural implements and/or livestock.

The impact associated with land capability will be due to high restrictions of agricultural machinery below the power line.

The land capability impacts are anticipated to be low and limited to the immediate vicinity of the power line support towers during the operational phase, provided that all the recommended mitigation and management measures are implemented accordingly during the construction phase, as evaluated on the impact rating table below.

Activity	Electrical power transmission							
Project phase	Operational phase through to closure							
Impact Summary	As result of the proposed power line there will be a reduction in local agricultural practices.							
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Before Management	*Moderate*	*Long*	*Local*	***Medium***	*Definite*	***Medium***	-	*Medium*
Proposed mitigation and management measures: • As agricultural activities will continue in the localized vicinity of the power line, machinery should be operated with caution • During maintenance activities restrict all intrusive surface disturbance to the localized vicinity of the power line support towers as far as practically possible in order to allow the prevailing land uses to continue with their operations, where feasible • Disturbed soils can be lightly ripped to at least 30 cm to alleviate soil compaction and subsequently re-vegetated with indigenous grass to alleviate soil compaction and minimize erosion.								
After Management	*Minor*	*Short*	*Site*	***Low***	*Definite*	***Low***	-	*Medium*

7.6.4 Wetlands

Impact W5: Wetland degradation as result of line inspections

Line inspections undertaken twice per year will require vehicles to move along the power line route, including through the wetlands. This is likely to lead to disturbance of wetland vegetation and fauna, especially if vehicles venture off defined tracks and access routes. Vehicle ruts that form along the route could create preferential flow paths that increase erosion risk and lead to gully erosion. Gully erosion has as a consequence the local lowering of the perched water table within the wetland, leading to desiccation and habitat degradation. Where channels are crossed in valley bottom wetlands damage to channel banks could occur, further increasing erosion risk. Disturbance and degradation of wetland habitat creates opportunities for invasion by invasive and alien species.

The wetlands impacts associated with the line inspections are considered to be low as this activity only takes place on a bi-annual basis and road networks identified during the construction phase will be utilised.

Activity	Undertake line inspections (twice per year)							
Project phase	Operation							
Impact Summary	Access to wetlands could lead to disturbance of wetland vegetation and fauna, increased risk of erosion along vehicle ruts that form preferential flow paths, damage to channel banks and increased risk of colonisation by invasive and alien species.							
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Before Management	*Major*	*Short-term*	*Site*	***Medium***	*Definite*	***Medium***	-	*High*
Proposed mitigation and management measures: • Vegetation clearing must be kept to the absolute minimum servitude required for safe operation of the power line • Vegetation clearing must be limited to removal of alien trees and mowing of grass and reeds. Complete removal of vegetation must be avoided • No driving through wetland/stream channels unless existing crossings are utilised • Existing access routes and disturbed areas identified during the construction phase will be utilised as far as possible to access power line route.								
After Management	*Minor*	*Short-term*	*Site*	***Low***	*Possible*	***Low***	-	*High*

7.6.5 Air Quality

No impacts expected during the operational and maintenance phases of the proposed power line.

7.6.6 Traffic

No impacts expected during the operational and maintenance phases of the proposed power line as line inspections will only be annual or bi- annually.

7.6.7 Surface Water

No impacts expected during the operational and maintenance phases of the proposed power line.

7.6.8 Groundwater

No impacts expected during the operational and maintenance phases of the proposed power line.

7.6.9 Noise

No impacts expected during the operational and maintenance phases of the proposed power line.

7.6.10 Visual

No impacts expected during the operational and maintenance phases of the proposed power line as the proposed new power line will be erected in a brownfields area with expensive mining and agricultural activities.

7.6.11 Heritage

No impacts expected during the operational and maintenance phases of the proposed power line.

7.6.12 Socioeconomic impacts

No negative or positive impacts are anticipated during the operational and maintenance phases of the proposed power line and residual land capability losses are addressed in Section 7.6.4.

7.7 Decommissioning phase: Biophysical impacts

Decommissioning phase activities for the existing power line include:

- Survey unsafe areas in order to identify suitable management measures to provide access in order to remove existing infrastructure to decommission the line
- Implement suitable mitigation and management measures in order to provide safe access to the site (e.g. buffer blasting)
- Decommission the existing power line (switch line off)
- Dismantling and removable of transmission cables, pylons and associated existing infrastructure
- Rehabilitation of foundations and excavations
- Material transport and disposal or recycling
- rehabilitation and disposal strategies

  A detailed project description is presented in section 4.

7.7.1 Biodiversity

Impact B4: Habitat loss due to inappropriate demolition practices, inefficient rehabilitation of disturbed areas

During the decommissioning of the existing power line, rehabilitation and removal of disturbed areas may affect remaining terrestrial ecological habitat, diversity and SCC if not performed according to a detailed rehabilitation plan and strategies. Furthermore, ineffective rehabilitation of disturbed areas may lead to continued erosion, alien and invasive plant species proliferation and siltation of watercourses. Demolition of all surface infrastructure must be in accordance with the Eskom's decommissioning plan for transmission lines, including the dismantling of the towers and the dispersal or recycling of the material.

Activity	Demolishing of all surface infrastructure in accordance with Eskom's decommissioning plan for transmission lines including provision for the dismantling of the towers and the disposal or recycling of the material.							
Project phase	Decommissioning and closure							
Impact Summary	As a result of decommissioning the existing power line there a loss of habitat							
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Before Management	*Moderate*	*Long*	*Site or Local*	***Medium***	*Definite*	***Medium***	-	*Medium*
Proposed mitigation and management measures: • Footprint areas of demolition activities and appropriate mitigation measures to address sinkholes must be kept as small as possible • Rehabilitation of disturbed areas must be implemented and grass seeds of species indigenous to the area must be used • Monitoring and control of Alien Invasive Plant (AIP) must be done during the decommissioning and closure phase • Disturbed areas caused during the demolition activities need to be ripped and rehabilitated and seeded with grass seeds indigenous to the area • Care must be taken when rehabilitation activities need to be performed within wetlands and associated buffer zones as these areas are sensitive and manual labor needs to be the preferred option.								
After Management	*Minor*	*Medium-term*	*Local*	***Low***	*Possible*	***Low***	-	*Medium*

7.7.2 Soils and land capability

Impact L2: Land capability loss

The current land use practices along the existing route include mining, agricultural and wilderness. In addition, due to formation of sinkholes along section of the route, no agricultural practices can be undertaken. Once decommissioning of the power line is complete, along with sinkhole remediation, current and potential new land use practices can resume.

The impact associated with land capability loss is anticipated to be low as current land uses practices are limited due to the formation of sinkholes and the power line is located within an existing mining area owned by Anglo.

Activity	Decommissioning of existing power line infrastructure							
Project phase	Decommissioning to post-closure							
Impact Summary	Land capability may be lost during the decommissioning of the existing power line.							
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Before Management	*Moderate*	*Long*	*Local*	***Medium***	*Possible*	***Medium***	-	*Medium*
Proposed mitigation and management measures: • Efforts should be made to reclaim all the infrastructure materials as soon as they are no longer in use, to prevent accumulated impacts • Electrical power must be safely disconnected immediately once the power line infrastructure is no longer in use, prior to decommissioning • Burying of waste should be strictly prohibited, and all waste should be managed in accordance with the relevant legislative requirements • All non-hazardous solid waste should be collected for recycling and/or disposal at an approved landfill • Records of waste disposal certificates should be securely filed for compliance monitoring • Undertake sinkhole remediation prior to the decommissioning of the existing power line.								
After Management	*Moderate*	*Short*	*Local*	***Low***	*Possible*	***Low***	-	*Medium*

7.7.3 Wetlands

Impact W6: Degradation of wetlands due to the decommissioning of the existing power line

Access to wetlands for removal of infrastructure will lead to disturbance of wetland vegetation and fauna. In addition increased risk of erosion along vehicle ruts that form preferential flow paths could occur as well as, obstruction and diversion of flow due to stockpiles of excavated soils and other materials, increased sedimentation in wetlands due to erosion of stockpiled soils, damage to channel banks and increased risk of colonisation by invasive and alien species.

The impact associated with degradation of wetlands due to the decommissioning of the existing power line is anticipated to be low as the wetlands within the current footprint are disturbed.

Activity	Removal of all infrastructure							
Project phase	Decommissioning & closure							
Impact Summary	Access to wetlands for removal of infrastructure will lead to disturbance of wetland vegetation and fauna, increased risk of erosion along vehicle ruts that form preferential flow paths, obstruction and diversion of flow due to stockpiles of excavated soils and other materials, increased sedimentation in wetlands due to erosion of stockpiled soils, damage to channel banks and increased risk of colonisation by invasive and alien species.							
	Magnitude	**Duration**	**Scale**	**Consequence**	**Probability**	**SIGNIFICANCE**	**+/-**	**Confidence**
Before Management	*Major*	*Short-term*	*Site*	***Medium***	*Definite*	***Medium***	-	*High*
Proposed mitigation and management measures: • Existing access routes and disturbed areas should be utilised as far as possible to access pylon locations • Access tracks through wetland areas should ideally run parallel to the contour to limit the formation of preferential flow paths that could lead to erosion. Accessing pylon locations along routes perpendicular to the contour should be avoided, unless along existing tracks. • Surface runoff along the access routes should not lead to erosion. Where ruts have formed and remain following completion of decommissioning activities, these should be plugged with regular shallow soil berms to prevent a preferential flow paths forming along the vehicle ruts • On completion of decommissioning at each pylon the site should be left clean and free from all debris, hydrocarbons and waste, and all excavations filled appropriately • All disturbance footprints associated with the pylon footings and access roads on site must be fully rehabilitated following decommissioning. This should include removal of all waste and contaminated material from site, soil compaction must be alleviated and the footprint landscaped to the surrounding landscape profile and re-vegetated with locally occurring indigenous grass species • Undertake decommissioning activities in the dry season as far as possible.								
After Management	*Moderate*	*Short-term*	*Site*	***Low***	*Possible*	***Low***	-	*High*

7.7.4 Air quality

No impacts expected during the decommissioning phase of the proposed power line.

7.7.5 Traffic

No impacts expected during the decommissioning phase of the proposed power line.

7.7.6 Surface water

No impacts expected during the decommissioning phase of the proposed power line.

7.7.7 Groundwater

No impacts expected during the decommissioning phase of the proposed power line.

7.7.8 Noise

No impacts expected during the decommissioning phase of the proposed power line.

7.7.9 Visual

No impacts expected during the decommissioning phase of the proposed power line.

7.7.10 Heritage

No impacts expected during the decommissioning phase of the proposed power line.

7.7.11 Social

No impacts expected during the decommissioning phase of the proposed power line.

8 Environmental Management Programme

8.1 Introduction

The purpose of the EIA/ EMP is to ensure that social and environmental impacts, risks and liabilities identified during the process are effectively managed during the construction, operations and closure of the project. The EIA/ EMP specifies the mitigation and management measures to which Eskom is committed, and shows how the Project should mobilise organisational capacity and resources to implement these measures. The ESMP also shows how mitigation and management measures will be scheduled.

The key objectives of the EIA/ EMP are to:

- Formalise and disclose the programme for environmental and social management
- Provide a framework for the implementation of environmental and social management initiatives.

Best practice principles require that every reasonable effort be made to reduce and preferably to prevent negative impacts, while enhancing positive benefits, especially within the environment and communities most directly affected by the proposed project. These principles are guiding in the EIA process.

The EIA/EMP covers information on the management and/or mitigation measures that should be taken into consideration to address impacts in respect of:

- Planning and design
- Pre-construction and construction activities
- Operation
- Decommissioning of existing power lines.

It is necessary to highlight that the EIA/EMP is a living document that should be periodically reviewed and updated by Eskom. It must also be noted that the EIA/ EMP should be read in conjunction with the assumptions, limitations and exclusions noted in Section 9 of this report.

As part of ongoing implementation, this EIA/EMP will be publicly disclosed during the stakeholder engagement process. An opportunity will be offered to participating stakeholders to provide comment.

Figure 8-1 below illustrates the principle of continual improvement in development of a policy framework, environmental and social management planning, which are implemented through a number of plans, programmes and operating procedures using Eskom's corporate governance structure. Implementation is monitored on a regular basis to determine environmental and social performance and conformance, and corrective action is taken where necessary. Management review is undertaken on scheduled basis to determine whether the system reflects the requirements and commitments of the company. These combined elements comprise the Environmental and Social Management System (ESMS). The EMP has been extracted and put into a standalone document for easy of reference for the construction phase.

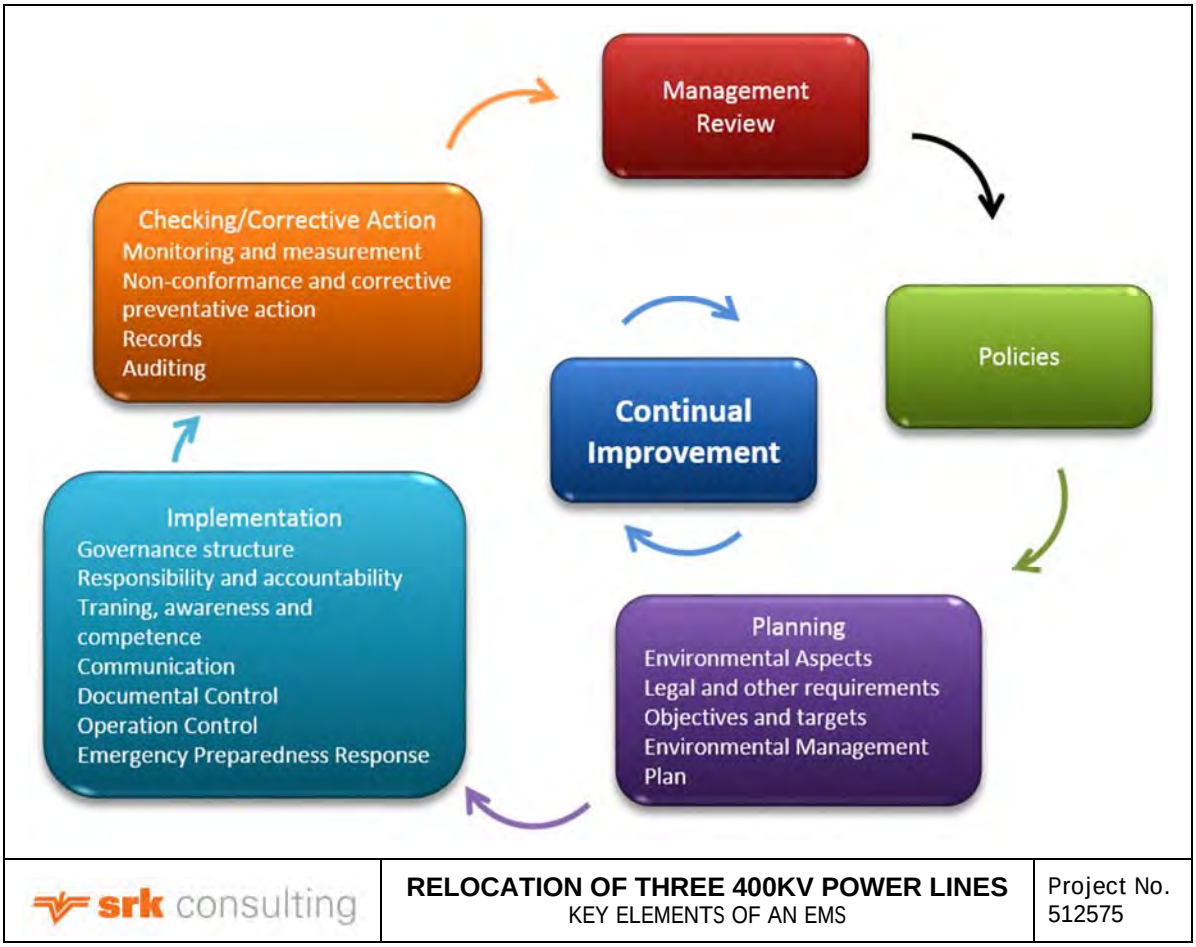


Figure 8-1: Key elements of an ESMS

*Source: http://infohouse.p2ric.org/ref/32/31028/ems/info/sme4.htm

8.2 Eskom Organogram

Figure 8-2 outlines the key teams involved in the development of the proposed power line project.

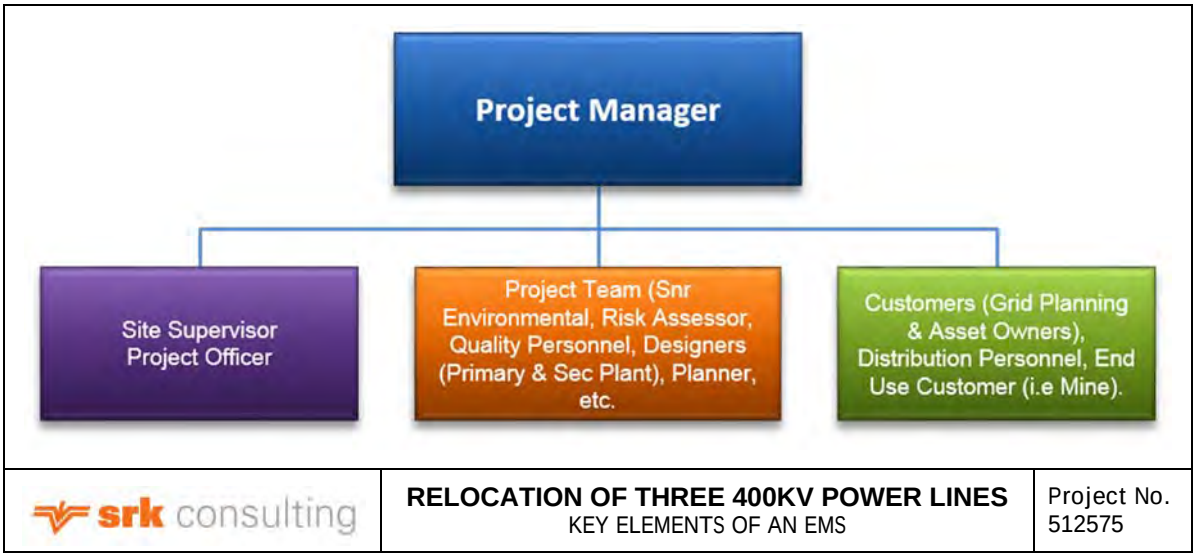


Figure 8-2: Key teams involved

8.2.1 Roles and Responsibilities of the project delivery team

Table 8-1 shows the project delivery team and outlines their roles and responsibilities.

Table 8-1: Project Delivery Team including their roles and responsibilities

Name	Disciplines
Calvin Govindasamy	Investment Delivery Packages (TIC) including SURS and Planning Report.
Thabo Mpela	Project Execution and Project Management
Sharon Mushabe	Design Packages including Concept, Geotech and Design Reports
Lands and Rights SRK	EIA and WULA
Land Development	Land Acquisitions Requirements

8.2.2 Project core team

Table 8-2 shows the core team and outlines their roles and responsibilities.

Table 8-2: Core project Team

Name	Disciplines
Calvin Govindasamy	Asset Investment Planning
Thabo Mpela	Project Execution and Project Management
Sharon Mushabe	Lines Engineering Services
Priscilla Gallant	Customer Representative

8.2.3 Stakeholders

Table 8-3 shows the key project stakeholders and outlines their roles and responsibilities.

Table 8-3: Key project stakeholders

Stakeholder Name	Interest
Anglo Coal	Relocation of lines to be done ASAP, for Safety Reasons
North East Grid	Relocation of lines to be done ASAP, for Safety Reasons
Department of Water and Sanitation	Issuing of Licence
Department of Environmental Affairs	Issuing of EIA Licence/Study
Public	Benefit in skill development and possible employment

8.3 Summary of Environmental and Social Management Measures

Table 8-4 to Table 8-6 below summarise the proposed mitigation and management measures for the impacts identified in this EIA through the specialist work undertaken to date.

The tables are organised by project phase for the project covering pre-construction/construction, operation and decommissioning/ closure phases, and are clustered according to biophysical and socioeconomic aspect and impacts. These tables represent the recommendations arising from the specialist studies undertaken to date for the EIA/EMP.

Table 8-4: Pre-construction Phase of the proposed power line

Aspect	Impact	Mitigation Measures	Performance Criteria	Responsibility Party
Activity: Pre-construction – stripping of soils, clearing of land				
Environmental and social awareness and training	EA1: Non-compliance with the EMP and quarry standards.	• Appointment of suitably staff qualified to oversee implementation of the EIA/ EMP during all phases of the project, as well as to undertake inspections and audits on a regular basis • An induction and training program as per the existing Eskom induction programme covering the EMP, environmental awareness, dealing with environmental incidents and waste management • All staff commissioned during pre-construction and construction, including sub-contractors, should be made aware of ESMP requirements through the induction program as well as on notice boards at the contractors' camps during the construction phase. These notice boards should cover the EMP, environmental and social awareness, dealing with emergencies and waste management • Specific training in safety for those individuals working in high risk environments • The Environmental Emergency preparedness procedure and the non-conformance and corrective action procedures should be updated for the current transmission projects for implementation in emergency situations such as oil or fuel leaks and spills, fires, sewage spillage, and damage to community property • The emergency preparedness procedure includes requirements to contact the Health and Safety officers following an emergency or incident	• Audit / incident reports • Staffs are able to respond correctly onsite to environmental and social aspects of their work • A coherent, immediate response to all emergencies	Eskom
Topography: No impacts expected during the pre-construction and construction phase of the proposed power line.				
Activity: Construction of the new power line route				
Biodiversity	Impact B1: Loss of faunal and floral habitat, diversity and SCC	• Avoid disturbance of wetland habitat unit during the determination of the location of the contractor camp (location of contractor camp to be determined by Eskom appointed contractor) • Installation of bird flappers at delineated wetland areas. Special bird flappers will be installed on the power lines to deter birds from flying into the power lines • Construction footprint to be demarcated as per the construction phase conditions outlined in section 4 in order to ensure that all construction activities remain within this footprint • Construction vehicles will be restricted to travel only on designated roadways to limit the ecological footprint of the proposed development • Implementation of the appropriate measures included in Eskom's Transmission Vegetation Management Guideline, which include the relation of identified floral SCC and obtain the relevant permits, if required. • Prohibit the collection of plant material for medicinal purposes and fire wood • Rehabilitation measures must be implemented in areas where the soil surface was disturbed as Alien and Invasive Plants will promoted by these activities and faunal habitat will be lost due to encroachment of these species.	• Eskom Environmental Management Policy • Eskom Environmental Management Systems Policy • Eskom Environmental Impact Assessment Policy • Eskom Environmental Management Programme • Eskom Transmission Bird Perch Guidelines, • Eskom Bird Nesting Guidelines • Eskom Transmission Vegetation Management Guidelines	Eskom
Activity: Clearing of power line servitude footprint				
Soils	Impact S1: Increase soil erosion	• Construction footprint to be demarcated as per the construction phase conditions outlined in section 4 in order to ensure that all construction activities remain within this footprint • A regulated speed limit of ≤ 40 km per hour will be maintained to minimise dust generation during the construction activities • Regular dust suppression along the road during the construction phase, especially when strong wind conditions are predicted according to the local weather forecast • All disturbed areas can be re-vegetated with an indigenous grass mix to re-establish a protective grass strip within the power line servitude to minimize soil erosion and dust emission • Temporary erosion control measures will be used to protect the disturbed soils until adequate vegetation has established • Restricted access to prevent weed infestation particularly on the cultivated maize fields by implementing appropriate herbicide(s) to control the grass strip.	• Eskom Environmental Management Policy • Eskom Environmental Management Programme • Eskom Vegetation Management Guidelines	Eskom
Activity: Vehicular traffic and construction activities				
Soils	Impact S2: Loss of soil resource due to soil compaction	• All vehicular traffic should be restricted to the existing access roads and the proposed power line servitude as far as practically possible • A regulated speed limit of ≤ 40 km per hour will be maintained to minimise dust generation during the construction activities • Direct surface disturbance of the identified wetland soils including the Katspruit, Westleigh, and the Avalon/Bainsvlei soil forms can be avoided for construction roads and placement of contractors camp to minimise the intensity of compaction due to the susceptibility of these soils to prolonged waterlogging conditions (inundation) • Disturbed soils can be lightly ripped to at least 25 cm bgs to alleviate compaction prior to re-vegetation.	• Eskom Environmental Management Policy • Eskom Environmental Management Programme • Eskom Vegetation Management Guidelines	Eskom
Activity: Incidental spills and/or leaks of potentially hazardous substances				

Aspect	Impact	Mitigation Measures	Performance Criteria	Responsibility Party
Soils	Impact S3: Soil contamination	• Eskom's spill prevention and emergency spill response plan, as well as dust suppression, and fire prevention plans will be implemented during the construction phase • An Eskom emergency response contingency plan will be implemented to address clean-up measures should a spill and/or a leak occur • Spill kits will be provided for onsite spill clearing • All potential contaminants and hazardous substances (e.g. hydrocarbons, cement, waste collection and storage areas etc.) will be located on bunded areas to capture and spills and leaks • Waste associated with construction phase activities will be stored and removed as per Eskom Environmental Management Policy and Environmental Management Programme.	• Eskom Environmental Management Policy • Eskom Environmental Management Programme • Eskom Vegetation Management Guidelines	Eskom
Activity: Vegetation clearance and associated physical construction activities				
Land Capability	Impact L1: Loss of agricultural land capability	• Vegetation should be cleared only within areas of construction and not along the power line route • Restrict all intrusive surface disturbance to the localized vicinity of the power line support towers as far as practically possible in order to allow the prevailing land uses to continue with their operations, where feasible • Disturbed soils can be lightly ripped to at least 30 cm to alleviate soil compaction and subsequently re-vegetated with indigenous grass to alleviate soil compaction and minimize erosion • Leaseses along the power line route need to notified at minimum six months prior to commencement of construction • A dedicated communication channel will be established by Eskom to ensure a clear line of communication between Eskom and land users • The recommended ripping and re-vegetation can be implemented concurrently in 3-5km km intervals on the subsections where construction works are complete.	• Eskom Environmental Management Policy • Eskom Environmental Management Programme • Eskom Vegetation Management Guidelines	Eskom
Activity: Clearing wetland vegetation along power line for the construction of the pylons and servitude along the route				
Wetlands	Impact W1: Loss and disturbance of wetland habitat due to clearing of vegetation along the power line route	• Vegetation clearing will be kept to the absolute minimum servitude required for safe operation of the power line • Vegetation clearing will be limited to removal of alien trees and mowing of grass and reeds • Complete removal of vegetation will be avoided, except in direct excavation footprints • No driving through wetland/stream channels and saturated soils unless existing crossings are utilised. • Access routes to the power line servitude will make use of existing roads and farm tracks as far as possible • Where new access tracks into wetlands will be made, the shortest possible route through the wetland will be followed and ideally run perpendicular to the direction of flow in the wetland. Where ruts are created these will be rehabilitated to prevent formation of preferential flow paths • All alien invasive tree species will be removed from the power line servitude, with follow-up treatment/clearing to ensure clearing is successful • Surface runoff along the access routes will not lead to erosion • Prior to the commencement of any excavations, the required disturbance footprint will be demarcated and all activities will be located within the demarcated area. No vegetation disturbance to take place outside the demarcated area • On completion of construction at each pylon the site will be left clean and free from all debris, hydrocarbons and waste, and all excavations filled appropriately • All excavations on site will be fully backfilled. Material to be replaced in excavation in correct order, i.e. material excavated from the bottom of the excavation will be placed at the bottom and topsoil must be placed on surface. No subsoil to be placed on surface.	• Eskom Environmental Management Policy • Eskom Environmental Management Systems Policy • Eskom Environmental Impact Assessment Policy • Eskom Environmental Management Programme • Eskom Transmission Environmental Impact Procedure	Eskom
Activity: Construction camp establishment				
Wetlands	Impact W2: Loss and disturbance of wetland habitats due to construction camp establishment	• All construction camps will be located outside delineated wetland areas and a minimum distance of 100m from delineated wetland areas, ideally on previously disturbed areas • Vegetation clearing will be kept to the absolute minimum area required for the construction camp/camps. • Where possible, grass cover will be maintained within the construction camp/camps • A stormwater management plan which incorporates sediment controls will be developed and implemented for each construction camp. Stormwater to be discharged in an environmentally sensitive manner, ideally into a well-vegetated area • All potential contaminants and hazardous substances (e.g. hydrocarbons, cement, waste collection and storage areas etc.) will be located on bunded areas to capture and spills and leaks • Institute environmental best practice guidelines as per the DWA Integrated Environmental Management Series for Construction Activities • No hunting or setting of traps/snares will be allowed in adjacent wetland areas	• Eskom Environmental Management Policy • Eskom Environmental Management Systems Policy • Eskom Environmental Impact Assessment Policy • Eskom Environmental Management Programme • Eskom Transmission Environmental Impact Procedure	Eskom

Aspect	Impact	Mitigation Measures	Performance Criteria	Responsibility Party
		• The construction camp footprint will be fully rehabilitated following completion of construction activities. All waste and contaminated material will be removed from site, soil compaction will be alleviated and the footprint re-vegetated with locally occurring indigenous grass species.		
Activity: Undertake concrete work				
Wetlands	Impact W3: Loss and disturbance of wetland habitats due to increased sediment transport into wetlands	• Institute environmental best practice guidelines as per the DWA Integrated Environmental Management Series for Construction Activities • Dispose of all soil contaminated due to concrete mixing and use as per Eskom Environmental Management Policy and Environmental Management Programme • Waste will be stored on site in clearly marked containers in a demarcated area. All waste must be disposed of offsite.	• Eskom Environmental Management Policy • Eskom Environmental Management Systems Policy • Eskom Environmental Impact Assessment Policy • Eskom Environmental Management Programme • Eskom Transmission Environmental Impact Procedure	Eskom
Activity: String transmission cables				
Wetlands	Impact W4: Loss and disturbance of wetland habitats due to stringing transmission cables	• Existing access routes and disturbed areas will be utilised as far as possible to access pylon locations. Where no existing tracks are available, a single access track to each pylon location should be used • Access tracks through wetland areas should ideally run parallel to the contour to limit the formation of preferential flow paths that could lead to erosion. Accessing pylon locations along routes perpendicular to the contour should be avoided, unless along existing tracks • Surface runoff along the access routes should not lead to erosion. Where ruts have formed and remain following completion of construction activities, these will be plugged with regular shallow soil berms to prevent a preferential flow paths forming along the vehicle ruts • Stringing locations should be outside delineated wetland areas if at all possible • No driving through wetland/stream channels unless existing crossings are utilised • No driving through saturated soils.	• Eskom Environmental Management Policy • Eskom Environmental Management Systems Policy • Eskom Environmental Impact Assessment Policy • Eskom Environmental Management Programme • Eskom Transmission Environmental Impact Procedure	Eskom
Activity: Construction vehicles onsite during the construction of new power line				
Traffic	Impact T1: Increased generation of traffic on existing road network	• The speed limit will be 40km/h on all roads running through and accessing the study area • Construction vehicles will be restricted to travel only on designated roadways • Appropriate road signage will be erected during the construction phase • Transportation of abnormal loads as per Eskom's Traffic Management Plan • Construction vehicles will only operate during daytime hours.	• Eskom Environmental Management Policy • Eskom Environmental Management Systems Policy • Eskom Environmental Impact Assessment Policy • Eskom Traffic Management Plan	Eskom
Surface Water: No impacts expected during the pre-construction and construction phase of the proposed power line. Impacts that are associated with water course channel disturbance is included under the wetlands impacts (See Section 7.3.4)				
Groundwater: No impacts expected during the pre-construction and construction phase of the proposed power line				
Activity: Construction vehicles and activities onsite during the construction of new power line				
Noise	Impact N1: General rise in the ambient noise levels caused by construction vehicles and activities	• The speed limit will be 40km/h on all roads running through and accessing the study area • Contractor camp will be located at least 500m from the nearest community • Equipment/ machinery to be used must comply with manufacturers specifications acceptable noise levels; • Ensure high level of equipment maintenance, especially intake and exhaust mufflers • Maintain a complaints and grievance register and act promptly to complaints regarding noise • Construction vehicles will be restricted to travel only on designated of the proposed development • Construction vehicles and activities will only operate during daytime hours.	• Eskom Environmental Management Policy • Eskom Environmental Management Systems Policy • Eskom Environmental Impact Assessment Policy • Eskom Environmental Management Programme • Eskom Transmission Environmental Impact Procedure • SANS Noise Guidelines	Eskom
Visual: No impacts expected during the pre-construction and construction phase of the proposed power line, as the proposed new power line will be erected in a brownfields area with expensive mining and agricultural activities.				
Activity: Site clearing				

Aspect	Impact	Mitigation Measures	Performance Criteria	Responsibility Party
Heritage	Impact H1: Possible archaeological and/or historical sites, features or artefacts that could be found during site clearing	In the event that historical features are found during the construction phase, a Chance Find Procedure should be followed: • Upon finding any archaeological or historical material all work at the affected area must cease • The area will be demarcated in order to prevent any further work there until an investigation has been completed • An archaeologist will be contacted immediately to provide advice on the matter. • Should it be a minor issue, the archaeologist will decide on future action, which could include adapting the HIA or not. Depending on the nature of the find, it may include a site visit • SAHRA's APM Unit will be notified • If needed, the necessary permit will be applied for with SAHRA. This will be done in conjunction with the appointed archaeologist • The removal of such archaeological material will be done by the archaeologist in lieu of the approval given by SAHRA, including any conditions stipulated by the latter • Work on site will only continue after removal of the archaeological/ historical material was done • Operating controls and monitoring will be aimed at the possible unearthing of such features. Care should therefore be taken when development commences that if any of these are discovered, a qualified archaeologist be called in to investigate the occurrence	• Chance Find Procedure • Eskom Environmental Management Policy • Eskom Environmental Management Systems Policy • Eskom Environmental Management Programme	Eskom
Social	Impact S1: Loss of land for servitude use and agricultural production	• The loss of land for servitude and production is address under the land capability section 7.3.3	• Eskom Social Plan	Eskom
Activity: Construction of power line				
Social	Impact S2: Perceptions around job creation, increased expectations around employment opportunities	• Management of employment expectations through distribution of appropriate and timely information • Communication with community and job-seekers regarding actual project start dates and available job opportunities • Undertake a skills assessment of the local area to ascertain the employability of locals • Do not employ at the contractor camps, ensure there is an employment procedure in place and known to work seekers • Adhere to Eskom's employment standards regarding the employment of local versus regional workers; and • Ensure that contractors adhere to Eskom employment standards.	• Eskom Social Plan	Eskom
Activity: Relocation of the power line				
Social	Impact S3: Improved national power supply services	• Undertake civil and mining geotechnical assessment and associated specialist studies to determine the most appropriate route to prevent impacts on the proposed power route due to subsidence • Undertake regular inspections and maintenance along the route • Relocate the power line	• Eskom Social Plan • Resettlement Action Plan	Eskom
Activity: Relocation of three households adjacent to Clewer				
	Impact S4: Permanent loss of land and land linked livelihoods along the proposed power line	• Clarify compensation rules that apply to land and subsistence farming within the power line servitude and communicate these measures to the affected households • Undertake and implement appropriate compensation and livelihoods restoration (where necessary) under a Resettlement Action Plan	• Eskom Social Plan • Resettlement Action Plan	Eskom

Table 8-5: Operational Phase of the proposed power line

Aspect	Impact	Mitigation Measures	Performance Criteria	Responsibility Party
Topography: No impacts expected during the operational and maintenance phases of the proposed power line				
Activity: Operation and maintenance of new power line. Switching the line on, operation of new power line and undertake line inspections				
Biodiversity	Impact B2: Loss of faunal and floral habitat, diversity and SCC	• Vegetation clearing must be kept to the absolute minimum servitude required for safe operation of the power line • Proliferation of alien and invasive species is expected within any disturbed areas. These species will be controlled by the implementation of the appropriate measures included in Eskom's Transmission Vegetation Management Guideline for the eradication of alien and invasive species • Complete removal of vegetation must be avoided • No driving through wetland/stream channels unless existing crossings are utilised • Install appropriate bird flappers and identified locations along the power line • Periodic walk down of the power line to inspect the route for any possible avifaunal casualties • When any casualties are observed, a qualified avifaunal specialist must be contacted to assist with the placement of suitable and/or additional bird flappers on the power line • The speed limit will be 40km/h on all roads running through and accessing the study area, to minimise the risk of vehicle collisions with faunal species • Maintenance vehicles will be restricted to travel only on designated roadways to limit the ecological footprint of the proposed development.	• Eskom Environmental Management Policy • Eskom Environmental Management Systems Policy • Eskom Environmental Impact Assessment Policy • Eskom Environmental Management Programme • Eskom Transmission Bird Perch Guidelines, • Eskom Bird Nesting Guidelines • Eskom Transmission Vegetation Management Guidelines	Eskom
Activity: Electrical power transmission				
Soils and Land Capability	Impact S4: Residual land capability losses	• As agricultural activities will continue in the localized vicinity of the power line, machinery should be operated with caution • During maintenance activities restrict all intrusive surface disturbance to the localized vicinity of the power line support towers as far as practically possible in order to allow the prevailing land uses to continue with their operations, where feasible • Disturbed soils can be lightly ripped to at least 30 cm to alleviate soil compaction and subsequently re-vegetated with indigenous grass to alleviate soil compaction and minimize erosion.	• Eskom Environmental Management Policy • Eskom Environmental Management Programme • Eskom Vegetation Management Guidelines	Eskom
Activity: Undertake line inspections (twice per year)				
Wetlands	Impact W5: Wetland degradation as result of line inspections	• Vegetation clearing must be kept to the absolute minimum servitude required for safe operation of the power line • Vegetation clearing must be limited to removal of alien trees and mowing of grass and reeds. Complete removal of vegetation must be avoided • No driving through wetland/stream channels unless existing crossings are utilised • Existing access routes and disturbed areas identified during the construction phase will be utilised as far as possible to access power line route.	• Eskom Environmental Management Policy • Eskom Environmental Management Systems Policy • Eskom Environmental Impact Assessment Policy • Eskom Environmental Management Programme • Eskom Transmission Environmental Impact Procedure	Eskom
Air Quality: No impacts expected during the operational and maintenance phases of the proposed power line				
Traffic: No impacts expected during the operational and maintenance phases of the proposed power line as line inspections will only be annual or bi- annually				
Surface water: No impacts expected during the operational and maintenance phases of the proposed power line.				
Groundwater: No impacts expected during the operational and maintenance phases of the proposed power line				
Noise: No impacts expected during the operational and maintenance phases of the proposed power line				
Visual: No impacts expected during the operational and maintenance phases of the proposed power line as the proposed new power line will be erected in a brownfields area with expensive mining and agricultural activities				
Heritage: No impacts expected during the operational and maintenance phases of the proposed power line				
Socio economic: No impacts expected during the operational and maintenance phases of the proposed power line and residual land capability losses are addressed in Section 7.6.4				

Table 8-6: Decommissioning Phase of the proposed power line

Aspect	Impact	Mitigation Measures	Performance Criteria	Responsibility Party
Topography: No impacts expected during the decommissioning phase of the proposed power line				
Activity: Demolishing of all surface infrastructure in accordance with Eskom's decommissioning plan for transmission lines including provision for the dismantling of the towers and the disposal or recycling of the material				
Biodiversity	Impact B4: Habitat loss due to inappropriate demolition practices, inefficient rehabilitation of disturbed areas	• Footprint areas of demolition activities and appropriate mitigation measures to address sinkholes must be kept as small as possible • Rehabilitation of disturbed areas must be implemented and grass seeds of species indigenous to the area must be used • Monitoring and control of Alien Invasive Plant (AIP) must be done during the decommissioning and closure phase • Disturbed areas caused during the demolition activities need to be ripped and rehabilitated and seeded with grass seeds indigenous to the area • Care must be taken when rehabilitation activities need to be performed within wetlands and associated buffer zones as these areas are sensitive and manual labor needs to be the preferred option	• Eskom Environmental Management Policy • Eskom Environmental Management Systems Policy • Eskom Environmental Impact Assessment Policy • Eskom Environmental Management Programme • Eskom Transmission Bird Perch Guidelines, • Eskom Bird Nesting Guidelines • Eskom Transmission Vegetation Management Guidelines	Eskom
Activity: Decommissioning of existing power line infrastructure				
Soils and Land Capability	Impact L2: Land capability loss	• Efforts should be made to reclaim all the infrastructure materials as soon as they are no longer in use, to prevent accumulated impacts • Electrical power must be safely disconnected immediately once the power line infrastructure is no longer in use, prior to decommissioning • Burying of waste should be strictly prohibited, and all waste should be managed in accordance with the relevant legislative requirements • All non-hazardous solid waste should be collected for recycling and/or disposal at an approved landfill • Records of waste disposal certificates should be securely filed for compliance monitoring • Undertake sinkhole remediation prior to the decommissioning of the existing power line.	• Eskom Environmental Management Policy • Eskom Environmental Management Programme • Eskom Vegetation Management Guidelines	Eskom
Activity: Removal of all infrastructure				
Wetlands	Impact W6: Degradation of wetlands due to the decommissioning of the existing power line	• Existing access routes and disturbed areas should be utilised as far as possible to access pylon locations • Access tracks through wetland areas should ideally run parallel to the contour to limit the formation of preferential flow paths that could lead to erosion. Accessing pylon locations along routes perpendicular to the contour should be avoided, unless along existing tracks. • Surface runoff along the access routes should not lead to erosion. Where ruts have formed and remain following completion of decommissioning activities, these should be plugged with regular shallow soil berms to prevent a preferential flow paths forming along the vehicle ruts • On completion of decommissioning at each pylon the site should be left clean and free from all debris, hydrocarbons and waste, and all excavations filled appropriately • All disturbance footprints associated with the pylon footings and access roads on site must be fully rehabilitated following decommissioning. This should include removal of all waste and contaminated material from site, soil compaction must be alleviated and the footprint landscaped to the surrounding landscape profile and re-vegetated with locally occurring indigenous grass species • Undertake decommissioning activities in the dry season as far as possible.	• Eskom Environmental Management Policy • Eskom Environmental Management Systems Policy • Eskom Environmental Impact Assessment Policy • Eskom Environmental Management Programme • Eskom Transmission Environmental Impact Procedure	Eskom
Air quality: No impacts expected during the decommissioning phase of the proposed power line				
Traffic: No impacts expected during the decommissioning phase of the proposed power line				
Surface water: No impacts expected during the decommissioning phase of the proposed power line				
Groundwater: No impacts expected during the decommissioning phase of the proposed power line				
Noise: No impacts expected during the decommissioning phase of the proposed power line				
Visual: No impacts expected during the decommissioning phase of the proposed power line as the proposed new power line will be erected in a brownfields area with expensive mining and agricultural activities				
Heritage: No impacts expected during the decommissioning phase of the proposed power line				
Socio – economic: No impacts expected during the operational and maintenance phases of the proposed power line and residual land capability losses are addressed in Section 7.6.4				

8.4 Environmental Monitoring

With the construction of the power line route, the following environmental monitoring is encouraged. In addition, any Eskom environmental monitoring will be implemented.

Wetlands

It is recommended that monitoring of all wetland crossing be undertaken immediately following the completion of construction activities, and then again 12 months after the completion of construction activities. Monitoring of wetland crossings should be undertaken by an independent wetland/aquatic ecologist in the form of a walk-down survey along the power line route. The following monitoring activities should be undertaken:

- A fixed point photographic record of each wetland crossing should be compiled
- Visual observations for signs of erosion and channel incision. Erosion features should be marked via GPS co-ordinates and measures (e.g. width and depth of erosion gullies and channels)
- Visual observations of vegetation cover and structure with a view to evaluating successful re-establishment of natural vegetation cover
- Observations of alien invasive species occurrence. Locations where alien invasive species are observed should be marked via GPS co-ordinates and basic characteristics of invasion noted (e.g. species, age, number of individuals/area covered etc.)

Following the completion of a monitoring event, the independent wetland/aquatic ecologist should recommend the need or not for rehabilitation activities and corrective actions required

Following the completion of the second monitoring event (12 months after construction), the independent wetland/aquatic ecologist should recommend the need or not for further monitoring.

8.5 Environmental Awareness Plan

The Environmental Awareness Plan developed for Eskom describes the manner in which the company intends informing its employees of any environmental risks which may result from their work and the manner in which the risk must be dealt with to avoid pollution or degradation of the environment. Eskom recognises that this needs to be broadened to capture social requirements.

Environmental conditions are included in any operational contracts, thereby making Contractors aware of the potential environmental risks associated with the project and the necessity to prevent accidental spillages by the implementation of good housekeeping practices.

The following principles should apply to safety, health and environmental (SHE) training:

- All personnel as a minimum undergo general SHE induction and awareness training
- An ESMS coordinator has been appointed
- The ESMS coordinator should identify the SHE training requirements for all Eskom personnel and Contractors. The training requirements are recorded in a training needs matrix indicating particular training that must be undertaken by identified personnel and Contractors
- The training matrix is administered by the Environmental Co-ordinator.

8.5.1 Awareness

General awareness training should be conducted as follows:

- Everyone should undergo induction on entry, which should, to incorporate environmental awareness training. At the end of this training, personnel should be required to complete the competency test and the level of competency assessed by the Training Department. Re-testing or induction will be undertaken during inspections and/or audits and/or as necessary and renewed on an annual basis

- Evaluation of competency training, where required, should be carried out through tests and questionnaires for employees
- All personnel performing tasks, which can cause significant or major environmental impacts, should be competent on the basis of training, education and/or experience. This applies to, but is not limited to, supervisor level and above.

In addition to the above environmental awareness, environmental issues should be addressed as follows:

- Induction on environmental issues for all employees starting to work on the project
- Annual induction for all employees
- Monthly environmental topics should be generated to raise awareness of employees on environmental issues.

8.5.2 Training

Training of contractors and staff is essential for the project. Key consideration include:

- Awareness training must include the potential consequences of departure from specified operating procedures as well as significant environmental impacts, actual or potential, of their work activities
- Training should be appropriate to the activity of individual employees.

8.5.3 Auditing and reporting

The EMP performance assessment (audit) must be undertaken at a maximum of every five years by an external auditor, and a report must be compiled and submitted to the competent authority.

In addition Eskom's auditing protocol will be implemented.

9 Assumptions and Limitations

The following assumptions and limitations have been identified with regards to the environmental baseline, impacts and mitigation measures:

- All the technical data, project description and information provided by the proponent to the EAP and specialists is pre-concept level. The EAP and specialists have identified all possible impacts based on the information provided and these have been assessed and rated accordingly
- All specialist modelling undertaken for this authorisation process is predictive modelling based on qualitative data and therefore will need to be updated once quantitative data becomes available during the pre-feasibility and feasibility stages, as well as during construction and operation phase
- The stakeholder engagement process has been sufficiently effective in identifying the critical issues that needed to be addressed through specialist investigations and/or by the EAP. Specialist input has thus been appropriately scoped to investigate the critical issues
- The stakeholder engagement process has sought to involve key stakeholders and individual landowners. It is assumed that where participation has been sought from the organizational representative/s, that these parties have the authority to comment on behalf of their organisation
- The public participation process provided ample opportunity for stakeholders to express any issues and concerns. It has thus been effective in identifying critical issues that the specialist investigations and/or EAP needed to address
- All comments received from the authorities are included and considered
- Eskom and its contractors will implement the management measures contained in the EIA/EMP
- A monitoring and evaluation system, including auditing, will be established, in line with this EIA/EMP, to track the implementation of this specific EMP to ensure that management measures are effective to avoid, minimize and mitigate impacts; and that corrective action is being undertaken to address shortcomings and/or non-performances
- Eskom will adopt a process of continual improvement when managing and/or mitigating negative environmental impacts arising from the project. The EIA/EMP will be used as the basis of environmental management and will be improved and refined regularly
- The monitoring required of the project will determine the validity and accuracy of the predictions made. Any exceedances of parameters or complaints from stakeholders will be investigated and remedied by the mine when required to do so.

9.1 Specialist's assumptions

9.1.1 Biodiversity

- The ecological assessment is confined to the power line development and the associated power line servitude, and does not include the neighbouring and adjacent properties; these were however considered as part of the desktop assessment
- With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. It is, however, expected that most floral and faunal communities have been accurately assessed and considered
- Due to the nature and habits of most faunal taxa and the high level of surrounding anthropogenic activities, it is unlikely that all species would have been observed during a site assessment of limited duration. Therefore, site observations were compared with literature studies where necessary
- The data presented in this report are based on one site visit, undertaken in March 2017. A more accurate assessment would require that assessments take place in all seasons of the year. However, on-site data was significantly augmented with all available desktop data, as well as previous studies conducted in the area, and the findings of this assessment are considered to be an accurate reflection of the ecological characteristics of the power line development.

9.1.2 Soils and Land Capability

- The soil survey conducted as part of the land capability assessment was restricted to the immediate zone of influence of 250 metres (m) from the centreline of the proposed power line route, which is considered to be adequate for the purpose of this investigation
- Sampling by definition means that not all areas are assessed, and therefore some aspects of soil and land capability may have been overlooked in this assessment. However, it is the opinion of the professional specialist that this assessment was carried out with sufficient sampling and in sufficient detail to enable the proponent, the Environmental Assessment Practitioner (EAP) and the regulating authorities to make an informed decision regarding the proposed power line infrastructure development
- Land Capability was classified according to current soil restrictions, with respect to prevailing climatic conditions on site; however, it is virtually impossible to achieve 100% purity in soil mapping, the delineated soil map units could include other soil type(s) as the boundaries between the mapped soils are absolute but rather form a continuum and gradually change from one type to another. Soil mapping and the findings of this assessment were therefore inferred from extrapolations from individual observation points
- Soil fertility status was not considered a limitation, seeing as inherent nutrient deficiencies and/or toxicities would be rectified by appropriate liming and/or fertilization prior to cultivation.

9.1.3 Wetlands

- Wetland systems reflect the ecological boundary where there is a close relation and interaction between water content and soil particles in the first 50 centimetres of the soil profile. The soil-water interaction in response influences the plant communities and soil properties, i.e. causing mottling and gleying in the soil. The wetland boundary, based on vegetation species compositions and soil properties, can vary depending on historical rainfall conditions and introduce a degree of variability in the wetland boundary between years as well as sampling period.
- The scale of the remote imagery used (1:10 000 aerial photographs and Google Earth Imagery), as well as the accuracy of the handheld GPS unit used to delineated wetlands in the field, result in the delineated wetland boundaries being accurate to about 10-20m on the ground. Should greater mapping accuracy be required, the wetlands would need to be pegged in the field and surveyed using conventional survey techniques
- Groundtruthing and field verification of wetland boundaries was limited to the study area. Wetlands falling outside the study area boundary were not delineated in the field as part of the current study, and are based on existing information from previous studies and desktop mapping where necessary to fill gaps
- This impact assessment was based on the project description and proposed development and activity descriptions as detailed and illustrated in the wetland specialist report.

Uncertainties

Reference conditions are unknown. This limits the confidence with which the present ecological category (PES) is assigned.

Knowledge Gaps

- Although most of the wetland crossings were assessed in the field during the current study, it was not possible to visit every wetland in the field during the current (2017) field survey. However all of the wetlands along the proposed power line route have been delineated and assessed in the field as part of previous studies undertaken in the last 5 years
- No hydrological flow modelling or hydro-pedological assessments of the wetlands were undertaken as part of this study. However, given the nature of the proposed project, this is not considered a significant short-coming and sufficient wetland information is available to inform the study and decision making.

9.1.4 Heritage

- Cultural Resources are all non-physical and physical man-made occurrences, as well as natural occurrences associated with human activity. These include all sites, structures and artifacts of importance, either individually or in groups, in the history, architecture and archaeology of human (cultural) development. Graves and cemeteries are included in this
- The significance of the sites, structures and artifacts is determined by means of their historical, social, aesthetic, technological and scientific value in relation to their uniqueness, condition of preservation and research potential. The various aspects are not mutually exclusive, and the evaluation of any site is done with reference to any number of these aspects
- Cultural significance is site-specific and relates to the content and context of the site. Sites regarded as having low cultural significance have already been recorded in full and require no further mitigation. Sites with medium cultural significance may or may not require mitigation depending on other factors such as the significance of impact on the site. Sites with a high cultural significance require further mitigation
- The latitude and longitude of any archaeological or historical site or feature, is to be treated as sensitive information by the developer and should not be disclosed to members of the public
- All recommendations are made with full cognizance of the relevant legislation
- It has to be mentioned that it is almost impossible to locate all the cultural resources in a given area, as it will be very time consuming. Developers should however note that the report should make it clear how to handle any other finds that might occur
- In this particular case the entire surveyed area has been disturbed by recent human activities, mainly mining infrastructure. Accordingly these areas are seen as a low risk areas to reveal heritage sites due to it being almost entirely disturbed
- The vegetation cover in certain areas was high and dense, which had a negative effect on both the vertical and the horizontal archaeological visibility
- Due To heavy rains the two days before the fieldwork was done, some of the maize fields through which the proposed power lines goes were inaccessible. However due to the disturbance it is seen as low risk areas for finding heritage features.

10 Conclusions

10.1 Impact Statements (Risks and Impacts)

The impact assessment confirmed that the certain proposed activities (without mitigation) are expected to have impacts of high significance rating in relation to social and biodiversity.

The key impacts that relate to the proposed power line relocation project and are rated as having a high significance, are included in Table 7.5 and Table 7.18. Section 7 describes all impacts identified in detail for each phase of the project and includes mitigation measures to reduce the significant ratings.

10.2 Recommendation that this project go ahead

No fatal flaws in the Eskom power line project have been identified thus far through the EIA process. However, several environmental and social impacts are envisaged from construction phase through to maintenance and operation and decommission, which require careful mitigation and monitoring. It is the opinion of the EAP that all major impacts have been identified and have been assigned appropriate management measures. Most HIGH negative impacts with mitigation, are reduced to a MEDIUM or LOW significance, and can be managed accordingly.

The relocation of power line has a positive social impact as the disruption to National power supply will be prevented with the construction of the new route.

It is recommended by the EAP that the proposed power line project should be authorised, on the condition that the environmental and social management commitments included in this EIA/EMP are adhered to, the project description remains as per the description provided in this document and considering the positive social impacts associated with the project. The relocation of the power line route is dependant on the MRD reclamation project, to provide sufficient space for Eskom to relocate three 400kV power lines. Therefore a positive decision on the MRD reclamation environmental authorisation is required in order to commence construction of the power line.

10.3 Conditions of Environmental Authorisation

The following conditions should be included in the environmental authorisation for the power line project:

- To ensure compliance with, and implementation of the EMP by:
  - Appointing of a suitably qualified individual to oversee implementation of the EMP during all phases of the project
  - Appointing a suitably qualified Environmental Control Officer/Superintendent to undertake audits on a regular basis throughout the construction phase
- To ensure that all staff, contractors and sub-contractors are aware of and understand the requirements of the EMP and environmental issues in relation to their individual areas of work by:
  - Developing an induction and training program covering the EMP, environmental awareness, dealing with environmental incidents and waste management
  - Advising staff commissioned during pre-construction and construction, including sub-contractors, of EMP requirements through the induction program as well as on notice boards at the contractor's camps during construction. These notice boards should cover the EMP, environmental awareness, dealing with emergencies and waste management
  - Implementing an Environmental Emergency preparedness procedure and the non-conformance and compiling the corrective action procedure for the power line project. This is to be implemented in emergency situations such as Oil or fuel leaks and spills, fires, sewage spillage. The Emergency preparedness procedure must include requirements to contact the Environmental Coordinator following an emergency or incident

  - Potential impacts identified should be monitored during all phases of the power line project. Maintenance of the transmission line will form an important aspect of the operations. Management measures will be amended to address the impacts if analysis of monitoring trends indicates this may be necessary. Monitoring of the operations, in accordance with their operating plans and protocols, will also form an important activity to ensure their long-term sustainability
  - Care should be taken with the choice of herbicide to ensure that no additional impact and loss of indigenous plant species occurs due to the herbicide used
  - Demarcate all sensitive floral habitat areas and ensure that these areas are off-limits to construction, operational vehicles and all personnel.
- As it is almost impossible to locate all the cultural resources in a given area, the following chance find procedure must be adhered to, should a heritage site be uncovered:
  - Stop all work on site
  - Demarcate area so that access is restricted for contractors and the general public
  - Contact heritage specialist to assess the site
  - Document the following:
  - Photograph of find
  - GPS coordinates
  - Basic description (eg graves, stone walling, stone tools)
  - If graves, try to include number of graves as well as oldest and youngest date of death indicated
  - Await feedback from heritage specialist and SAHRA prior to commencing with activities.
- A GA application for the proposed power line was submitted on 31 May 2017 and approval from DWS was granted on 4 July 2017.
- Ensure that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage. Regularly inspect all vehicles for leaks
- Eskom would like to request, should DEA grant the proposed project a positive environmental authorisation that the environmental authorisation be valid for a five years.

Wetlands:

- Based on the outcomes of the wetlands study, specifically considering the existing disturbances impacting n many of the wetlands in the area and resulting in the moderately to largely modified condition of the affected wetlands, together with the fact that expected impacts can be mitigated to Low significance, it is our considered opinion that the proposed relocation of the power line as detailed in this report could be authorised from a wetland perspective. Should authorisation be granted, the following conditions should however apply:
  - The construction camps must be located outside delineated wetland areas and a minimum distance of 100m from delineated wetland areas, preferably on previously disturbed areas
  - The mitigation measures detailed in this wetland report must be included in the EMP and must be fully implemented on site.

10.4 EAP oath

I, Beth Candy, declare that

- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report

- I will ensure that the plan of study for undertaking the environmental impact assessment will be clearly communicated with the interested and affected parties to ensure that everyone involved is aware and in agreement in terms of the plan of study.

Signature of the environmental assessment practitioner:

Beth Candy

Name of company: SRK Consulting (South Africa) (Pty) Ltd

Date:

Prepared by

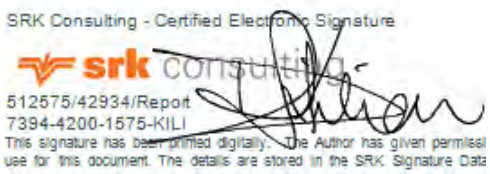
Natasha Anamuthoo

Senior Environmental Scientist, *CEAPSA*

Beth Candy

Principal Environmental Scientist, *Pr Sc. Nat*

Reviewed by



Darryll Kilian

Project Partner

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

Appendices

Appendix A: Qualifications of EAP's

Appendix B: CV of EAP's

Appendix C: Stakeholder Engagement

Appendix C1: Stakeholder Database

Appendix C 2: Attendance Registers and Meeting Minutes

Appendix C 3: Background Information Letters

Appendix C 4: Newspaper Adverts

Appendix C 5: Photos of Site Notices

Appendix C 6: Radio Advert

Appendix C 7: Flyer

Appendix C 8: Cancellation of Public Meeting

Appendix C 9: Notification letter EMP Availability

Appendix C 10: Flyer Availability of EMP

Appendix C 11: Radio Advert Availability

Appendix C 12: Advertisement Availability

Appendix D: Specialist Reports

Appendix D 1: Desktop Mining Geotechnical Review

Appendix D 2: Biodiversity Eco Scan

Appendix D 3: Heritage Impact Assessment

Appendix D 4: Desktop Civil Geotechnical Review

Appendix D 5: Wetland Assessment

Appendix D 6: Soils and Land Capability Assessment

SRK Report Distribution Record

Report No.	515757_Eskom Power line Relocation EIA/ EMP
Copy No.	

Name/Title	Company	Copy	Date	Authorised by
Constance Musemburi	Department of Environmental Affairs	1 and CD	July 2017	Darryll Kilian
Reception (first floor) and Spatial Planning (3rd floor)	eMalahleni Local Municipality	2	July 2017	Darryll Kilian
Clifford Masango	eMalahleni Public Library	3	July 2017	Darryll Kilian
Maida Mahlangu	Clewer Post Office	4	July 2017	Darryll Kilian
Lizette Gnirck	Landau Recreation Club	5	July 2017	Darryll Kilian
Reception	Greenside Village	6	July 2017	Darryll Kilian
Human Resources and Shop Steward Kromdraai in Matimba Village	North and South Union Offices, Matimba Village	7	July 2017	Darryll Kilian
SRK Enviro	SRK Consulting	8	July 2017	Darryll Kilian

Approval Signature: