PROPOSED MATJHABENG SOLAR PV WITH BATTERY ENERGY STORAGE SYSTEMS PROJECT:
PHASE 1 AND PHASE 2 POWER LINES

BASIC ASSESSMENT REPORT

DRAFT

August 2021

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TITLE AND APPROVAL PAGE

Project Name:	Proposed Matjhabeng Solar PV with Battery Energy Storage Systems Project: Phase 1 and Phase 2 Power Lines
Report Title:	Basic Assessment Report
Authority Reference:	*To be assigned*
Report Status:	Draft

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EXECUTIVE SUMMARY

A. PROJECT BACKGROUND AND MOTIVATION

Electricity generation sources need to be diversified to ensure security of supply and reduction in the carbon footprint created by the current heavy reliance of South Africa on coal to produce electricity.

SunElex Energy (Pty) Ltd (the Applicant) has proposed the development of the Matjhabeng 400 MW Solar Photovoltaic Power Plant with 80 MW (320 MWh) Battery Energy Storage Systems (hereinafter the 'Project'), which is located north and south of the town of Odendaalsrus in the Free State Province. The proposed Project will be developed to serve the Matjhabeng Local Municipality's energy requirements and will generate power for delivery to the local/national grid.

The electricity generated by the Project will be injected into the existing Eskom 132 kV distribution system.

This document serves as the Draft Basic Assessment Report for the proposed Project: Phase 1 and Phase 2 Power Lines and Substations.

B. PROJECT LOCATION

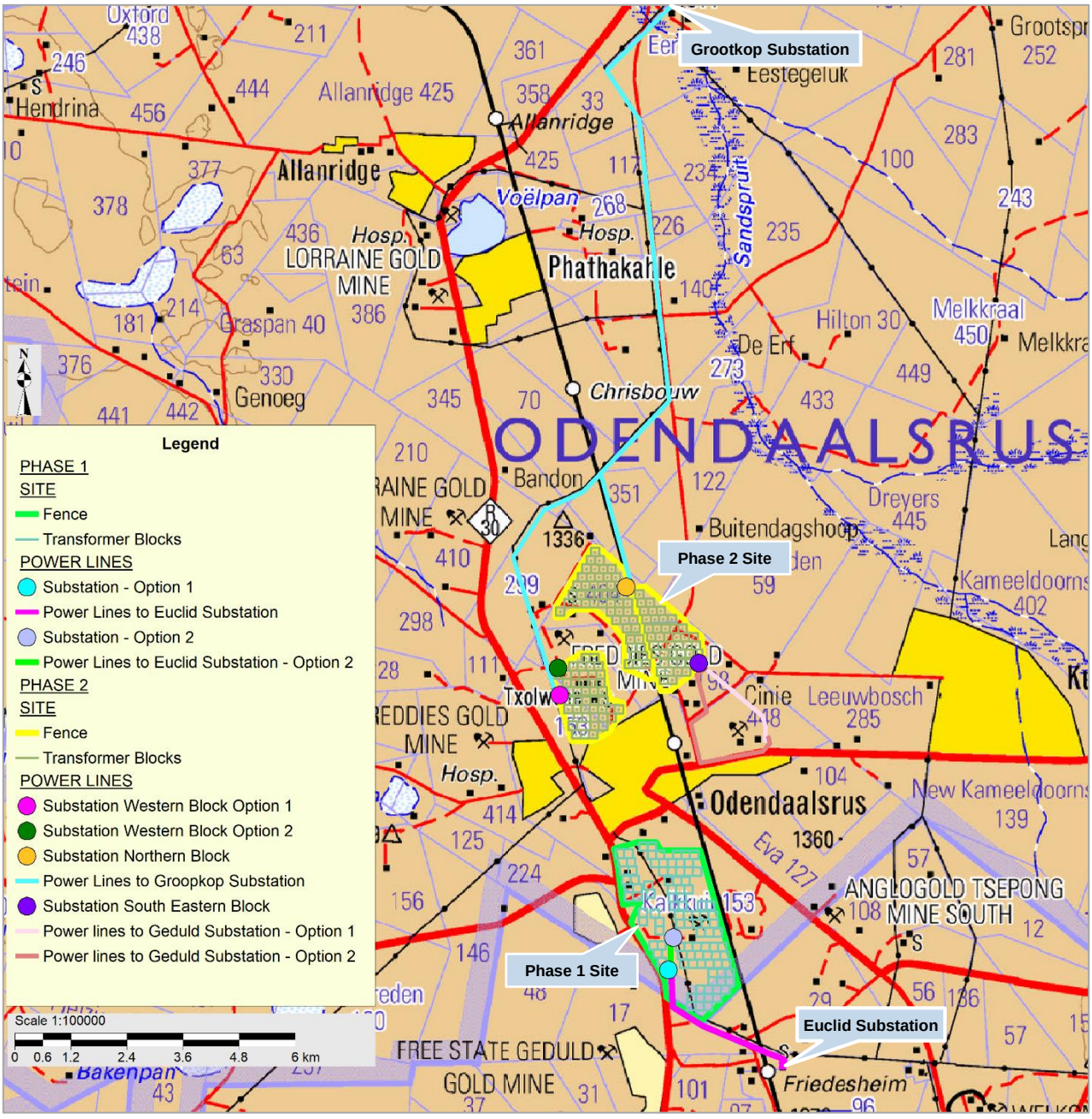
The rationale for the Project is based on its geographic location and the suitability of the sites (high solar yield area, flat and sparsely populated land, grid connection, water supply, good transport infrastructure, availability of a large portion of municipal land) and the value it provides to the Matjhabeng Local Municipality and users of electricity/energy to be generated by the proposed Project.

The Project is located in the north-western part of the Free State Province and falls within the Matjhabeng Local Municipality and Lejweleputswa District Municipality. The Phase 1 and Phase 2 Sites are located south and north of Odendaalsrus, respectively (see figure to follow). The sites are easily accessible from the north and south by the R30 arterial road (traversing both sites) and from the east and west via the R34 arterial road.

The electricity generated by the Project will be injected into the existing Eskom 132 kV distribution system as follows:

- Phase 1:
  - Proposed new 132kV overhead power lines between the on-site substation and the existing Eskom Euclid Substation located to the south-east of the Phase 1 Site.
- Phase 2:
  - Northern and western blocks – proposed new 132kV overhead power lines between the on-site substations and the existing Eskom Grootkop Substation located to the north of the Phase 2 Site; and

- South-eastern block – proposed new 132kV overhead power line between the on-site substation and the existing Eskom Geduld Substation located to the south-east of the Phase 2 Site.



Locality map of Project Area

(Note: not all components of the Phase 1 and Phase 2 Facilities are shown)

C. PROJECT DESCRIPTION

A Network Integration Study was undertaken to investigate the integration of the proposed Solar PV Plant into the Eskom electrical network. Two sub-transmission integration options per plant were identified and assessed, based on technical, operational and economic factors in order to determine

the preferred option. The results showed that the Eskom grid has sufficient spare capacity to absorb the phases of the Project.

The electrical reticulation within the Solar PV Farm will be underground at 33kV and stepping up to 132kV to match the voltage of the nearby Eskom Transmission grid. Phase 1 will be connected to a single 132/33kV substation on the site. Phase 2 will be divided into three sections each with their own 132/33kV substations. An alternative, Option 2, for Phase 2 is to connect all three sections to a single 132/33kV Substation.

The proposed Solar PV Farm substations will each be approximately 80m x 80m. The HV Substation will consist of large ground mounted transformers and outdoor high voltage switchgear with overhead conductors and steel lattice structures. The yard will be fenced off and only authorised personnel are allowed inside the yard. The grid connections from the Solar PV Farm substations will be via 132kV transmission lines mostly running in the existing servitudes for 44kV lines.

The project-lifecycle as well as resources and services required for construction and operation are explained within the Basic Assessment Report.

D. LEGISLATION AND GUIDELINES CONSIDERED

Pertinent legislation that has possible bearing on the proposed Phase 1 and Phase 2 Power Lines and Substations from an environmental perspective is briefly discussed in the Basic Assessment Report.

The relationship between the Project and the following key pieces of environmental legislation is also explained:

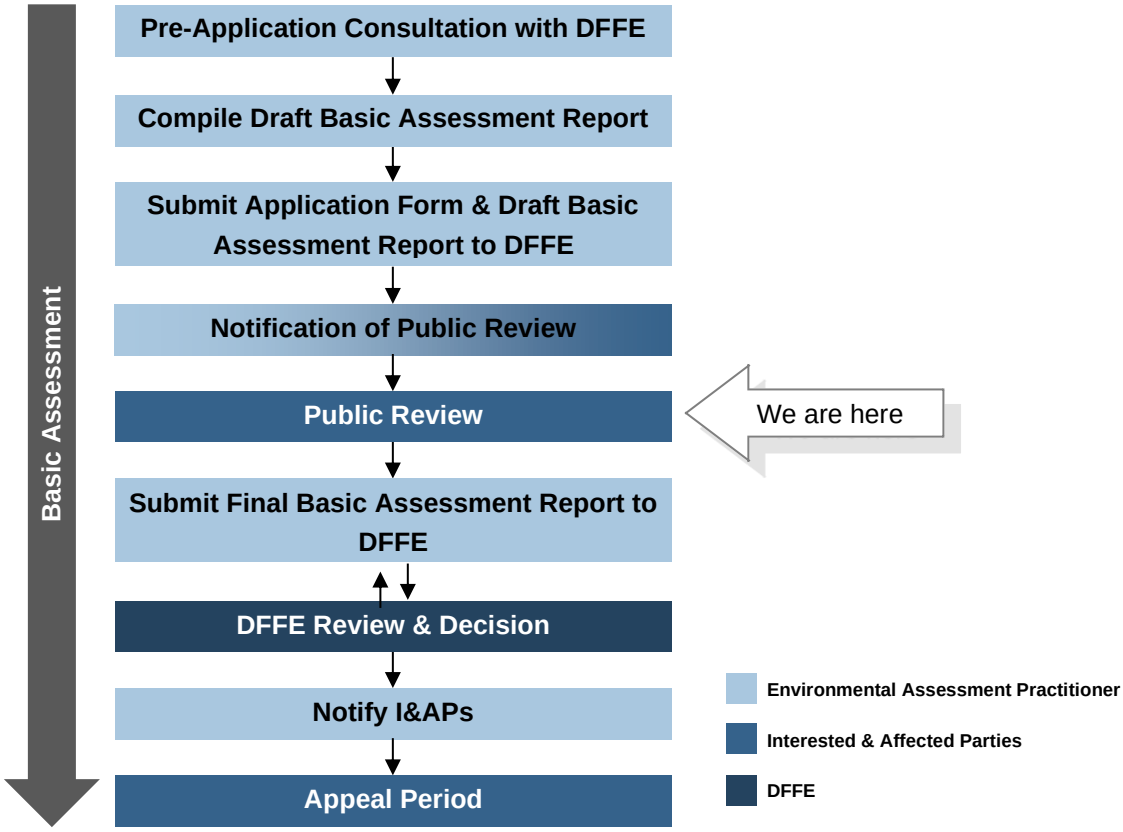
- National Environmental Management Act (No. 107 of 1998);
- National Environmental Management: Waste Act (Act No. 59 of 2008);
- National Water Act (Act No. 36 of 1998);
- National Environmental Management Air Quality Act (Act No. 39 of 2004);
- National Environmental Management: Biodiversity Act (Act No. 10 of 2004); and
- National Heritage Resources Act (Act No. 25 of 1999).

E. BASIC ASSESSMENT PROCESS

An Application for Environmental Authorisation in terms of the National Environmental Management Act (Act No. 107 of 1998) and the Environmental Impact Assessment Regulations of 2014 (as amended) has been made for the proposed Project. In terms of the aforementioned Act, the lead decision-making authority for the environmental assessment is the Department of Forestry, Fisheries and the Environment.

The process for seeking authorisation is undertaken in accordance with Government Notice No. R. 982 of 4 December 2014 (as amended). Based on the types of activities involved, the requisite

environmental assessment for the Project: Phase 1 and Phase 2 Power Lines and Substations is a Basic Assessment Process. An outline of the process is provided in the diagram to follow.



Overview of Basic Assessment Process

F. PROFILE OF THE RECEIVING ENVIRONMENT

The Basic Assessment Report provides a general description of the status quo of the receiving environment in the Project area. This serves to provide the context within which the assessment was conducted and allows for an appreciation of sensitive environmental features and possible receptors of the effects of the proposed Project.

The receiving environment is explained in terms of the following:

- Land Use and Land Cover
- Climate
- Geology and Geohydrology
- Soils
- Topography
- Surface Water
- Flora & Fauna
- Socio-Economic Environment
- Planning
- Existing Structures and Infrastructure
- Transportation
- Air quality
- Noise
- Cultural Heritage & Palaeontological Features
- Aesthetic Qualities
- Health

G. SPECIALIST STUDIES

The specialist studies 'triggered' by the nature of the proposed development and its receiving environment, which aimed at addressing the key issues and compliance with legal obligations, include the following:

1. Water Resources Impact Assessment;
2. Terrestrial Ecology Assessment;
3. Avifaunal Assessment;
4. Agricultural Impact Assessment;
5. Phase 1 Cultural Heritage Impact Assessment;
6. Desktop Paleontological Assessment;
7. Visual Impact Assessment; and
8. Socio-Economic Impact Assessment.

The information obtained from the respective specialist studies was incorporated into the Basic Assessment Report in the following manner (amongst others):

1. The information was used to complete the description of the receiving environment in a more detailed and site-specific manner;
2. A summary of each specialist study is provided, focusing on the approach to each study, key findings and conclusions drawn;
3. The specialists' impacts assessment, and the identified mitigation measures, were included in the overall project impact assessment;
4. The evaluations performed by the specialists on the alternatives of the Project components were taken into consideration in the identification of the most favourable options; and
5. Salient recommendations made by the specialists were taken forward to the final Conclusions.

H. IMPACT ASSESSMENT

The Basic Assessment Report assessed the pertinent environmental impacts that could potentially be caused during the pre-construction, construction and operational phases of the Project.

Impacts were identified as follows:

- Impacts associated with listed activities contained in Government Notice No. R. 983, R. 984 and R. 985 of 4 December 2014, as amended, for which Environmental Authorisation have been applied for;
- An appraisal of the Project's activities and components;
- An assessment of the receiving biophysical, social, economic and built environments;
- Findings from specialist studies;
- Issues highlighted by environmental authorities; and
- Comments received during public participation.

The impacts and the proposed management measures are discussed on a qualitative level and thereafter quantitatively assessed to ultimately determine the significance of the impacts. The assessment considered impacts before and after mitigation, where in the latter instance the residual impact following the application of the mitigation measures is evaluated.

The proposed mitigation of the impacts associated with the Project includes specific measures identified by the technical team (including engineering solutions) and environmental specialists, stipulations of environmental authorities and environmental best practices. The Environmental Management Programme provides a comprehensive list of mitigation measures for specific elements of the Project, which extends beyond the impacts evaluated in the body of the Basic Assessment Report.

The implications of the “no-go option” are also assessed. The “no go option” was considered in light of the motivation as well as the need and desirability of the overall Project. In contrast, should the proposed Project not go ahead, any potentially significant environmental issues associated with the Project would be irrelevant and the status quo of the local receiving environment would not be affected by the Project-related activities. The objectives of this Project would, however, not be met. This will *inter alia* mean that the Project’s intended benefits to Matjhabeng Local Municipality will not be realised. The “no-go option” is thus not preferred.

Cumulative impacts were evaluated in terms of renewable energy projects in proximity to the proposed Project footprint. From a desktop scan it can be seen that these other renewable energy project sites have also been affected by mining and other anthropogenic activities. Nonetheless, cumulative impacts may be caused by these various developments, including loss of biodiversity and habitat fragmentation, visual and landscape character impacts, noise, reduction in air quality, traffic disruptions, as well as pressures on local facilities, goods and services. The aforementioned impacts in relation to the Project were assessed individually in the Basic Assessment Report and mitigation measures were developed for each of the impact areas.

Other aspects considered in terms of cumulative impacts included:

- The sensitivity of the Project area from an avifaunal perspective;
- Traffic-related impacts in terms of the local road network;
- The clearance of vegetative cover for the Project’s development footprint will exacerbate erosion, which is already encountered in the greater area as a result of other land use disturbances;
- Increase in the dust levels during the construction phase;
- Other developments that may be enabled by the proposed Project may place a strain on the infrastructure of Odendaalsrus;
- Problems associated with the influx of employment seekers;
- Cumulative effects in terms of the electromagnetic fields may occur as a result of aligning the proposed Phase 1 and Phase 2 Power Lines alongside existing high-voltage power lines; and
- Positive cumulative economic effects from the construction of multiple developments in the area.

I. ANALYSIS OF ALTERNATIVES

There were two alternatives that were ultimately assessed to identify the preferred options, namely Layout Alternatives A and B (with changes to Phase 2 Power Lines and Substations), as well as the Phase 1 Substation Options 1 and 2 and associated power line route options to the Euclid Substation.

Based on the recommendations of the specialists, technical considerations and the comparison of the impacts, the following alternatives were identified as the Best Practicable Environmental Option:

- Layout – Layout Alternative B; and
- Phase 1 Substation – Option 1.

J. PUBLIC PARTICIPATION

The Basic Assessment Report provides the details of the following tasks undertaken as part of the public participation process:

- Compiling the database of Interested and Affected Parties;
- Announcing the Project by distributing a notification letter and reply form, placing onsite notices and publishing newspaper notices;
- Notification of review of the Draft Basic Assessment Report;
- Means of accessing the Draft Basic Assessment Report;
- Supplying of copies of the Draft Basic Assessment Report to Authorities;
- Scheduling of authorities and public meetings to present the Draft Basic Assessment Report; and
- Commenting on the Draft Basic Assessment Report.

K. CONCLUSIONS

The following key tasks were undertaken during the Basic Assessment for the proposed Phase 1 and Phase 2 Power Lines and Substations:

- Specialist studies were undertaken and the findings were incorporated into the Basic Assessment Report in terms of understanding the environmental status quo and sensitive features, assessing the potential impacts and establishing concomitant mitigation measures, as well as identifying the preferred alternatives;
- Potentially significant impacts pertaining to the pre-construction, construction and operational phases of the Project were identified and assessed, and mitigation measures were provided; and
- Alternatives for achieving the objectives of the proposed activity were considered, and the preferred options were identified. The “no-go” option is not supported when considered the implications of not implementing the Project.

Attention is drawn to specific sensitive environmental features for which mitigation measures are included in the Basic Assessment Report and Environmental Management Programme.

An Environmental Impact Statement is also provided, which includes highlighting key findings from the Basic Assessment, which may also influence the conditions of the Environmental Authorisation (if granted).

With the selection of the Best Practicable Environmental Option, the adoption of the mitigation measures included in the Basic Assessment Report and the dedicated implementation of the Environmental Management Programme, it is believed that the significant environmental aspects and impacts associated with this Project can be suitably mitigated. With the aforementioned in mind, it can be concluded that there are no fatal flaws associated with the Project and that authorisation can be issued, based on the findings of the specialists and the impact assessment, through the compliance with the identified environmental management provisions.

AMENDMENTS PAGE

Date	Nature of Amendment	Amendment No.	Signature
August 2021	Draft for Review by Authorities and the Public	0	

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LIST OF ACRONYMS & ABBREVIATIONS

AC	Alternating Current
ACSR	Aluminium Conductor Steel Reinforced
ADU	Animal Demography Unit
AEL	Atmospheric Emission Licence
AIDS	Acquired Immunodeficiency Syndrome
AoI	Area of Interest
ASAPA	Association for Southern African Professional Archaeologists
BAR	Basic Assessment Report
BESS	Battery Energy Storage System
BPEO	Best Practicable Environmental Option
CBAs	Critical Biodiversity Areas
CPV	Concentrated Photovoltaics
CR	Critically Endangered (CR), (EN), (VU) or (LC),
DAFF	Department of Agriculture, Forestry and Fisheries
DC	Direct Current
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DEAT	Department of Environmental Affairs and Tourism
DEFF	Department of Environment, Forestry and Fisheries
DEL	Department of Employment and Labour
DESTEA	Department of Economic, Small Business Development, Tourism and Environmental Affairs
DFFE	Department of Forestry, Fisheries and the Environment
DC	Direct Current
DMRE	Department of Mineral Resources and Energy
DPRT	Department of Police, Roads and Transport
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EEPP	Emergency Economic Priority Project
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EHS	Environmental, Health, and Safety
EMPr	Environmental Management Programme
EN	Endangered
ESAs	Ecological Support Areas
FSHRA	Free State Heritage Resources Authority
GHG	Greenhouse Gas
GIS	Geographical Information System
GN	Government Notice
HGM	Hydromorphic
HIV	Human Immunodeficiency Virus
HV	High Voltage
IAPs	Interested and Affected Parties
IBAs	Important Bird & Biodiversity Areas

IDP	Integrated Development Plan
IFC	International Finance Corporation
IRP	Integrated Resource Plan
IUCN	International Union for Conservation of Nature
KZN	KwaZulu-Natal
LC	Least Concerned
LDM	Lejweleputswa District Municipality
MLM	Matjhabeng Local Municipality
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act (No. 107 of 1998)
NEM:AQA	National Environmental Management: Air Quality Act (Act No. 39 of 2004)
NEM:BA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEM:WA	National Environmental Management: Waste Act (Act No. 59 of 2008)
NFEPA	National Freshwater Ecosystem Priority Areas
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NWA	National Water Act (Act No. 36 of 1998)
NWCS	National Wetland Classification Systems
OHS	Occupational Health and Safety
PES	Present Ecological Status
PPA	Power Purchase Agreement
PS	Performance Standards
PV	Photovoltaic
REDZ	Renewable Energy Development Zones
REEA	Renewable Energy EIA Application
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
S&EIR	Scoping and Environmental Impact Reporting
SA	South Africa
SABAP2	South African Bird Atlas Project, Version 2
SACAA	South African Civil Aviation Authority
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SAIIAE	South African Inventory of Inland Aquatic Ecosystems
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency SOC Ltd
SANS	South African National Standard
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
SIPs	Strategic Integrated Projects
SMME	Small, Medium and Micro-sized Enterprises
SQRs	Sub-Quaternary Reaches
Ss	Substation
VAC	Visual Absorption Capacity
VU	Vulnerable
WMA	Water Management Area

UNITS OF MEASUREMENT

Bq/g	Becquerels per gram
°C	Degrees Celsius
ha	Hectare
km	Kilometre
km^2	Square kilometre
km/h	Kilometres per hour
kV	Kilovolt
m	Metre
m^2	Square metre
m^3	Cubic metre
m/s	Metre per Second
mm	Millimetre
MVA	Megavolt ampere
MW	Megawatt
MWh	Megawatt hour
TWh	Terawatt Hours
%	Percentage

1 PURPOSE OF THIS DOCUMENT

Nemai Consulting (Pty) Ltd was appointed by SunElex as the independent Environmental Assessment Practitioner (EAP) to apply for Environmental Authorisation for the proposed development of the Matjhabeng 400 MW Solar Photovoltaic (PV) Plant with 80 MW (320 MWh) Battery Energy Storage System (BESS) (hereinafter the 'Project'), which is located north and south of the town of Odendaalsrus in the Free State Province.

The proposed utility-scale Solar PV Plant will be developed in the following two (2) phases:

- Phase 1: 200 MW PV with 40 MW (160 MWh) BESS on the Project site located south of Odendaalsrus (hereinafter referred to as '**Phase 1 Site'**); and
- Phase 2: 200 MW PV with 40 MW (160 MWh) BESS on the Project site located north of Odendaalsrus (hereinafter referred to as '**Phase 2 Site'**).

The electricity generated by the Project will be injected into the existing Eskom 132 kV distribution system as follows:

- Phase 1:
  - Proposed new 132kV overhead power lines between the on-site substation and the existing Eskom Euclid Substation located to the south-east of the Phase 1 Site.
- Phase 2:
  - Northern and western blocks – proposed new 132kV overhead power lines between the on-site substations and the existing Eskom Grootkop Substation located to the north of the Phase 2 Site; and
  - South-eastern block – proposed new 132kV overhead power line between the on-site substation and the existing Eskom Geduld Substation located to the south-east of the Phase 2 Site.

The following separate environmental assessment processes, in terms of the EIA Regulations of 2014 (as amended), are being undertaken for the proposed Project:

- **PV Sites with BESS** – Scoping and Environmental Impact Reporting process in terms of Regulation 21 to Regulation 24 of Government Notice (GN) No. R. 982 of 4 December 2014, as amended; and
- **Power Lines and Substations** (focus of this document) – Basic Assessment Process in terms of Regulation 19 to Regulation 20 of GN No. R. 982 of 4 December 2014, as amended.

This document serves as the **Draft Basic Assessment Report** (BAR) for the proposed Project: **Phase 1 and Phase 2 Power Lines and Substations**.

According to GN No. R. 982 of 4 December 2014 (as amended), the objectives of the Basic Assessment Process are to undertake the following, through a consultative process:

(a) Determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
(b) Identify the alternatives considered, including the activity, location, and technology alternatives;
(c) Describe the need and desirability of the proposed alternatives;
(d) Through the undertaking of an impact and risk assessment process, inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine -
    (i) The nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
    (ii) The degree to which these impacts -
        (aa) can be reversed;
        (bb) may cause irreplaceable loss of resources;
        (cc) can be avoided, managed or mitigated;
(e) Through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to—
    (i) Identify and motivate a preferred site, activity and technology alternative;
    (ii) Identify suitable measures to avoid, manage or mitigate identified impacts; and
    (iii) Identify residual risks that need to be managed and monitored.

The Draft BAR will be made available to Interested and Affected Parties (IAPs) for a 30-day review period from **16 August until 16 September 2021**. All comments received will be addressed in the Final BAR and will also be included in the Comments and Responses Report. The Final BAR will then be submitted to DFFE, who is the Competent Authority in respect to this proposed development in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA).

2 DOCUMENT ROADMAP

As a minimum, the BAR aims to satisfy the requirements stipulated in Appendix 1 of GN No. R 982 of 4 December 2014 (as amended). **Table 1** below presents the document's composition in terms of the aforementioned regulatory requirements.

Table 1: BAR Roadmap

Chapter	Title	Correlation with GN No. R. 982	GN No. R. 982 Description
1.	Purpose of this Document	–	–
2.	Document Roadmap	–	–
3.	Project Background and Motivation	3(1)(b), (c) & (d)	(b) the location of the activity, including: (i) the 21-digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties. (c) a plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale; or, if it is - (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or on land where the property has not been defined, the coordinates within which the activity is to be undertaken. (d) a description of the scope of the proposed activity, including - (ii) a description of the activities to be undertaken including associated structures and infrastructure.
4.	Project Location		
5.	Project Description		
6.	Need and Desirability	3(1)(f)	(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location.
7.	Legislation and Guidelines Considered	3(1)(e)	(d) a description of the scope of the proposed activity, including (i) all listed and specified activities triggered and being applied for. (e) a description of the policy and legislative context within which the development is proposed including - (i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and

Chapter	Title	Correlation with GN No. R. 982	GN No. R. 982 Description
			(ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;
8.	Basic Assessment Process	3(1)(a)	(a) Details of – (i) the Environmental Assessment Practitioner (EAP) who prepared the Environmental Management Programme (EMPr); and (ii) the expertise of that EAP to prepare an EMPr, including curriculum vitae.
9.	Assumptions and Limitations	3(1)(o)	(o) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed.
10.	Financial Provisions	3(1)(s)	(s) where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts.
11.	Resource Use and Process Details	–	–
12.	Profile of the Receiving Environment	3(1)(h)	(h) a full description of the process followed to reach the proposed preferred alternative within the site, including: (iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.
13.	Summary of Specialist Studies	3(1)(k) & (m)	(k) where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report. (m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr.
14.	Impact Assessment	3(1)(h), (i) and (j)	(h) a full description of the process followed to reach the proposed preferred alternative within the site, including: (v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental

Chapter	Title	Correlation with GN No. R. 982	GN No. R. 982 Description
			impacts and risks associated with the alternatives; (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) the outcome of the site selection matrix; (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity. (i) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including- (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures. (j) an assessment of each identified potentially significant impact and risk, including- (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; (vii) the degree to which the impact and risk can be avoided, managed or mitigated.
15.	Analysis of Alternatives	3(1)(h) & (g)	(h) full description of the process followed to reach the proposed preferred alternative within the site, including - (i) details of all the alternatives considered. (g) a motivation for the preferred site, activity and technology alternative.

Chapter	Title	Correlation with GN No. R. 982	GN No. R. 982 Description
16.	Public Participation Process	3(1)(h)	(h) a full description of the process followed to reach the proposed preferred alternative within the site, including: (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.
17.	Conclusions and Recommendations	3(1)(l), (m), (n) & (p)	(l) an environmental impact statement which contains- (i) a summary of the key findings of the environmental impact assessment; (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives. (m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr. (n) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation. (p) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.
Appendix M	Oath of Environmental Assessment Practitioner	3(1)(r)	(r) an undertaking under oath or affirmation by the EAP in relation to: (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties;
N/A		3(1)(t)	Where applicable, any specific information required by the Competent Authority.
N/A		3(1)(u)	Any other matters required in terms of sections 24(4)(a) and (b) of the Act.

3 PROJECT BACKGROUND AND MOTIVATION

The South African Government ratified the Paris Agreement in 2016, and thereby showed the country's commitment to contribute to the global effort to address the challenge of climate change.

Electricity generation sources need to be diversified to ensure security of supply and reduction in the carbon footprint created by the current heavy reliance of South Africa (SA) on coal to produce electricity. The electricity demand is increasing in SA, and in order to match that demand there is a need to supply a diversified power generation that includes renewable energy technologies. These technologies include solar, wind, small utility scale hydro, biomass, biogas and energy storage that the Department of Mineral Resources and Energy (DMRE) intends to develop and implement as identified in the approved Integrated Resource Plan (IRP) 2019.

Since the adoption of the Constitution, international and government policy papers have created the foundation for SA's energy programme. The need to expand and increase electricity generation capacity in the country is based on national policy and informed by on-going strategic planning undertaken by the DMRE. The hierarchy of policy and planning documentation that support the development of renewable energy projects such as the proposed Project is illustrated in **Figure 1** below.

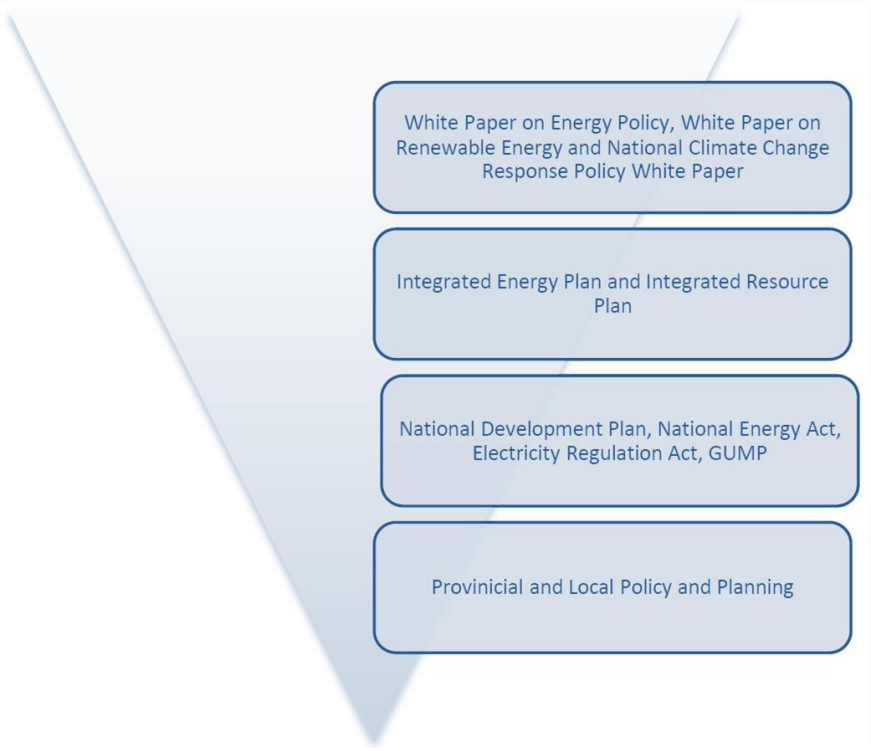


Figure 1: Hierarchy of electricity policy and planning documents

The Matjhabeng Local Municipality (MLM) recognizes the need to meet the energy requirements of its residents in a dynamic changing sector. In response to this need, SunElex Energy (Pty) Ltd

(hereinafter referred to as “SunElex”) has proposed the development of the Matjhabeng 400MW Solar PV with Battery Energy Storage Systems (BESS) Power Plant (hereinafter referred to as the “Project”). The Project will thus be developed to serve the MLM’s energy requirements and will generate power for delivery to the local/national grid. Surplus power will be taken up by other Commercial and Industrial (C&I) off-takers via additional Private Power Purchase Agreements (PPA’s). Therefore, the MLM’s Council has formally classified this Project as an “Emergency Economic Priority Project” (EEPP).

The Project will thus benefit the MLM as follows:

- Savings on the current and already substantial Eskom Bill as the Project’s tariff is lower than the Eskom tariff and the escalation rate is fixed per year at its applicable CPI rates during the life-cycle of the Project;
- Potential to attract foreign investments and subsequently achieve economic growth;
- Additional revenue stream due to the innovational technology, which has the potential to enable the selling of excess power to Eskom or another off-taker;
- Refinancing the current Eskom debt for immediate relief;
- Financial investment into the municipality jurisdiction that will boost the economic cycle of the community;
- New upcoming industrialization activity attraction;
- Job creation, skills development and Small Medium Micro Enterprises (SMME) development; and
- Transforming the energy sector in SA and Africa as per its current timeline. The Project will be the first to rollout utility scale BESS at the capacity quoted within the next 24 months due to imminent delays and risks of Eskom’s pilot BESS programme.

The proposed Project will have a project design life of 25 years. The clean energy from the Solar Park will be integrated and connected to the Eskom national grid which will be done in conjunction with Eskom, SA’s State Owned Company (SOC), which is the national electricity supplier.

The South African Government adopted a National Infrastructure Plan in 2012 that intends to transform our economic landscape while simultaneously creating significant numbers of new jobs, and to strengthen the delivery of basic services. The plan also supports the integration of African economies. The National Infrastructure Plan consists of 18 Strategic Integrated Projects (SIPs), of which SIP 8 targets the development of green energy in support of SA’s economy. This Project supports SIP 8 and aims to address the MLM’s urgent need for electricity.

The Feasibility Studies, which were finalised in 2016, confirmed the techno-economic feasibility of the Project, as well as its significant potential for positive socio-economic impact in the MLM.
A Network Integration Study was undertaken to investigate the integration of the proposed Solar PV Plant into the Eskom electrical network. The results showed that the Eskom grid has sufficient spare capacity to absorb the phases of the Project.

4 PROJECT LOCATION

4.1 Location of the Project relative to Solar Yield Area

The rationale for the Project is based on its geographic location and the value it provides to the MLM and its users of electricity/energy. The Project is to be located in a high solar yield area, with irradiation levels capable of producing over 1TWh (equal to one million MWhs) of renewable energy annually, with a nominal net generating capacity of 400 MWn, based solely on PV technology (refer to **Figure 2** below).

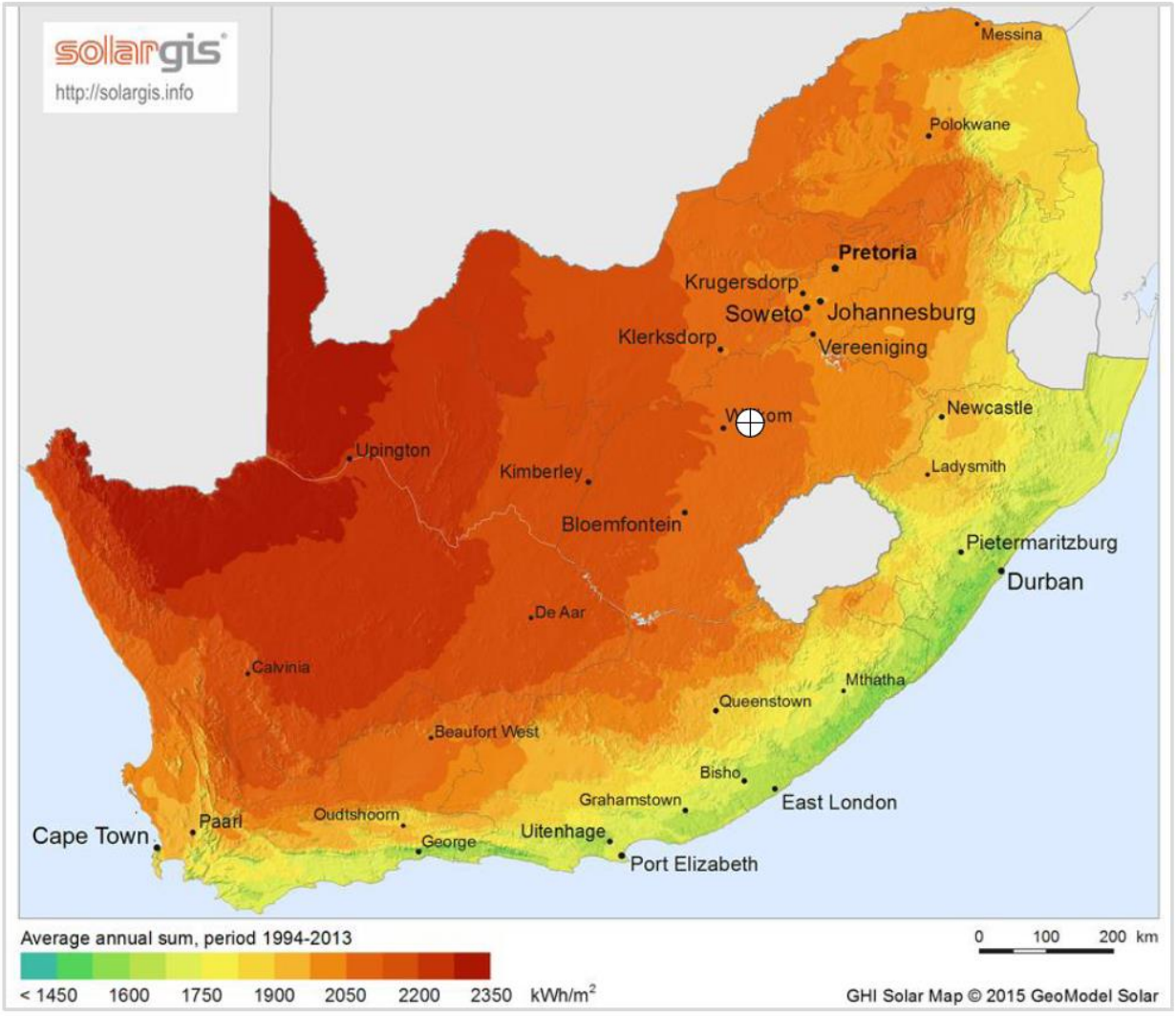


Figure 2: Location of the Project relative to Solar Yield Area
(denoted by the black cross on white background)

4.2 Geographical Context

The Project is located in the north-western part of the Free State Province and falls within the MLM and Lejweleputswa District Municipality (LDM). The locality map is depicted in **Figure 3** below and

aerial views of the Phase 1 and Phase 2 Power Lines are shown in **Figure 4** and **Figure 5** below, respectively. Additional maps are also contained in **Appendix A**.

The Project is located in close proximity to all required infrastructure. Specifically, the power infrastructure is excellent and according to a Network Integration Study that was undertaken the two (2) Eskom substations, namely, Euclid and GrootKop, have the potential to enable the evacuation of 900 MW of new electricity generation. The connection to Eskom infrastructure will be uncomplicated, with new 132 kV power lines running from the sites, via existing and/or new associated infrastructure servitudes, to the two (2) Eskom Distribution Stations.

Details of the properties that are directly affected by the Project's Phase 1 and Phase 2 Power Lines are contained in **Appendix B**, and coordinates for the project components are listed in **Appendix C**.

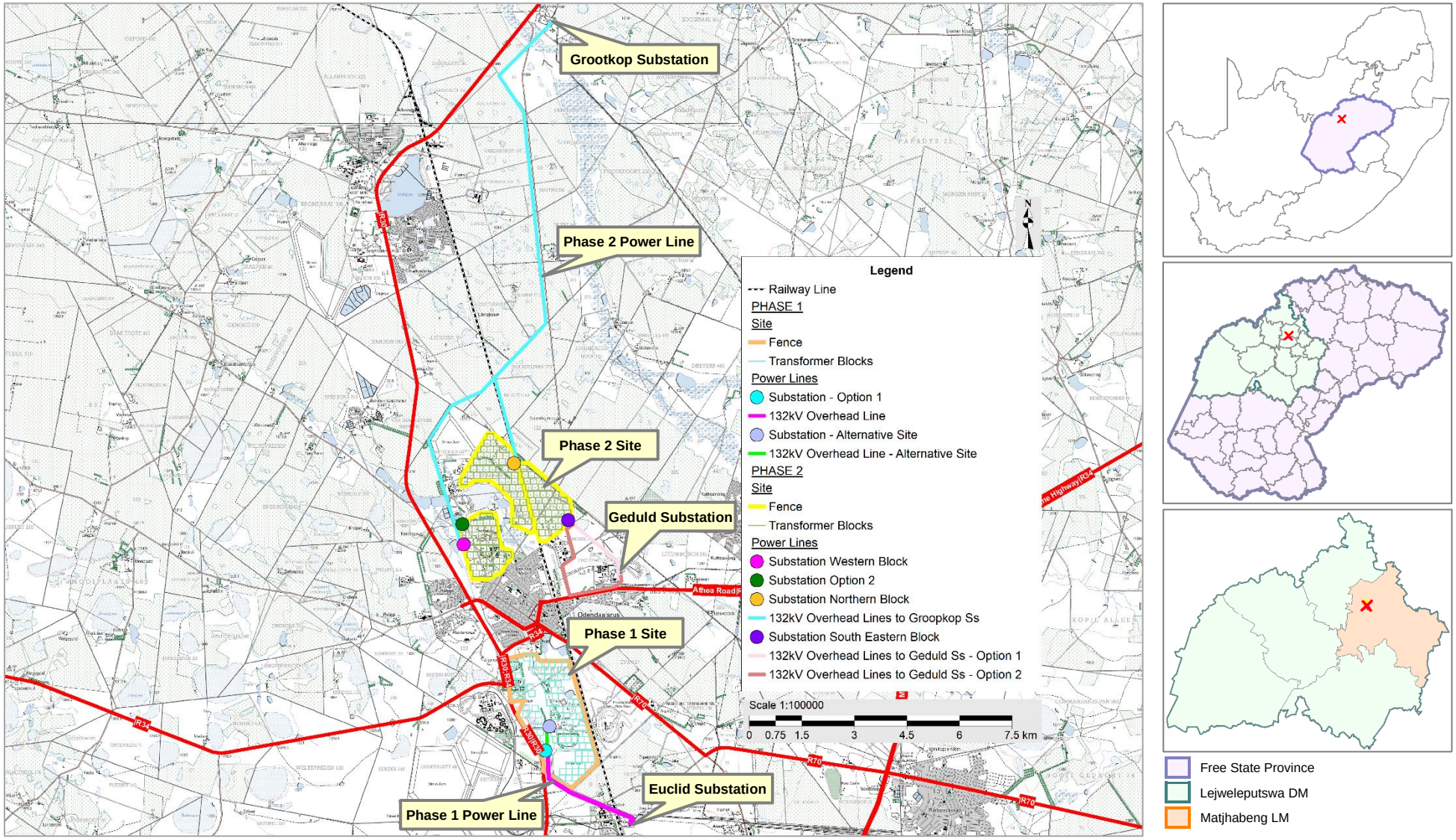


Figure 3: **Locality map of the Project's Phase 1 and Phase 2 Power Lines**

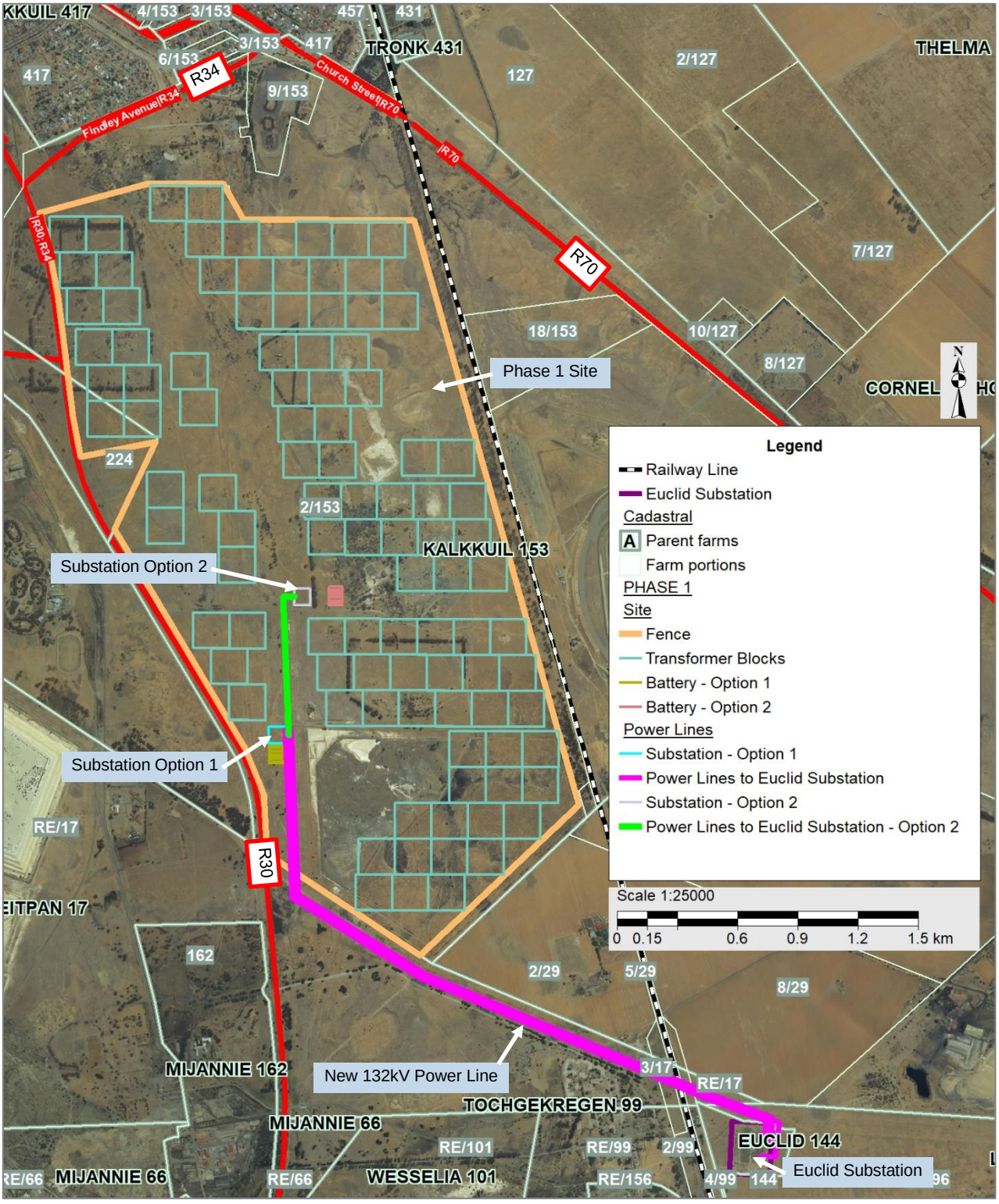


Figure 4: **Orthophotograph of the Project's Phase 1 Power Line Routes**
(Note: not all components of the Phase 1 PV Facility are shown)

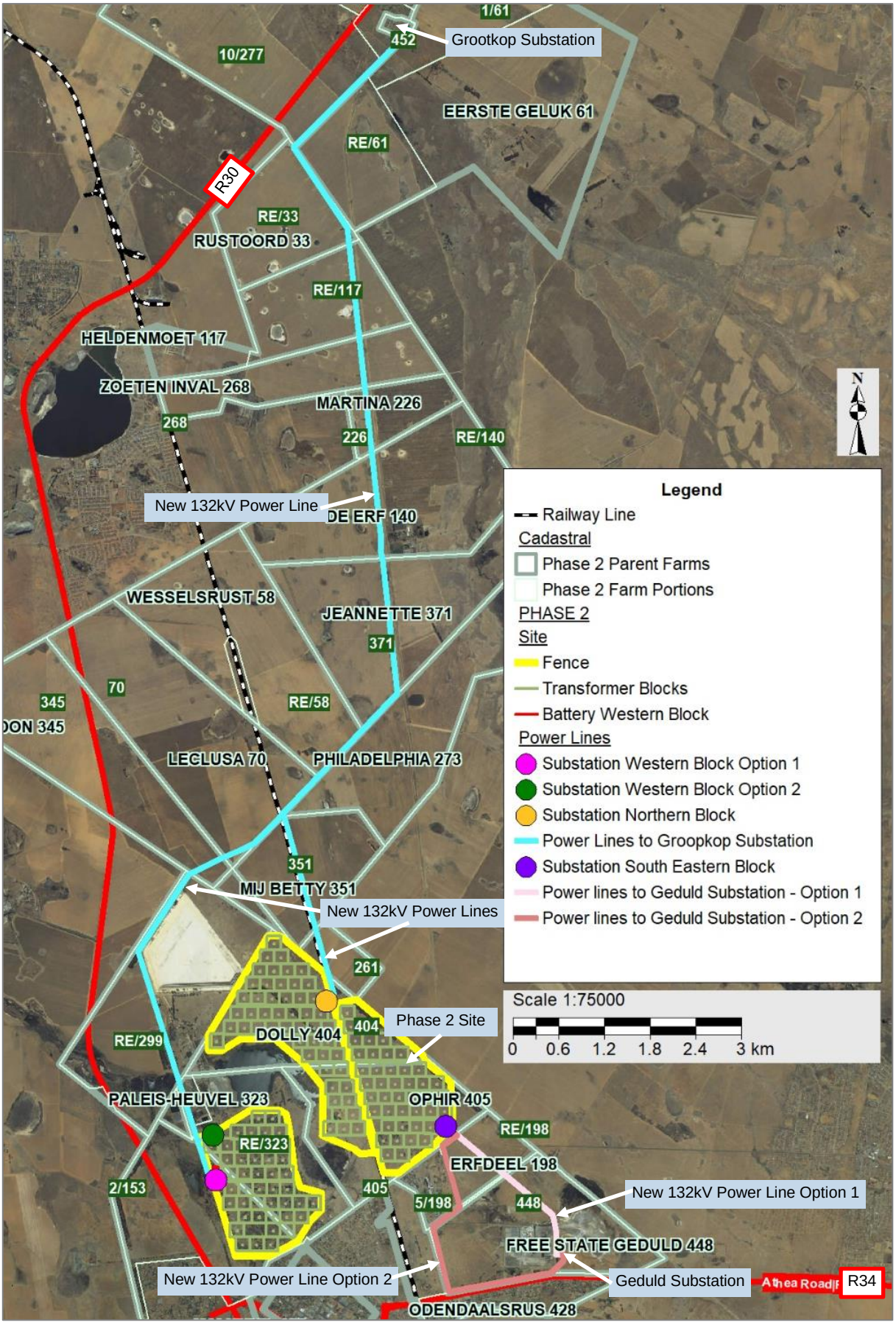


Figure 5: **Orthophotograph of the Project's Phase 2 Power Line Routes**
(Note: not all components of the Phase 2 PV Facility are shown)

5 PROJECT DESCRIPTION

5.1 Overview of Photovoltaic

PV technology produces direct current (DC) which is then converted to alternating current (AC) via power electronic inverters. The main technology categories are crystalline modules (mono or poly), thin film, and concentrated photovoltaics (CPV). **Figure 6** below provides an overview of Solar PV Power Plant.

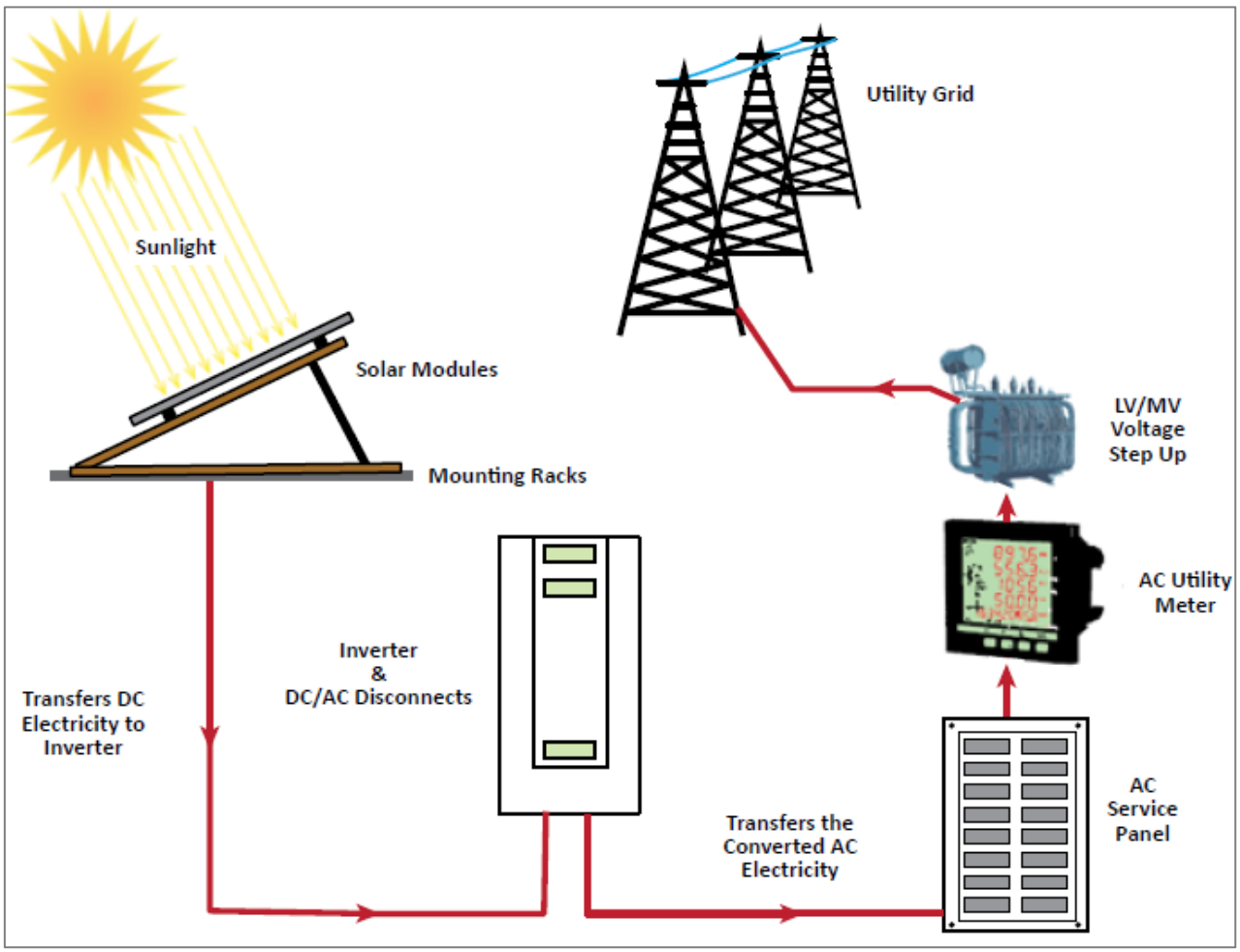


Figure 6: Overview of Solar PV Power Plant (IFC, 2015)

5.2 Project Layout

The desirability of the proposed Phase 1 and Phase 2 Sites, as well as the associated power lines, for the development of the proposed Solar Park is due to the following key characteristics:

- **Solar Radiation**: The feasibility of a solar facility especially a Solar Park of this magnitude is dependent on the direct solar irradiation levels (refer to **Figure 2** above).

- **Topography**: The suitability of the surface area is an important characteristic for the construction and operation of solar facilities. It was found that the majority of the site has a slope of less than 2% and can therefore be considered as suitable for most technologies.
- **Power and transmission considerations**: The electricity generated by the Solar PV Plant will be injected into the existing Eskom 132 kV distribution system (refer to **Section 5.3** below). The Phase 1 and Phase 2 Sites are located close to the main Eskom transmission grid that links the major centres in South Africa.
- **Extent of site**: The overall extent of the sites is sufficient for the installation of the PV facility, and allows for the avoidance of site sensitivities.
- **Site access and road infrastructure**: The site can be accessed via the R30 (to the west of the site) and R34 (access to the north and western section of Phase 1 Site) and can also be accessed via other secondary roads.
- **Availability of land**: The proposed Project Sites have been secured and the MLM has entered into a Long-Term Land Lease Agreement with the Applicant. The proposed land satisfies this planning requirements.

The following factors were considered in determining the layouts (amongst others):

- Findings from previous studies (including Feasibility Study, Geotechnical Investigation and Solar Resource Assessment);
- Watercourses;
- Existing servitudes and infrastructure; and
- Exclusion zones associated with defunct mining areas.

5.3 Grid Connection

5.3.1 Overview

A Network Integration Study was undertaken to investigate the integration of the proposed Solar PV Plant into the Eskom electrical network. Two sub-transmission integration options per plant were identified and assessed, based on technical, operational and economic factors in order to determine the preferred option. The results showed that the Eskom grid has sufficient spare capacity to absorb the phases of the Project.

Based on the findings of the abovementioned study, as well as the progression of the technical design of the Project, the electricity generated by the Solar PV Plant will be injected into the existing Eskom 132 kV distribution system as follows:

- **Phase 1** (refer to **Figure 4** above):
  - New 132kV power lines between the on-site substation and the existing Eskom Euclid Substation located to the south-east of the Phase 1 Site. From the on-site Substation Option 1 the distance is approximately 3.5 km, and from Substation Option 2 the distance is approximately 4.3 km.
- **Phase 2** (refer to **Figure 5** above):

- **Northern block** – new 132kV power line between the on-site substation and the existing Eskom Grootkop Substation located to the north of the Phase 2 Site. From the on-site substation the distance is approximately 14.1 km.
- **Western block** – new 132kV power line between the on-site substation and the existing Eskom Grootkop Substation located to the north of the Phase 2 Site. From the on-site Substation Option 1 the distance is approximately 17.3 km, and from Substation Option 2 the distance is approximately 16.9 km
- **South-eastern block** – new 132kV power line between the on-site substation and the existing Eskom Geduld Substation located to the south-east of the Phase 2 Site. From the on-site substation the distance is approximately 2.4 km for Power Line Option 1, and approximately 4.2 km for Power Line Option 2.

The electrical reticulation within the Solar PV Farm will be underground at 33kV and stepping up to 132kV to match the voltage of the nearby Eskom Transmission grid. Phase 1 will be connected to a single 132/33kV substation on the site. Phase 2 will be divided into three sections each with their own 132/33kV substations. An alternative, Option 2, for Phase 2 is to connect all three sections to a single 132/33kV Substation.

5.3.2 Substations

For Phase 1, two options were considered for substation positions. Option 1 is the preferred position from a technical perspective as it will lead to less shading of the solar PV panels by the transmission lines and substation. Option 2 is located further north and more central in Phase 1. Option 2 has the advantage of shorter 33kV cables lengths.

For Phase 2, two options were considered. Phase 2 is divided into three sections by a railway line and waterbodies. Option 1 is to have 3 substations, one for each section. Option 2 is to have a single substation for all three sections. The existing Eskom Geduld Substation is located closest to the south-eastern section of Phase 2 Site. Two existing 132kV lines connecting the Geduld Substation to the main grid are rated at approximately 120MVA each. Firm capacity would be limited to 120MVA should the entire Phase 2 be connected to this substation and as such is not a suitable option.

Option 1 for the Northern and Western blocks of the Phase 2 Site connecting to the Eskom Grootkop Substation was selected as a preferred option as the evacuation capacity from this substation is in multiple directions and there are 2 spare 132kV line bays to connect the new transmission lines and install the 132kV switchgear.

The proposed Solar PV Farm substations will each be approximately 80m x 80m. The new adjacent Eskom substation yards will be approximately 80 x 80m, i.e. 160m x 80m in total for each of the Solar PV Farm substations.

The existing Eskom Euclid and Grootkop Substations have spare 132kV line bays and do not require extensions. The Geduld Substation will require an extension to the 132kV side of the substation of approximately 25m to the west and 15m to the east of the substation.

A typical HV Substation will look like the substation shown in **Figure 7** below, with large ground mounted transformers and outdoor high voltage switchgear with overhead conductors and steel lattice structures. The yard is fenced off and only authorised personnel are allowed inside the high voltage yard (see example shown in **Figure 8** below).

Figure 7: Example of High Voltage Substation

Figure 8: Example of High Voltage Transformers

5.3.3 132KV Transmission Lines

The grid connections from the Solar PV Farm substations will be via 132kV transmission lines mostly running in the existing servitudes for 44kV lines. The assumption has been made that there is redundant capacity on the 44kV lines and that some of these lines can be removed and the load shared on the remaining lines. The 44kV lines are Eskom lines and consultation and approval is required with Eskom. Detailed planning needs to be completed to determine which lines will remain and which can be removed to create space for the new 132kV transmission lines. This will form part of the design phase.

The proposed 132kV transmission lines will be supported by steel lattice tower structures, double circuit with three phase conductors on both sides of the towers (refer to drawing of typical tower contained in **Appendix E**). The heights of the transmission lines will be approximately 30m. Final heights will be established once the detailed design has been completed to ensure ground and clearances to other lines and services. Conductors for the transmission lines will be Aluminium Conductor Steel Reinforced (ACSR). An example of a 132kV transmission line is shown in **Figure 9** below.

Figure 9: Example of a 132kV transmission line

Bird flight diverters will be installed on the conductors where specified by the Avifauna Specialist to make the lines visible to birds to provide an economic means of reducing bird flight hazards.

Existing 44kV power line servitudes will be used in most instances. New 31m wide servitudes will be registered where the lines are not able to follow the existing servitudes.

An example of high voltage transmission line connecting to a substation is provided in **Figure 10** below.

Figure 10: Example of High Voltage Transmission Line Connecting to Substation

5.4 Project Life-Cycle

5.4.1 General

The project life-cycle for a new substation and transmission lines includes the following primary activities:

- Feasibility phase – This includes selecting a suitable location for the substation and buffer as well as corridors for the transmission line route.
- Planning and design phase – This phase, which is only undertaken should Environmental Authorisation be obtained, includes the following –
  - Survey of the route;
  - Selection of the most appropriate structures;
  - Conduct a walk-down survey to determine the exact locations of the towers, based on sensitive environmental features and technical criteria; and
  - Prepare relevant planning documentation, including technical and design documentation.
- Construction phase – During the implementation of the Project, the construction activities related to the installation of the necessary infrastructure and equipment is undertaken.
- Operational phase – This includes operational activities associated with the maintenance and control of the substation and transmission lines.

- Decommissioning – This phase will include measures for complying with the prevailing regulatory requirements, rehabilitation and managing environmental impacts in order to render the affected area suitable for future desirable use.

The sub-sections to follow provide an overview of key activities that are typically associated with selected phases of the project life-cycle for a project of this nature.

5.4.2 Construction Phase – Power Lines

5.4.2.1 Vegetation Clearance

The following aspects (amongst others) will determine the minimum standards for vegetation clearing and maintenance for the power lines:

- Where the vegetation poses a safety clearance risk;
- When access is hindered;
- When the vegetation poses a fire risk; and
- To comply with legal imperatives.

It is expected that vegetation clearance for the proposed Phase 1 and Phase 2 Power Lines will be minimal, as the natural vegetation is mostly disturbed by historical land use practices such as agriculture, as well as by the construction of existing infrastructure (including roads and power lines.

5.4.2.2 Tower pegging

Following the necessary access negotiations and arrangements, a surveyor will peg the substation sites and the transmission lines.

5.4.2.3 Construction camp establishment

A suitable site for the construction camp still needs to be selected. The camp must strictly adhere to the mitigation measures contained in the Environmental Management Programme (EMPr).

5.4.2.4 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.

5.4.2.5 Excavation for foundations

Excavations will be made for the foundations and anchors of the towers. Foundation sizes are dependent on *inter alia* the tower type and soil conditions. The foundations are ultimately filled with concrete. Contractors are required to safeguard excavations.

5.4.2.6 Foundation of steelwork

Following the preparation of the excavations, the construction team will position the premade foundation structures into the holes. Thereafter, these structures will be tied together for support.

5.4.2.7 Concrete works

The construction team will then undertake the concrete filling of the foundation. Concrete is sourced via a 'Ready-mix' truck which accesses the site. If the access roads do not permit use by such a heavy vehicle, concrete will be mixed on site.

5.4.2.8 Erection of steel structures

The steelwork is usually delivered to the site via trucks. The towers will then be assembled on site (see example in **Figure 11** below).

Figure 11: Example of a tower construction

5.4.2.9 Stringing of transmission cables

Cable drums will then be delivered to the site. 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.

A transmission line is generally strung in sections (from bend to bend). Once the tension has been exacted, the conductor cables are strung. Tension is created, the conductors clamped at the tower and the excess cable cut off.

5.4.2.10 Rehabilitation

Site reinstatement and rehabilitation are undertaken for each component of the construction phase, which include the following activities (amongst others):

- Removal of excess building material, spoil material and waste;
- Repairing any damage caused as part of the construction activities;
- Rehabilitating the areas affected by temporary access roads;
- Reinstating existing access roads; and
- Replacing topsoil and planting indigenous vegetation (where necessary).

5.4.3 Construction Phase – Substation

The main activities associated with the construction of a substation include the following:

- Establishing access roads;
- Preparing the site (fencing, clearing, levelling and grading, etc.);
- Establishing the site office;
- Establishing laydown areas and storage facilities;
- Transporting equipment to site;
- Undertaking civil (e.g. digging foundations, storm water drainage construction and concrete works), mechanical and electrical work (including the installation of circuit breakers, current transformers, isolators, insulators, surge arrestors, voltage transformers and earth switches);
- Connection of power line to the substation;
- Reinstating and rehabilitating working areas outside of permanent development footprint; and
- Testing and commissioning.

5.4.4 Operational Phase – Power Lines

During operations, the servitude needs to be reached via access roads to perform maintenance of the transmission lines. The servitude will need to be cleared occasionally to ensure that vegetation does not interfere with the operation of the line.

5.4.5 Operational Phase – Substation

Maintenance is classified in two categories as follows:

- Breakdown or corrective maintenance activities undertaken after failure of equipment; or
- Preventive maintenance to ensure smooth and efficient working of a system and equipment.

Maintenance activities include testing, inspecting, servicing, examining and/or overhauling of equipment associated with the substation (e.g. circuit breakers and transformers). Additional activities may include fire detection system inspection and maintenance, fence repair, stormwater maintenance and general landscaping maintenance (amongst others).

5.5 Resources and Services required for Construction and Operation

This section briefly outlines the resources that will be required to execute the Project. Note that provision is made in the EMPr to manage impacts associated with aspects listed below, as relevant.

5.5.1 Raw Materials

Material required for construction purposes (e.g. steel, cement, sand, aggregate, etc.), will be sourced from suitable suppliers. The components of the substations will also be sourced from accredited suppliers.

5.5.2 Water

During construction, the Contractor will require water for potable use by construction workers and water will also be used in the construction of the foundations and other components of the Project. The necessary negotiations will be undertaken with the MLM or landowners to obtain water from approved sources.

5.5.3 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.

5.5.4 Waste

Solid waste generated during the construction phase will be temporarily stored at suitable locations (e.g. at the construction camp) and will be removed at regular intervals and disposed of at approved waste disposal sites. According to the 2019 - 2020 IDP for the MLM, there are four permitted municipal landfill sites. All the waste disposed of will be recorded.

Wastewater, which refers to any water adversely affected in quality through construction-related activities and human influence, will include the following:

- Sewage;
- Water used for washing purposes (e.g. equipment, staff); and
- Drainage over contaminated areas (e.g. workshop, equipment storage areas).

Waste types that may be generated during the operational phase include domestic and putrescible waste, sewage from site toilets and stormwater run-off.

Suitable measures will be implemented to manage all waste and wastewater generated during the construction and operational phases.

5.5.5 Roads

Temporary access roads will be created during the construction phase. The areas affected by temporary roads will be reinstated, if they are not be used permanently in the operational phase.

As shown in **Figure 12** below, the Phase 1 and Phase 2 Sites and Power Line routes are accessible via the surrounding road network.

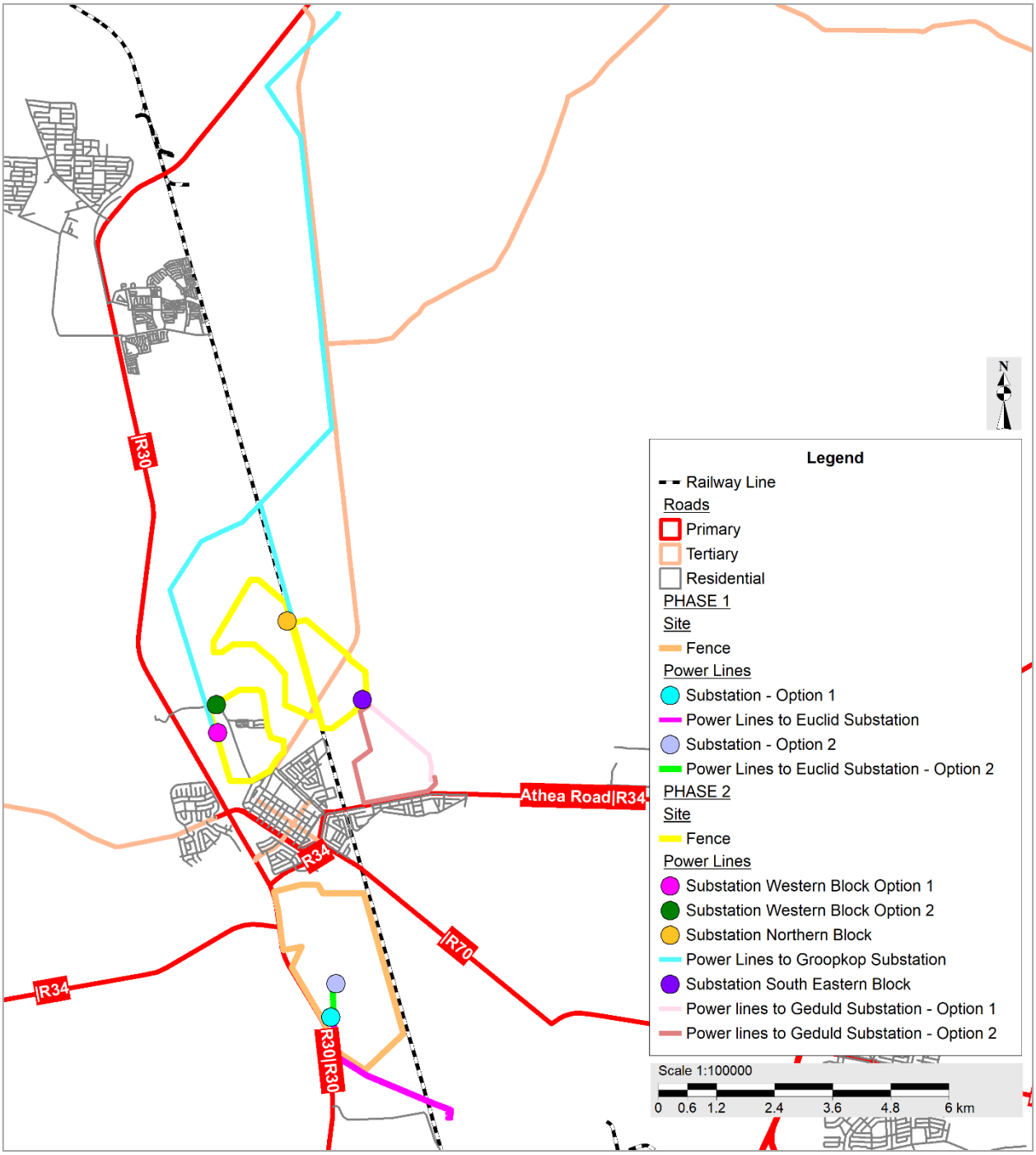


Figure 12: Road network surrounding the Phase 1 and Phase 2 Sites & Power Lines

5.5.6 Stormwater

Best environmental practices will be implemented during construction to manage stormwater.

The new substation switchyard will have an impervious surface and an oil containment system. An on-site stormwater drainage system will be established during. Appropriate controls will be implemented to ensure that sediments, oils and chemicals are controlled and not released from the substation site.

5.5.7 Electricity

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

5.5.8 Laydown Areas

A laydown area will be required during the construction phase.

5.5.9 Construction Workers

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

6 NEED AND DESIRABILITY

This section serves to expand on the motivation / need and desirability for the proposed development that is provided in **Section 3** above. The format contained in the Guideline on Need and Desirability (DEA&DP, 2010b) was used in **Table 2** below.

Note that the proposed Phase 1 and Phase 2 Power Lines and Substations are linked to the Solar PV Park. Hence, the need and desirability of the power lines are directly link to the overall Project, which is reflected in in **Table 2** below.

Table 2: Need and Desirability of the Project

No.	Question	Response
	NEED ('timing')	
1.	Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved Spatial Development Framework (SDF) agreed to by the relevant environmental authority? (i.e. is the proposed development in line with the projects and programmes identified as priorities within the IDP).	▪ The proposed Project PV Sites have been secured and the MLM has entered into a Long-Term Land Lease Agreement with the Applicant. ▪ The 2018 - 2019 Integrated Development Plan (IDP) of the LDM acknowledges the natural abundance of sunshine associated with the Free State Province to support solar energy projects. ▪ The following is stated in the 2019 - 2020 IDP for the MLM: o The MLM "is trying level best to decrease its carbon footprint thus moving towards green economy"; o There is "an increase of electricity as energy source". The number of people in the MLM's electricity network has increased. o There is a "lack of usage of alternative source of energy to fulfil our energy needs". ▪ Refer to **Section 12.10** below for a discussion on the SDF and planning aspects.
2.	Should development, or if applicable, expansion of the town/area concerned in terms of this land use (associated with the activity being applied for) occur here at this point in time?	▪ The Project is located in a high solar yield area. ▪ The proposed location of the Solar PV Sites strongly depends on the flat and sparsely populated land, grid connection, water supply, good transport infrastructure and the availability of a large portion of municipal land. ▪ Eskom tariffs have increased and Solar PV capital costs decreased. Generating power via Solar PV is cheaper than pursuing electricity from Eskom.
3.	Does the community/area need the activity and the associated land use concerned (is it a societal priority)? This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate)	▪ The proposed Project will be developed to serve the MLM's energy requirements. Refer to **Section 3** above for the Project's benefits to the MLM.

No.	Question	Response
4.	Are the necessary services with appropriate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?	▪ Ideal location in terms of evacuating the energy via the Eskom grid. Grid showed that 900 MW can be injected in grid at Matjhabeng without any negative impact on the grid or stability. ▪ No upgrade or strengthening of grid needed. ▪ Existing Eskom substation are used to connect to the grid and evacuate energy ▪ The services required for the development are explained in **Section 5.5** below.
5.	Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services)?	▪ The MLM's Council has formally classified this Project as an EEPP (refer to **Section 3** above).
6.	Is this project part of a national programme to address an issue of national concern or importance?	▪ SA's commitment to renewable energy is reflected in its ratification of the Paris Agreement and the country's long-term energy planning iterations. ▪ Solar power represents a large component of the needed diversification of SA's electricity system. ▪ According to the Department of Energy (2017), energy is by nature an intergovernmental issue, cutting across energy security, economic prosperity, employment and environment, among others. In recognising these benefits, clean energy has been incorporated into the broader policy framework. ▪ The White Paper on Renewable Energy of 2003 is one of SA's policy documents that laid the foundation for the promotion of renewable energy technologies such as solar, hydro, biomass and wind (http://www.energy.gov.za/files/renewables_frame.html). Through this policy document, a ten year target of how renewable energy technologies could diversify the country's energy mix and secure cleaner energy was set. ▪ Ministerial determination has confirmed that this project is part of the long term energy mix and a suitable substitute for coal fired energy. ▪ This Project supports SIP 8: Green energy in support of SA's economy. ▪ The Applicant intends to bid for the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP).
DESIRABILITY ('placing')		
7.	Is the development the best practicable environmental option (BPEO) for this land/site?	▪ Refer to **Section 15** below for the selected BPEO for the Project alternatives.
8.	Would the approval of this application compromise the integrity of the existing approved municipal IDP and SDF as agreed to by the relevant authorities?	▪ It is not anticipated that the proposed project will contradict or be in conflict with the municipal IDPs and SDFs (refer to response provided above to item no. 1).

No.	Question	Response
9.	Would the approval of this application compromise the integrity of the existing environmental management priorities for the area (e.g. as defined in EMFs), and if so, can it be justified in terms of sustainability considerations?	▪ The compatibility of the Project with the Free State Biodiversity Plan (2015), including Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). and other environmental management and planning tools, were considered as part of the Terrestrial Ecology Assessment (refer to **Section 12.8.1** below).
10.	Do location factors favour this land use (associated with the activity applied for) at this place? (this relates to the contextualisation of the proposed land use on this site within its broader context).	▪ The rationale for the Project is based on its geographic location and the value it provides to MLM and users of electricity/energy. ▪ The site is also located close to the main Eskom transmission grid that links the major centres in South Africa. ▪ The specialist studies further investigated the location based on sensitive environmental features and receptors. Refer to the findings of the specialist studies contained in **Section 13** below. ▪ Refer to response provided above to item no. 2.
11.	How will the activity or the land use associated with the activity applied for, impact on sensitive natural and cultural areas (built and rural/natural environment)?	▪ See compilation of significant environmental issues associated with the proposed project contained in **Section 14** below. ▪ Refer to **Section 15** below, which discusses how the layouts for Phase 1 and Phase 2 incorporated the findings of the specialist studies.
12.	How will the development impact on people's health and wellbeing (e.g. in terms of noise, odours, visual character and sense of place, etc.)?	
13	Will the proposed activity or the land use associated with the activity applied for, result in unacceptable opportunity costs?	▪ Opportunity costs are associated with the net benefits forgone for the development alternative. ▪ The land affected by the PV Sites is rural in nature and was previously used for mining purposes. ▪ As mentioned, the proposed Project Sites have been secured and the MLM has entered into a Long-Term Land Lease Agreement with the Applicant. ▪ Although there is an existing mining right by Harmony Gold Mining Company Ltd on the area in question, a consent letter was received from the mining company. In addition, no objections were raised by DMRE against the proposed Project. ▪ The proposed Phase 1 and Phase 2 Power Lines run parallel to existing power lines to minimise disturbances and impacts to the receiving environment. ▪ The specialist studies (**Section 13** below) assisted in determining whether the opportunity costs will be unacceptable.
14	Will the proposed land use result in unacceptable cumulative impacts?	Cumulative impacts are considered in **Section 14.26** below.

7 LEGISLATION AND GUIDELINES CONSIDERED

7.1 International Finance Corporation - Performance Standards & Guidelines

Where relevant, the Project would strive to satisfy and incorporate the International Finance Corporation (IFC) Performance Standards (PS), which serve as an international benchmark for identifying and managing environmental and social risks.

The IFC PS offer a framework for understanding and managing environmental and social risks for high profile, complex, international and potentially high impact projects. The IFC PS encompass the following eight topics:

- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts;
- Performance Standard 2: Labour and Working Conditions;
- Performance Standard 3: Resource Efficiency and Pollution Prevention;
- Performance Standard 4: Community Health, Safety, and Security;
- Performance Standard 5: Land Acquisition and Involuntary Resettlement;
- Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- Performance Standard 7: Indigenous Peoples; and
- Performance Standard 8: Cultural Heritage.

IFC's Environmental, Health, and Safety (EHS) Guidelines provide technical guidelines with general and industry-specific examples of good international industry practice to meet IFC PS. The EHS Guidelines for Electric Power Transmission and Distribution are of particular relevance to the Project.

7.2 Legislation

7.2.1 Environmental Statutory Framework

The legislation that has possible bearing on the proposed Phase 1 and Phase 2 Power Lines and Substations from an environmental perspective is captured in **Table 3** below. **Note:** *this list does not attempt to provide an exhaustive explanation, but rather represents an identification of some of the most appropriate sections from pertinent pieces of legislation*.

Table 3: Environmental Statutory Framework

Legislation	Description and Relevance
Constitution of the Republic of South Africa, (No. 108 of 1996)	▪ Chapter 2 – Bill of Rights. ▪ Section 24 – Environmental Rights.

Legislation	Description and Relevance
National Environmental Management Act (NEMA) (No. 107 of 1998)	▪ Key sections (amongst others): o Section 24 – Environmental Authorisation (control of activities which may have a detrimental effect on the environment). o Section 28 – Duty of care and remediation of environmental damage. ▪ Environmental management principles. ▪ Authorities – Department of Forestry, Fisheries and the Environment (DFFE) (national) and the Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA) (provincial).
GN No. R 982 of 4 December 2014 (as amended)	▪ Purpose - regulate the procedure and criteria as contemplated in Chapter 5 of NEMA relating to the preparation, evaluation, submission, processing and consideration of, and decision on, applications for environmental authorisations for the commencement of activities, subjected to EIA, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto.
GN No. R. 983 of 4 December 2014 (as amended) (Listing Notice 1)	▪ Purpose - identify activities that would require environmental authorisations prior to commencement of that activity and to identify competent authorities in terms of sections 24(2) and 24D of NEMA. ▪ The investigation, assessment and communication of potential impact of activities must follow a Basic Assessment Process, as prescribed in regulations 19 and 20 of GN No. R 982 of 4 December 2014 (as amended). However, according to Regulation 15(3) of GN No. R 982 (as amended), S&EIR must be applied to an application if the application is for two or more activities as part of the same development for which S&EIR must already be applied in respect of any of the activities. ▪ Activities under Listing Notice 1 that are relevant to this project follow.
GN No. R. 985 of 4 December 2014 (as amended) (Listing Notice 3)	▪ Purpose - list activities and identify competent authorities under sections 24(2), 24(5) and 24D of NEMA, where environmental authorisation is required prior to commencement of that activity in specific identified geographical areas only. ▪ The investigation, assessment and communication of potential impact of activities must follow a Basic Assessment Process, as prescribed in regulations 19 and 20 of GN No. R 982 of 4 December 2014 (as amended). However, according to Regulation 15(3) of GN No. R 982 (as amended), S&EIR must be applied to an application if the application is for two or more activities as part of the same development for which S&EIR must already be applied in respect of any of the activities. ▪ Activities under Listing Notice 3 that are relevant to this project follow.
National Water Act (Act No. 36 of 1998)	▪ Sustainable and equitable management of water resources. ▪ Key sections (amongst others): o Chapter 3 – Protection of water resources. o Section 19 – Prevention and remedying effects of pollution. o Section 20 – Control of emergency incidents. o Chapter 4 – Water use. ▪ Authority – Department of Water and Sanitation (DWS).
National Environmental Management Air Quality Act (Act No. 39 of 2004)	▪ Air quality management ▪ Key sections (amongst others): o Section 32 – Dust control. o Section 34 – Noise control. ▪ Authorisation type – Atmospheric Emission License. *Note that this is not required for the Project.* ▪ Authority – DFFE (national) and provincial counterparts as well as municipalities.
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	▪ Management and conservation of the country's biodiversity. ▪ Protection of species and ecosystems. ▪ Authorisation type – Permit. ▪ Authority – DFFE and provincial counterparts.
National Environmental Management: Protected Areas Act (Act No. 57 of 2003)	▪ Protection and conservation of ecologically viable areas representative of South Africa's biological diversity and natural landscapes.
National Environmental Management: Waste Act (Act No. 59 of 2008)	▪ Management of waste. ▪ Chapter 5 – licensing requirements for listed waste activities - GN No. R. 921 of 29 November 2013 (as amended). ▪ Authorisation type – Waste Management Licence. *Note that this is not required for the Project.* ▪ Authority – DFFE (national) and provincial counterparts.
National Forests Act (No. 84 of 1998)	▪ Supports sustainable forest management and the restructuring of the forestry sector, as well as protection of indigenous trees in general. ▪ Section 15 – Authorisation required for impacts to protected trees.

Legislation	Description and Relevance
	▪ Authorisation type – Permit. ▪ Authority – Department of Agriculture, Forestry and Fisheries (DAFF).
Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)	▪ Equitable access to and sustainable development of the nation's mineral and petroleum resources and to provide for matters related thereto. ▪ Key sections (amongst others): o Section 22 – Application for mining right. o Section 27 – Application for, issuing and duration of mining permit. o Section 53 – Use of land surface rights contrary to objects of Act. ▪ Authorisation type – Mining Permit / Mining Right. *Note that this is not required for the Project.* ▪ Authority – Department of Mineral Resources and Energy (DMRE).
Occupational Health & Safety Act (Act No. 85 of 1993)	▪ Provisions for Occupational Health & Safety. ▪ Authority – Department of Employment and Labour (DEL). ▪ Relevant regulations, such as Electrical Installation Regulations, Construction Regulations, etc.
Hazardous Substance Act (No 15 of 1973) and Regulations	▪ Provides for the control of substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure thereby in certain circumstances, and for the control of certain electronic products ▪ Provides for the division of such substances or products into groups in relation to the degree of danger. ▪ Provides for the prohibition and control of the importation, manufacture, sale, use, operation, application, modification, disposal or dumping of such substances and products.
National Heritage Resources Act (Act No. 25 of 1999)	▪ Key sections: o Section 34 – protection of structure older than 60 years. o Section 35 – protection of heritage resources. o Section 36 – protection of graves and burial grounds. o Section 38 – Heritage Impact Assessment for linear development exceeding 300m in length; development exceeding 5 000m^2 in extent, etc. ▪ Authorisation type – Permit. ▪ Authority – South African Heritage Resources Agency (SAHRA) and Free State Heritage Resources Authority (FSHRA).
Conservation of Agricultural Resources Act (Act No. 43 of 1983)	▪ Control measures for erosion. ▪ Control measures for alien and invasive plant species. ▪ Authority – Department of Agriculture.
Free State Province Nature Conservation Ordinance 8 of 1969	▪ Provides for the listing of certain protected plant species.

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

7.2.2 National Environmental Management Act

According to Section 2(3) of the National Environmental Management Act (NEMA) (Act No. 107 of 1998), "*development must be socially, environmentally and economically sustainable*", which means the integration of these three factors into planning, implementation and decision-making so as to ensure that development serves present and future generations.

The proposed Project requires authorisation in terms of NEMA and the EIA is being undertaken in accordance the EIA Regulations of 2014 (as amended), which consist of the following:

- EIA procedure - GN No. R 982 (4 December 2014), as amended;
- Listing Notice 1 - GN No. R 983 (4 December 2014), as amended;
- Listing Notice 2 - GN No. R 984 (4 December 2014), as amended; and
- Listing Notice 3 - GN No. R 985 (4 December 2014), as amended.

The Project triggers activities under Listing Notices 1 and 3, and thus needs to be subjected to a Basic Assessment Process. The listed activities are explained in the context of the project in **Table 4** below.

Table 4: Listed Activities Triggered by the Phase 1 and Phase 2 Power Lines

Description of Listed Activities Triggered	Description of relevance
GN No. R.983 – Activity no. 11(i): The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more; excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is — (a) temporarily required to allow for maintenance of existing infrastructure; (b) 2 kilometres or shorter in length; (c) within an existing transmission line servitude; and (d) will be removed within 18 months of the commencement of development.	*The capacity of the proposed power lines will be 132 kilovolts, outside an urban area.*
GN No. R.983 – Activity no. 12(ii)(a - c): The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) 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; — excluding— (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; (ee) where such development occurs within existing roads, road reserves or railway line reserves; or (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.	*The cumulative footprints of the proposed power line towers will exceed 100 square meters in size. The proposed power line towers will not encroach into any watercourse. However, due to the length of power lines and the multiple watercourse crossings, the towers may fall within 32m from watercourse(s).* *The final tower positions and sizes will be confirmed during the design phase.*
GN No. R.983 – Activity no. 14: *The development 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.*	*"Dangerous goods" that are likely to be associated with the project include fuel stores during the construction phase or hazardous chemical substances at the substation during the operational phase. Threshold of 80 m^3 expected to be exceeded.*
GN No. R.983 – Activity no. 19: *The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells,*	*Towers will be built within 32m from watercourse(s). The final tower positions and sizes will be confirmed during the design phase.*

Description of Listed Activities Triggered	Description of relevance
shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; *but excluding where such infilling, depositing, dredging, excavation, removal or moving -* *(a) will occur behind a development setback;* *(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;* *(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;* *(d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or* *(e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.*	
GN No. R.983 – Activity no. 27: *The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for-* *(i) the undertaking of a linear activity; or* *(ii) maintenance purposes undertaken in accordance with a maintenance management plan.*	*Clearance of areas consisting of indigenous vegetation associated with the construction footprint for the substations.* *The proposed Solar PV Farm substations will each be approximately 80m x 80m. The new adjacent Eskom substation yards will be approximately 80 x 80m, i.e. 160m x 80m in total for each of the Solar PV Farm substations.*
GN No. R.983 – Activity no. 28(ii): Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.	*Footprint of Project on land that was previously used for agricultural purposes, prior to mining, outside of an urban area.*
GN No. R.983 – Activity no. 48(i)(a - c): The expansion of— (i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or (ii) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more; where such expansion 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; excluding— (aa) the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such expansion activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such expansion occurs within an urban area; or (ee) where such expansion occurs within existing roads, road reserves or railway line reserves.	*Expansion of watercourse crossings along the power line's access roads.*

Description of Listed Activities Triggered	Description of relevance
GN No. R.985 – Activity no. 10 - (b)(i): The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. b. Free State i. Outside urban areas: (hh) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.	*"Dangerous goods" that are likely to be associated with the project include fuel stores during the construction phase or hazardous chemical substances at the substation during the operational phase, located within 100 metres from the edge of a watercourse or wetland. Threshold of 30 m^3 expected to be exceeded.*
GN No. R.985 – Activity no. 12 - (b)(i), (ii) & (iv): The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. b. Free State i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans; iv. Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.	*It is proposed to clear areas of indigenous vegetation larger than 300 square metres within critical biodiversity as well as watercourses and wetlands traversed by the power lines.*
GN No. R.985 – Activity no. 14(ii)(a) & (c) - (b)(i)(ff): The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or (ii) infrastructure or structures with a physical footprint of 10 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 has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. b. Free State i. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.	*Towers will be built within 32m from watercourse(s). The final tower positions and sizes will be confirmed during the design phase.*

Note that the dimensions of the project infrastructure and components should be regarded as approximates due to the dynamic nature of the planning and design process. As a conservative approach, all possible activities that could possibly be triggered by the Project were included in the Application Form (contained in **Appendix D**).

7.2.3 National Environmental Management: Waste Act

Amongst others, the purpose of the National Environmental Management: Waste Act (NEM:WA) (Act No. 59 of 2008) includes the following:

1. To reform the law regulating waste management in the country by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development;
2. To provide for institutional arrangements and planning matters;
3. To provide for specific waste management measures;
4. To provide for the licensing and control of waste management activities;
5. To provide for the remediation of contaminated land; and
6. To provide for compliance and enforcement.

Some key definitions from this Act include:

- "*Disposal*" – the burial, deposit, discharge, abandoning, dumping, placing or release of any waste into, or onto, any land.
- "*General waste*" means waste that does not pose an immediate hazard or threat to health or to the environment, and includes -
  - domestic waste;
  - building and demolition waste;
  - business waste: and
  - inert waste;
- "Hazardous waste" – any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.
- "Storage" – the accumulation of waste in a manner that does not constitute treatment or disposal of that waste.
- "Waste" – any substance, whether or not that substance can be reduced, re-used, recycled and recovered -
  - That is surplus, unwanted, rejected, discarded, abandoned or disposed of;
  - Which the generator has no further use of for (he purposes of production;
  - That must be treated or disposed of; or
  - That is identified as a waste by the Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector, but -
    - A by-product is not considered waste; and
    - Any portion of waste, once re-used, recycled and recovered, ceases to be waste.

GN No. R. 921 of 29 November 2013 (as amended) contains a list of waste management activities that have, or are likely to have, a detrimental impact on the environment. If any of the waste management activities are triggered in Category A and Category B, a Waste Management Licence is required. Activities listed in Category C need to comply with the relevant National Norms and Standards.

No authorisation will be required in terms of NEM:WA for the Project as no listed waste management activities are triggered. The following is noted with regards to waste management for the Project:

- Construction phase –
  - Temporary waste storage facilities will remain below the thresholds contained in the listed activities under Schedule 1 of NEM:WA; and
  - The EMPr makes suitable provisions for waste management, including the storage, handling and disposal of waste.
- Operational phase –
  - Minimum waste will be generated during the operational phase;
  - Waste will be sent to the relevant municipal sites; and
  - Waste generated during maintenance of substations will be sent to suitable disposal sites.

7.2.4 National Water Act (Act No. 36 of 1998)

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

- Meeting the basic human needs of present and future generations;
- Promoting equitable access to water;
- Redressing the results of past racial and gender discrimination;
- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Facilitating social and economic development;
- Providing for growing demand for water use; protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources;
- Meeting international obligations;
- Promoting dam safety; and
- Managing floods and droughts.

The Department of Water and Sanitation (DWS) is the custodian of South Africa's water resources.

Some key definitions from this Act include:

- "*Pollution*" – the direct or indirect alteration of the physical, chemical or biological properties of a water resource so as to make it (a) less fit for any beneficial purpose for which it may reasonably be expected to be used; or (b) harmful or potentially harmful;
- "*Waste*" – includes any solid material or material that is suspended, dissolved or transported in water (including sediment) and which is spilled or deposited on land or into a water resource in such volume, composition or manner as to cause, or to be reasonably likely to cause, the water resource to be polluted; and
- "*Water resource*" – includes a watercourse, surface water, estuary, or aquifer.

The Project will entail the following activities that constitute water uses in terms of Section 21 of the NWA:

- Section 21(c) - Impeding or diverting the flow of water in a watercourse; and
- Section 21(i) - Altering the bed, banks, course or characteristics of a watercourse.

A Water Use Licence Application will be submitted to DWS to seek authorisation in terms of the NWA for the abovementioned water uses. The process to seek authorisation for the water uses was initiated via DWS' Electronic Water Use Licence Application and Authorisation System (e-WULAAS), and discussions were held with the DWS Vaal Proto Catchment Management Agency (CMA). The process is being undertaken in accordance with the Water Use Licence Application and Appeals Regulations (GN No. R. 267 of 24 March 2017).

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

The purpose of the National Environmental Management: Air Quality Act (NEM:AQA) (Act No. 39 of 2004) is to reform the law regulating air quality by providing measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development. This Act aims to promote justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government, and for specific air quality measures.

Some key definitions from this Act include:

- "*Air pollution*" – any change in the composition of the air caused by smoke, soot, dust (including fly ash), cinders, solid particles of any kind, gases, fumes, aerosols and odorous substances.
- "*Atmospheric emission*" or "*emission*" – any emission or entrainment process emanating from a point, non-point or mobile source that results in air pollution.
- "*Non-point source*" – a source of atmospheric emissions which cannot be identified as having emanated from a single identifiable source or fixed location, and includes veld, forest and open fires, mining activities, agricultural activities and stockpiles.
- "*Point source*" – single identifiable source and fixed location of atmospheric emission, and includes smoke stacks and residential chimneys.

This Act provides for the listing of activities which result in atmospheric emissions that pose a threat to health or the environment. No person may without an Atmospheric Emission Licence (AEL) conduct any such listed activity.

No AEL is required for the Project. Provision is made in the EMPr to manage impacts to air quality as a result of the Project during the construction phase.

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

The purpose of the National Environmental Management: Biodiversity Act (NEM:BA) (Act 10 of 2004) is to provide for the management and conservation of SA's biodiversity within the framework of NEMA.

The Act allows for the publication of provincial and national lists of ecosystems that are threatened and in need of protection. The list should include:

- *Critically Endangered Ecosystems*, which are ecosystems that have undergone severe ecological degradation as a result of human activity and are at extremely high risk of irreversible transformation.
- *Endangered Ecosystems*, which are ecosystems that, although they are not critically endangered, have nevertheless undergone ecological degradation as a result of human activity.
- *Vulnerable Ecosystems*, which are ecosystems that have a high risk of undergoing significant ecological degradation.
- *Protected Ecosystems*, which are ecosystems that are of a high conservation value or contain indigenous species at high risk of extinction in the wild in the near future.

Similarly, the Act allows for the listing of endangered species, including critically endangered species, endangered species, vulnerable species and protected species. A person may not carry out a restricted activity (including trade) involving listed threatened or protected species without a permit.

The Regulations on the management of Listed Alien and Invasive Species were promulgated on 1 August 2014. The Listed Invasive Species were also published on this date and were subsequently amended in GN 864 of 29 July 2016.

Some key definitions from this Act include:

- "*Alien species*" –
  - A species that is not an indigenous species; or
  - An indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention.
- "*Biological diversity*" or "*biodiversity*" – the variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems.
- "*Indigenous species*" – a species that occurs, or has historically occurred, naturally in a free state in nature within the borders of the Republic, but excludes a species that has been introduced in the Republic as a result of human activity.

- "*Invasive species*" – any species whose establishment and spread outside of its natural distribution range -
  - Threaten ecosystems, habitats or other species or have demonstrable potential; and
  - May result in economic or environmental harm or harm to human health.
- "*Species*" – a kind of animal, plant or other organism that does not normally interbreed with individuals of another kind, and includes any sub-species, cultivar, variety, geographic race, strain, hybrid or geographically separate population.

The implications of this Act for the Project *inter alia* include the requirements for managing invasive and alien species, protecting threatened ecosystems and species, as well as for rehabilitation.

The findings from the Terrestrial Ecological and Water Resources Impact Assessments that were undertaken for the Project are included in **Section 13.4** and **Section 13.3** below, respectively.

7.2.7 National Heritage Resources Act (Act No. 25 of 1999)

The purpose of the National Heritage Resources Act (NHRA) (Act No. 25 of 1999) is to protect and promote good management of SA's heritage resources, and to encourage and enable communities to nurture and conserve their legacy so it is available to future generations.

In terms of Section 38 of this Act, certain listed activities require authorisation from provincial agencies:

- The construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
- The construction of a bridge or similar structure exceeding 50 m in length;
- Any development or other activity which will change the character of a site -
  - Exceeding 5 000 m^2 in extent; or
  - Involving three or more existing erven or subdivisions thereof; and
- The re-zoning of a site exceeding 10 000 m^2 in extent.

The findings from the Phase 1 Cultural Heritage Impact Assessment and Desktop Palaeontological Impact Assessment that were undertaken for the Project are included in **Section 13.7** and **Section 13.8** below, respectively.

7.3 Governance of Energy in SA

SA has expressed and entrenched its commitment to promoting the use of renewable energy and implementing Energy Efficiency through the following (amongst others):

- SA is a signatory to various international treaties and conventions relating to climate change and greenhouse gas (GHG), such as –
  - United Nations Framework Convention on Climate Change;

- Kyoto Protocol; and
- Paris Agreement.

❖ SA has developed the following related policy frameworks –

- White Paper on Energy Policy (1998);
- White Paper on Renewable Energy (2003);
- Integrated Energy Plan (2003);
- Integrated Resource Plan (IRP) 2010;
- Integrated Resource Plan (IRP) 2019
- National Climate Change Response White Paper (2011);
- Post-2015 National Energy Efficiency Strategy;
- The National Development Plan (2030);
- Climate Change Bill (2018); and
- Carbon Tax Bill (2019).

❖ SA has developed the following related legal frameworks –

- Electricity Regulation Act (Act No. 4 of 2006);
- National Energy Act (Act No. 34 of 2008); and
- Income Tax Act (1962) - tax incentive provided for Section 12L.

❖ The former Department of Environmental Affairs (DEA), which is now known as DFFE, developed EIA Guideline for Renewable Energy Projects (2015).

❖ SA's related voluntary instruments include –

- South African National Standard (SANS) 941 energy-efficiency of electrical and electronic equipment; and
- SANS 50001 energy management standard.

7.4 Guidelines

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

❖ Guideline on Alternatives, EIA Guideline and Information Document Series (DEA&DP, 2010a);

❖ Guideline on Need and Desirability, EIA Guideline and Information Document Series (DEA&DP, 2010b);

❖ Integrated Environmental Management Guideline Series 7: Public Participation in the EIA Process (DEA, 2010);

❖ EIA Guideline for Renewable Energy Projects (Department of Environmental Affairs (DEA, 2015); and

❖ Guidelines for Involving Specialists in the EIA Processes Series (Brownlie, 2005).

7.5 National and Regional Plans

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

- Municipal Spatial Development Frameworks (SDFs);
- Municipal Integrated Development Plans (IDPs);
- Relevant national, provincial, district and local policies, strategies, plans and programmes; and
- Free State Biodiversity Plan (2015) (Collins, 2016).

7.6 Renewable Energy Development Zones

A Strategic Environmental Assessment (SEA) was undertaken by DFFE in order to identify geographical areas most suitable for the rollout of wind and solar PV energy projects and the supporting electricity grid network. These areas are referred to as Renewable Energy Development Zones (REDZs), in which development will be incentivised and streamlined. The proposed Project's Phase 1 and Phase 2 Sites in relation to the REDZs are shown in **Figure 13** below.

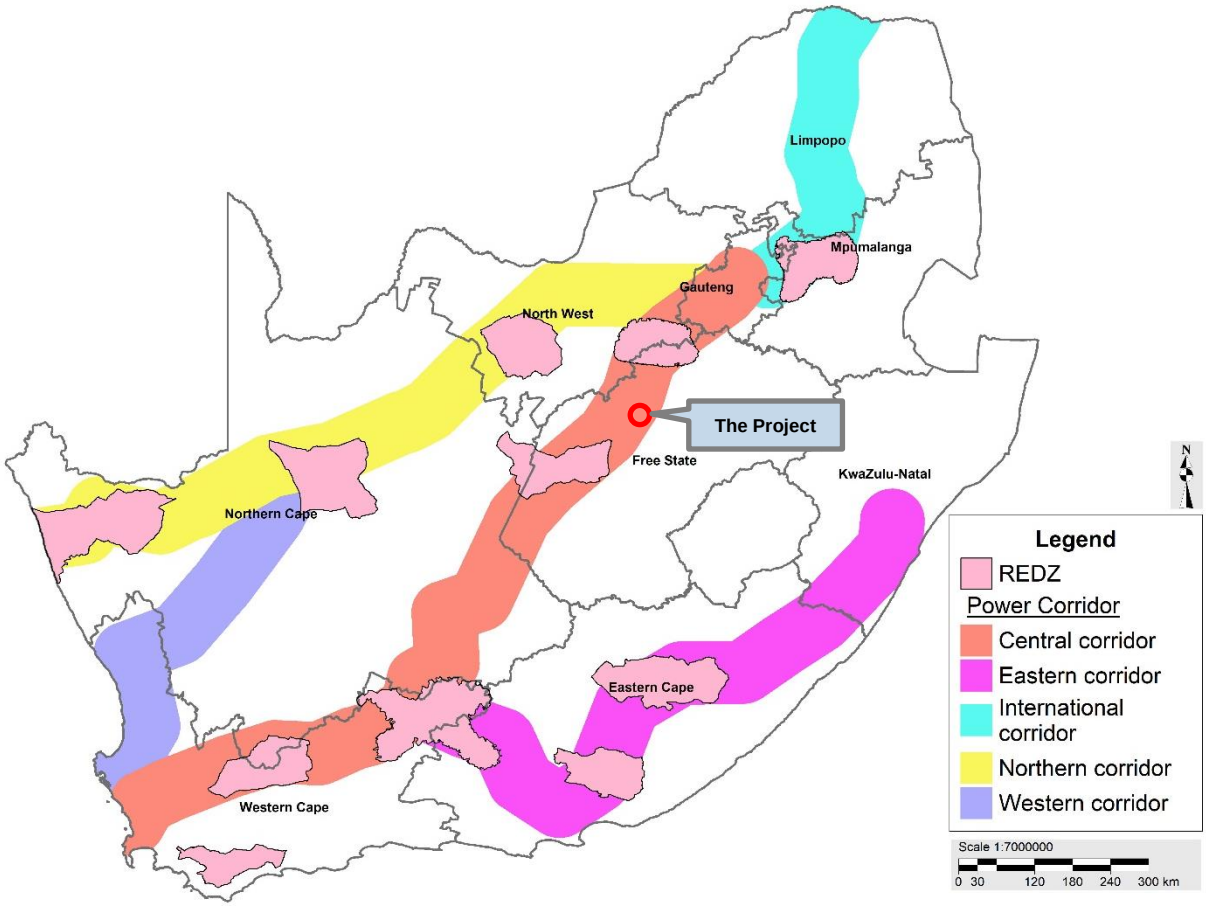


Figure 13: The Project in relation to REDZs

As shown in **Figure 13** above, the Project is not located within any REDZs. According to GNR 114 of 16 February 2018, where an Application for Environmental Authorisation for large scale wind or

solar PC facilities is being made and these facilities fall outside of the REDZs then these applications will be considered in terms of the requirements of the EIA Regulations of 2014 (as amended).

As shown in **Figure 13** above, the Project falls within the Central Corridor of the Strategic Transmission Corridors, in terms of GNR 113 of 16 February 2018. As mentioned, a separate EIA will be undertaken for the proposed power lines associated with the Solar PV Plant.

8 BASIC ASSESSMENT PROCESS

8.1 Environmental Assessment Authorities

In terms of NEMA the lead decision-making authority for the environmental assessment is DFFE, as the competent authority for renewable energy related applications. Due to the geographic location of the Project, DESTEA is regarded as one of the key commenting authorities in terms of NEMA during the execution of the EIA, and all documentation will thus be copied to this Department (amongst others).

Various other authorities with jurisdiction over elements of the receiving environment or project activities (refer to **Section 7.2** above) will also continue to be consulted during the course of the EIA. Refer to the database of Interested and Affected Parties (IAPs) contained in **Appendix H** for a list of the government departments.

8.2 Environmental Assessment Practitioner

Nemai Consulting was appointed by SunElex as the independent Environmental Assessment Practitioner (EAP) to undertake the environmental assessment for the proposed Project.

In accordance with Appendix 3, Section 3(1)(a) of GN No. R 982 of 4 December 2014 (as amended), this section provides an overview of Nemai Consulting and the company's experience with EIAs, as well as the details and experience of the EAPs that form part of the Basic Assessment team.

Nemai Consulting is an independent, specialist environmental, social development and Occupational Health and Safety (OHS) consultancy, which was founded in December 1999. The company is a 100% black female owned company, with a level 1 BBBEE rating. The company is directed by a team of experienced and capable environmental engineers, scientists, ecologists, sociologists, economists and analysts. The company has offices in Randburg (Gauteng) and Durban (KZN).

The core members of Nemai Consulting that are involved with the Scoping and EIA process for the project are captured in **Table 5** below, and their respective Curricula Vitae are contained in **Appendix F**. The oath of the EAP is contained in **Appendix M**.

Table 5: Scoping and EIA Core Team Members

Name	Qualifications	Experience	Duties
Ms D. Naidoo	BSc Eng (Chem)	24 years	Project Manager - EIA Process
Mr D. Henning	MSc (River Ecology)	19 years	Project Leader - EIA Process

8.3 Environmental Assessment Triggers

The process for seeking authorisation under NEMA is undertaken in accordance with GN No. R. 982 of 4 December 2014 (as amended), promulgated in terms of Chapter 5 of NEMA. As mentioned, based on the types of activities involved the requisite environmental assessment for the Project: Phase 1 and Phase 2 Power Lines and Substations is a Basic Assessment Process. Refer to **Section 7** above for the Project's legal framework and specifically the activities triggered by the Project in terms of Listing Notices 1 and 3 of the EIA Regulations of 2014 (as amended).

As mentioned, Environmental Authorisation for the Solar PV Plant: Phase 1 and Phase 2 Sites and for the proposed power lines is being applied for separately.

8.4 Basic Assessment Process

The objectives of the Basic Assessment, based on the EIA Regulations of 2014 (as amended), are captured in **Section 1** above.

An outline of the Basic Assessment Process is provided in **Figure 14** below.

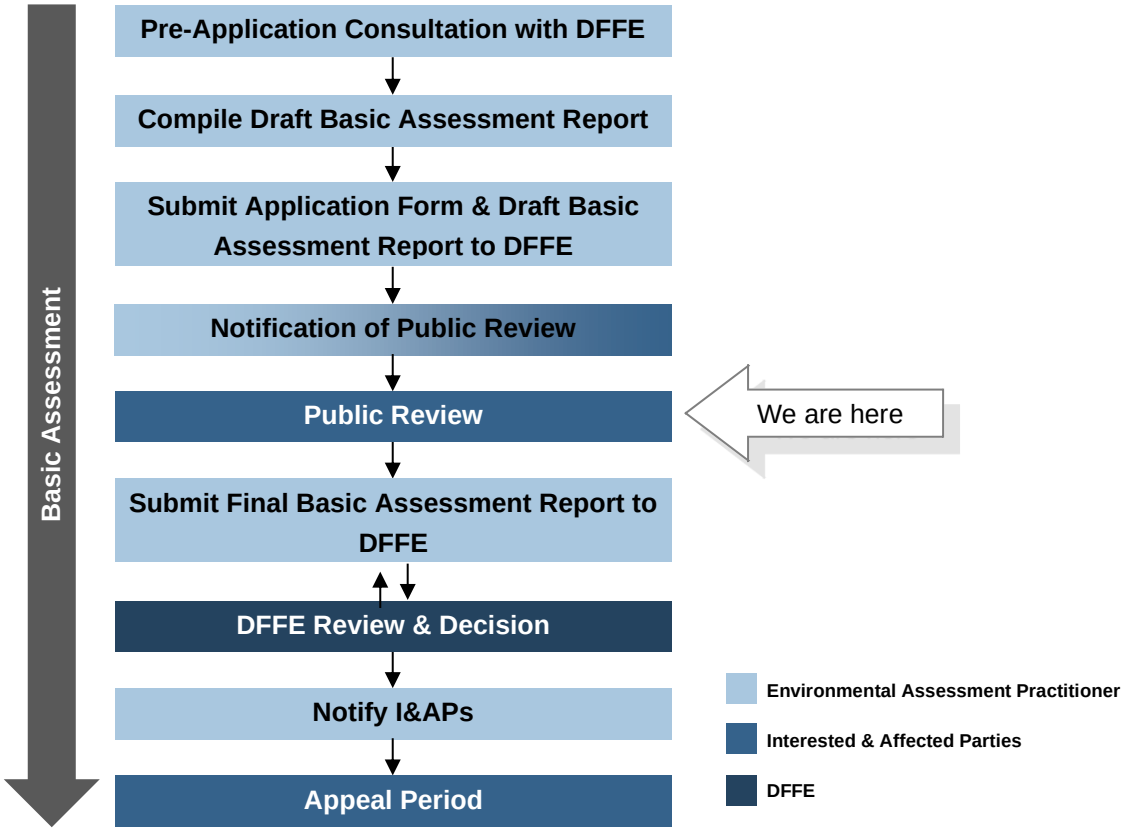


Figure 14: Basic Assessment Process

Project announcement was undertaken from October to November 2020. Thereafter, the Project was placed on hold and the Basic Assessment resumed in July 2021.

8.5 DFFE Pre-application Meeting

The Applicant convened a Pre-application Meeting with DFFE on 22 January 2020. Thereafter, another Pre-application Meeting was held with DFFE on 6 August 2021, after the Project had been resuscitated. Minutes of the Pre-application Meetings are appended to the Application Form, which is contained in **Appendix D**.

The purpose of the Pre-application Meetings included the following:

- To discuss the history of the previous EIA;
- To provide an overview of the Project;
- To initiate a new EIA application process;
- To seek clarification regarding certain matters that pertain to the EIA process; and
- To determine DFFE's requirements.

8.6 Other Renewable Energy Applications in the Project Area

DFFE has created the SA Renewable Energy EIA Application (REEA) Database, which contains spatial data for renewable energy applications for Environmental Authorisation. It includes spatial and attribute information for both active (in process and with valid authorisations) and non-active (lapsed or replaced by amendments) applications (https://egis.environment.gov.za/renewable_energy). A map is contained in **Figure 15** below, which shows other renewable energy applications within a 50 km radius of the Project.

According to the REEA Database, renewable energy applications have been made for the properties to the immediate south and west of the Phase 1 Site and to the south-east of the Phase 2 Site (see **Figure 15** below).

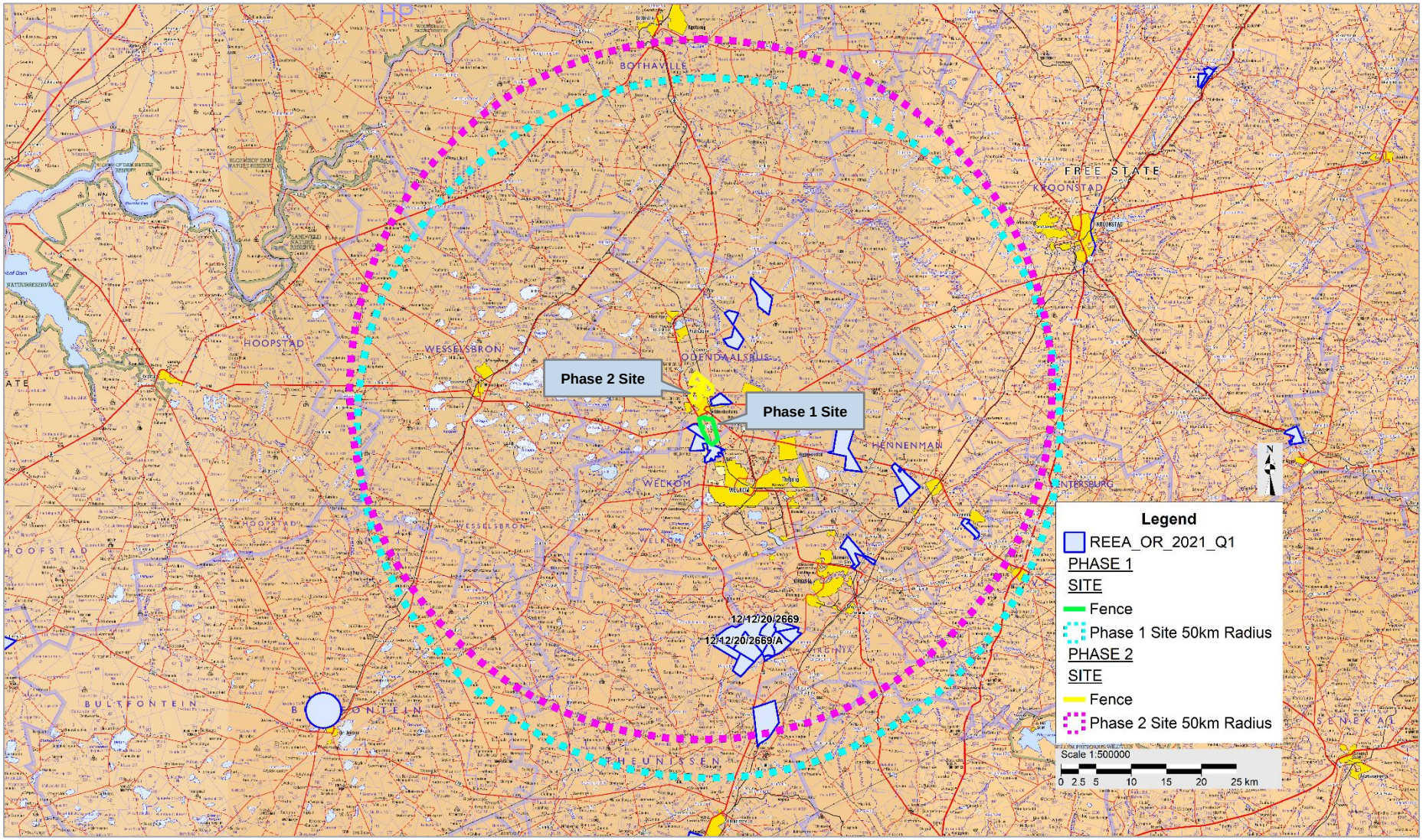


Figure 15: **Renewable energy applications in relation to the Project (within a 50 km radius)**

9 ASSUMPTIONS, GAPS AND LIMITATIONS

The following assumptions and limitations accompany the Basic Assessment Process:

- As the design of the Project components is still in feasibility stage, and due to the dynamic nature of the planning environment, the dimensions and layout of the infrastructure may change during the detailed design phase.
- Regardless of the analytical and predictive method employed to determine the potential impacts associated with the Project, the impacts are only predicted on a probability basis. The accuracy of the predictions is largely dependent on the availability of environmental data and the degree of understanding of the environmental features and their related attributes.
- The following assumptions, gaps and limitation were noted as part of the Specialist Studies –
  - Water Resources Impact Assessment (TBC, 2020a):
    - A single season survey was conducted, which constitutes a wet season survey;
    - Due to the nature of the water resources, a comprehensive wetland assessment was achieved for the Project, supported by a desktop aquatic ecology study;
    - The use of soil and vegetation indicators for wetland delineation was limited in places where longstanding and intense crop cultivation was present;
    - This assessment has not assessed any temporal trends for the Project;
    - Due to the scale of the Project, wetland delineation was limited to a 40m corridor for detailed field-based delineation while wetlands beyond this (within the 500m regulated area) were desktop delineated; and
    - The GPS used for water resource delineations is accurate to within 5m. Therefore, the wetland delineation plotted digitally may be offset by at least five meters to either side.
  - Terrestrial Ecology Assessment (TBC, 2020b):
    - A single season survey was conducted, which constitutes a wet season survey;
    - This assessment has not assessed any temporal trends for the Project;
    - Final Project layout was provided after field work was conducted, as such habitat features, and sensitivities are based sites assessed during the survey; and
    - A separate avifaunal study was compiled for the power line as such impacts on avifauna and mitigations are only briefly discussed in this report.
  - Agricultural Impact Assessment (Index, 2020):
    - The impact of installing the power lines will be temporary and last for the duration of construction. The only permanent loss will be the footprint of the pylons.
  - Phase 1 Cultural Heritage Impact Assessment (van Schalkwyk, 2020):
    - It is assumed that the description of the proposed Project is accurate.
    - The unpredictability of buried archaeological remains;
    - No subsurface investigation (i.e. excavations or sampling) were undertaken, since a permit from SAHRA is required for such activities;
    - It is assumed that the public consultation process undertaken as part of the EIA is sufficient and that it does not have to be repeated as part of the Heritage Impact Assessment.

- Desktop Paleontological Assessment (Banzai Environmental, 2020):
  - The focal point of geological maps is the geology of the area and the sheet explanations were not meant to focus on palaeontological heritage. Many inaccessible regions of South Africa have never been reviewed by palaeontologists and data is generally based on aerial photographs alone. Locality and geological information of museums and universities databases have not been kept up to date or data collected in the past have not always been accurately documented.
  - Comparable Assemblage Zones in other areas is sourced to provide information on the existence of fossils in an area which was not documented in the past. When using similar Assemblage Zones and geological formations for Desktop studies it is generally assumed that exposed fossil heritage is present within the footprint. A field-assessment will thus improve the accuracy of the desktop assessment.
- Visual Impact Assessment (SAS, 2020):
  - No specific national legal requirements for Visual Impact Assessments currently exist in South Africa. However, the assessment of visual impacts is required by implication when the provisions of relevant acts governing environmental management are considered and when certain characteristics of either the receiving environment or the proposed Project indicate that visibility and aesthetics are likely to be significant issues and that visual input is required;
  - Due to a lack of visual specialist guidelines within the Free State Province, the “Guidelines for Involving Visual and Aesthetic Specialists in the EIA Process” (Oberholzer, 2005), prepared by the Western Cape Department of Environmental Affairs & Development Planning, were used;
  - Distance, terrain, existing infrastructure within the surrounding area plays a critical role when assessing visual impacts of an area. Due to the existing mining infrastructure, various power lines and substations in the area immediate surroundings, it was deemed sufficient to identify all potential sensitive receptors within a 2km radius of the proposed power line route alternatives and associated substations, on a desktop-level, which were then verified during the field assessment. The 2km radius can be considered the visual assessment zone. It should be noted that the visibility of an object decreases exponentially the further away the observer is from the source of impact;
  - All information relating to the proposed Project as referred to in this report is assumed to be the latest available information. Additionally, best practice guidelines were taken into consideration and the maximum expected heights of the infrastructure and the placement thereof utilised in the viewshed calculations as a precautionary approach;
  - Abstract or qualitative aspects of the environment and the intangible value of elements of visual and aesthetic significance are difficult to measure or quantify and as such depend to some degree on subjective judgments. It therefore is necessary to differentiate between aspects that involve a degree of subjective opinion and those that are more objective and quantifiable.
- Socio-Economic Impact Assessment (Nemai Consulting, 2020):

- It is assumed that information obtained during the public participation process provides a comprehensive account of the community structure and community concerns for the Project;
- The study was done with information available to the specialist at the time of executing the study, within the available time frames and budget. The sources consulted are not exhaustive and additional information which might strengthen arguments, contradict information in this report and/ or identify additional information which might exist. However, the specialist did take an evidence-based approach in the compilation of this report and did not intentionally exclude information relevant to the assessment;
- The study was completed using the Statistics South Africa Census 2011 data and Statistics South Africa Community Survey 2016. The data might be somewhat outdated; however, it is the most comprehensive primary data available;
- It is assumed that no relocation of families or people will take place for this Project (power lines and substations); and
- This Project presents multiple route alternatives which will generally run parallel to or within existing 44kV servitudes. The routes largely follow existing infrastructure to reduce the impacts and effects on the local receiving environment. The assessed impacts and effects may later change during the detailed design phase of the Project.

10 FINANCIAL PROVISIONS

In terms of Section 3(1)(s) of Appendix 1 of GN No. R. 982 of 4 December 2014 (as amended), this section discusses details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts.

Due to the sensitive nature of financial provisions, the Applicant cannot detail the exact amounts but can confirm that there will be sufficient funds available to ensure that the Project can be successfully completed and for subsequent maintenance. Provision will be made in the bill of quantities for the Contractor for the implementation of mitigation measures included in the EMPr, including requirements for reinstatement and rehabilitation.

11 RESOURCE USE AND PROCESS DETAILS

11.1 Waste, Effluent, Emission and Noise Management

11.1.1 Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase?	YES: X
If yes, what estimated quantity will be produced per month?	To be determined during final design stage

How will the construction solid waste be disposed of (describe)?

The types of solid waste to be generated during the construction phase include the following:

- Waste generated from site preparations (e.g. plant material);
- Domestic waste;
- Surplus and used building material; and
- Hazardous waste (e.g. chemicals, oils, soil contaminated by spillages, diesel rags).

Solid waste generated during the construction phase will be temporarily stored at suitable locations (e.g. at the construction camp) and will be removed at regular intervals and disposed of at approved waste disposal sites.

Where will the construction solid waste be disposed of (describe)?

General waste will be disposed of at permitted waste disposal sites within MLM. According to the 2019 - 2020 IDP for the MLM, there are four permitted municipal landfill sites. All the waste disposed of will be recorded.

Hazardous waste will be removed by a waste service provider and will be disposed of at permitted site(s).

Will the activity produce solid waste during its operational phase?	YES
If yes, what estimated quantity will be produced per month?	To be determined during final design stage

How will the solid waste be disposed of (describe)?

General waste will be disposed of at permitted waste disposal sites within MLM.

Has the municipality or relevant service provider confirmed that sufficient air space exists for treating/disposing of the solid waste to be generated by this activity?	NO: X

Where will the solid waste be disposed if it does not feed into a municipal waste stream (describe)?

Solid waste will be removed by waste service providers and will be disposed of at other permitted site(s) within the greater region.

Note: If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

	YES	
Can any part of the solid waste be classified as hazardous in terms of the relevant legislation?	X	

If yes, inform the competent authority and request a change to an application for scoping and EIA.

Note that the only anticipated hazardous waste that will be generated during the construction phase will include chemicals, oils, soil contaminated by spillages, diesel rags, etc. The management of this waste is catered for in the EMPr.

		NO
Is the activity that is being applied for a solid waste handling or treatment facility?		X

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Describe the measures, if any, that will be taken to ensure the optimal reuse or recycling of materials:

The EMPr makes provision for waste separation and recycling.

11.1.2 Liquid effluent (other than domestic sewage)

		NO
Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?		X
If yes, what estimated quantity will be produced per month?		
If yes, has the municipality confirmed that sufficient capacity exists for treating / disposing of the liquid effluent to be generated by this activity(ies)?		
Will the activity produce any effluent that will be treated and/or disposed of on site?		
If yes, what estimated quantity will be produced per month?		
If yes describe the nature of the effluent and how it will be disposed.		

Note that if effluent is to be treated or disposed on site the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Will the activity produce effluent that will be treated and/or disposed of at another facility?		NO X

If yes, provide the particulars of the facility:

Facility name:			
Contact person:			
Postal address:			
Postal code:			
Telephone:		Cell:	
E-mail:		Fax:	

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:

11.1.3 Liquid effluent (domestic sewage)

Will the activity produce domestic effluent that will be disposed of in a municipal sewage system?		NO X
If yes, what estimated quantity will be produced per month?		
If yes, has the municipality confirmed that sufficient capacity exist for treating / disposing of the domestic effluent to be generated by this activity(ies)?		NO X
Will the activity produce any effluent that will be treated and/or disposed of on site?		

If yes describe how it will be treated and disposed off.

11.1.4 Emissions into the atmosphere

Will the activity release emissions into the atmosphere?		NO X
If yes, is it controlled by any legislation of any sphere of government?		

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

If no, describe the emissions in terms of type and concentration:

Only construction related emissions are anticipated.

11.2 Water Use

Indicate the source(s) of water that will be used for the activity:

Municipal	Directly from water board	Groundwater	River, stream, dam or lake	Other	the activity will not use water
X					

If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate
the volume that will be extracted per month:

If Yes, please attach proof of assurance of water supply, e.g. yield of borehole, in the appropriate Appendix.

Does the activity require a water use permit from DWS?	**YES**	
	X	

If yes, list the permits required

The Project entails the following activities that constitute water uses in terms of Section 21 of the NWA, which require authorisation from DWS: ▪ Section 21(c) (impeding or diverting the flow of water in a watercourse) and Section 21(i) (altering the bed, banks, course or characteristics of a watercourse) - encroachments into the regulated areas of watercourses.

If yes, have you applied for the water use permit(s)?		**NO**
		X
If yes, have you received approval(s)? (attached in appropriate appendix)		**NO**
		X

11.3 Power Supply

Please indicate the source of power supply e.g. Municipality / Eskom / Renewable energy source

During the operational phase power will be obtained from the Solar PV Plant.

If power supply is not available, where will power be sourced from?

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

11.4 Energy Efficiency

Describe the design measures, if any, that have been taken to ensure that the activity is energy efficient:

Not applicable, due to the nature of the Project.

Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

Not applicable, due to the nature of the Project.

12 PROFILE OF THE RECEIVING ENVIRONMENT

12.1 General

This section provides a general description of the status quo of the receiving environment in the Project area. This serves to provide the context within which the Basic Assessment was conducted. The study area includes the entire footprint of the Project components and related activities for the Phase 1 and Phase 2 Power Lines and Substations.

The reader is referred to **Section 13** below for more elaborate explanations of the specialist studies and their findings for specific environmental features.

This section allows for an appreciation of sensitive environmental features and possible receptors of the effects of the proposed Project. The potential impacts to the receiving environment are discussed further in **Section 14** below.

12.2 Land Use & Land Cover

The Land Cover Map (shown on **Figure 16** below) indicates the large extent of rainfed agriculture (maize fields), mining activities and the populated or built-up land within the study area.

The following is noted in terms of the 2013-14 South African National Land-Cover dataset:

- The land cover along the Phase 1 Power Lines route is dominated by grassland and cultivated areas (commercial rainfed); and
- The land cover along the Phase 2 Power Lines route is dominated by grassland and cultivated areas (commercial rainfed).

Located in the middle of the Phase 1 and Phase 2 PV Sites is the town Odendaalsrus, which is dominantly classified as an Urban Village with open trees and bush. Remaining natural land cover types include mainly grassland, low shrubland, pans and limited thicket/dense bushland along the Sandspruit. Some scattered woodland areas also occur, and some planted trees and shrubs (mainly wind breaks) are also shown (MetroGIS, 2015).

The Projects' proposed PV Sites were previously utilised by Harmony Gold Mining Company Ltd for mining activities. A Radiological Survey was undertaken of potential radiological sources (i.e. anything that may cause radiation exposure or releasing radioactive substances or materials) found on the proposed sites. The findings of the Radiological Survey are included in the EIA Report for the PV Sites. The recommendations from this survey will also apply to the proposed power lines and substations.

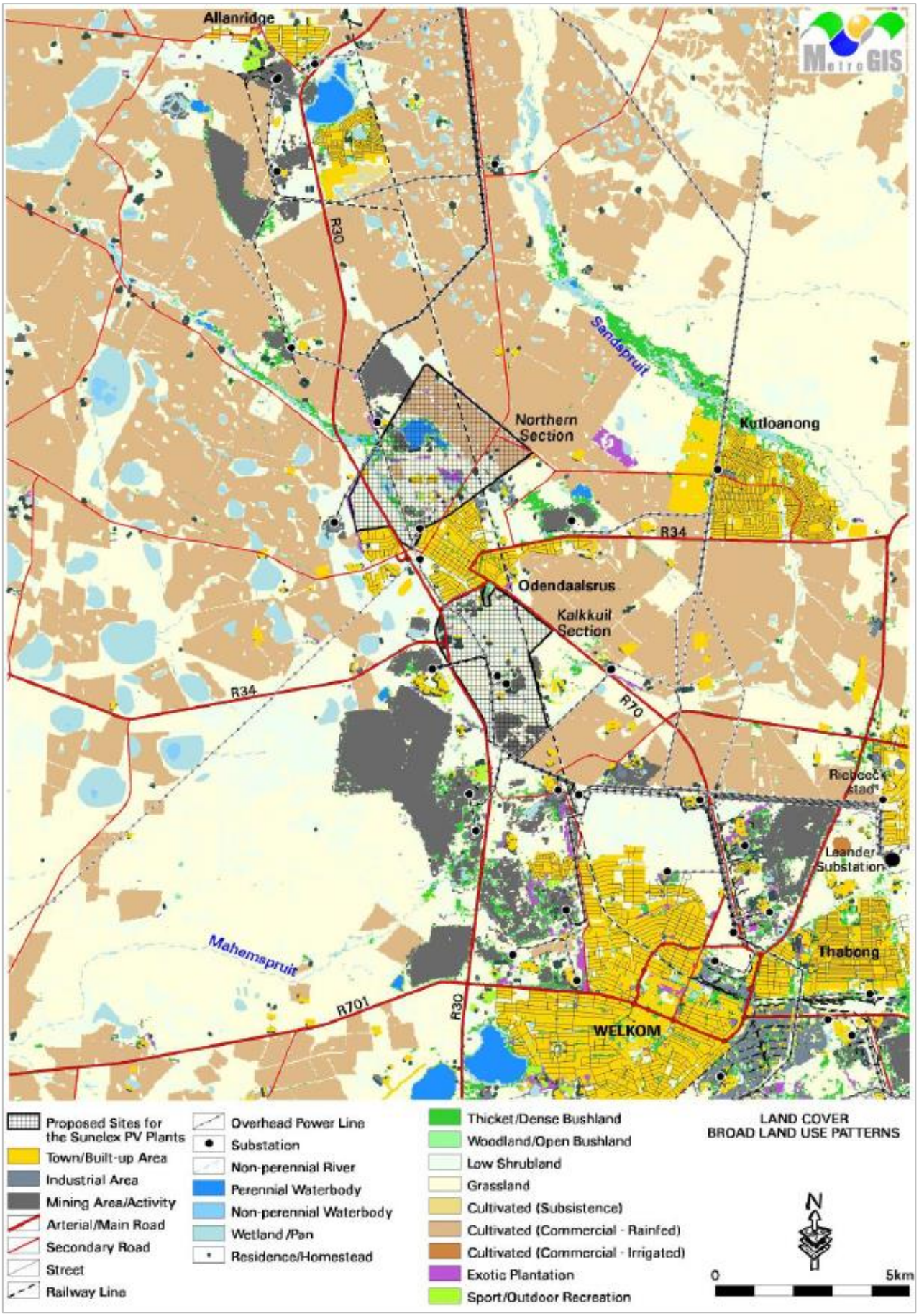


Figure 16: Land cover/land use map (MetroGIS, 2015)

Views of the Phase 1 and Phase 2 Sites, showing areas that are vacant and not affected by previous mining activities, are provided in **Figure 17** and **Figure 18** below, respectively.

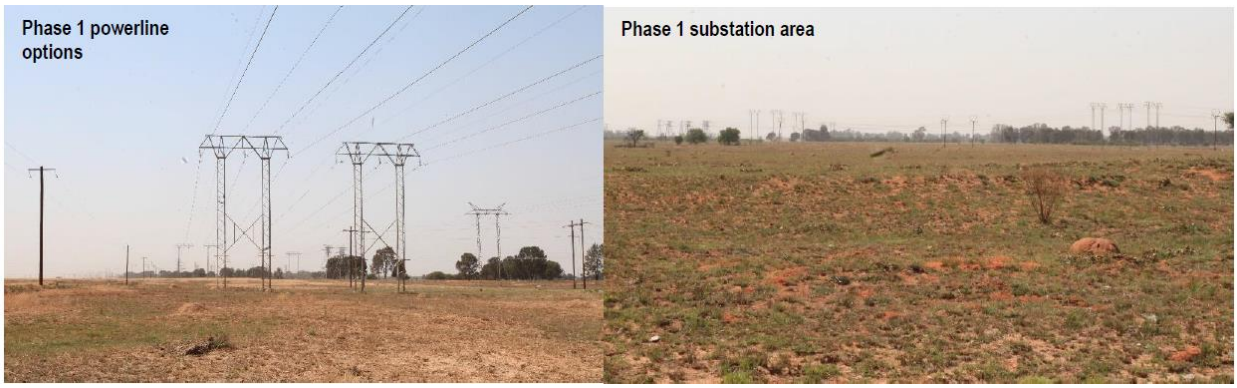


Figure 17: General view of the proposed Phase 1 Power Line route and substation site (SAS, 2020)

Figure 18: General view of the proposed Phase 2 Power Line route (SAS, 2020)

Further details of the agricultural land use in the project area are contained in the Agricultural Impact Assessment (contained in **Appendix G4**).

12.3 Climate

Rainfall for the area is given as 505 mm per annum with a standard deviation of 115 mm according to the South African Rain Atlas (Water Research Commission, undated). The average monthly distribution of rainfall is shown in **Table 6** below. Local thunderstorms and showers are responsible for most of the precipitation during the summer, from October to March and peaking in January. Hail is sometimes associated with the thunderstorms and mainly occurs in the early summer from October to January with its highest frequency in December.

Table 6: Average monthly rainfall (mm) for the site (27° 47' S 26° 44' E) in mm (Water Research Commission, undated)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Tot
77	70	70	42	18	7	5	8	21	46	65	74	**505**

The proposed Project area falls within class 4 (C4) in terms of moisture availability (see **Table 7** below).

Table 7: The classification of moisture availability climate classes for summer rainfall areas across South Africa (Agricultural Research Council, Undated)

Climate class	Moisture availability (Rainfall/0.25 PET)	Description of agricultural limitation
C4	12-18	Moderate to severe

The dominant wind direction is north-easterly. The Weather Bureau has supplied information which indicates that wind speeds of up to 17 m/s can occur (annual frequency of 4 per 100). Generally, however, wind speeds do not exceed 6m/s. The highest wind velocities (on a monthly basis) are generally associated with westerly and north-westerly winds.

The winds are seldom high over the central interior but gust winds of more than 100 km/h associated with thunderstorms can occur. Moderate to fresh winds (30 - 50 km/h) usually occur with the passing of cold fronts. The area is known locally for dust storms with wind velocities capable of lifting the soil off the lands that have been prepared for summer crop cultivation. (5 m/s = 18 km/h = 9.7 knots).

According to Airshed (2015), the annual maximum, minimum and mean temperatures are given as 24°C, 10°C and 17°C, respectively, based on the long-term record. Average daily maximum temperatures range from 29°C in January to 17°C in June, with daily minima ranging from 17°C in January to 2°C in June and July. Sunshine duration in summer is about 60%.

12.4 Geology and Geohydrology

The information to follow was obtained from the Desktop Paleontological Assessment (Banzai Environmental, 2020) (contained in **Appendix G6**). Refer to **Sections 13.8** for a synopsis of the study.

The surface geology of the proposed Matjhabeng PV Solar grid connection is depicted on the 1:25 000 2726 Kroonstad (2000) Geological Map (Council for Geosciences). The Phase 1 and Phase 2 Power Lines are primarily underlain by Caenozoic Superficial Sediments as well as the Bothaville Formation (Ventersdorp Supergroup, Ecca Group, Karoo Supergroup) in the north of Phase 2 (see **Figure 19** below).

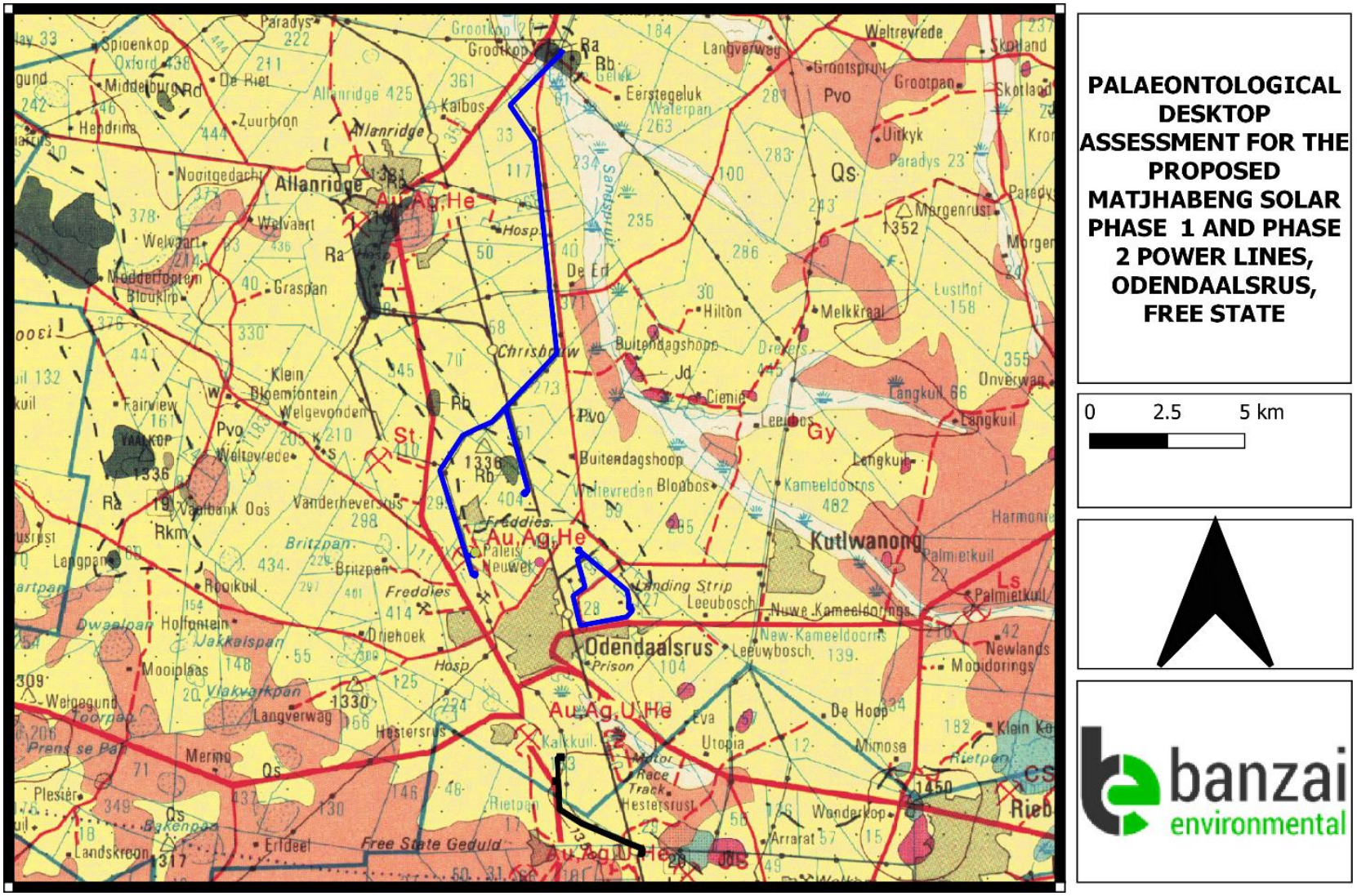
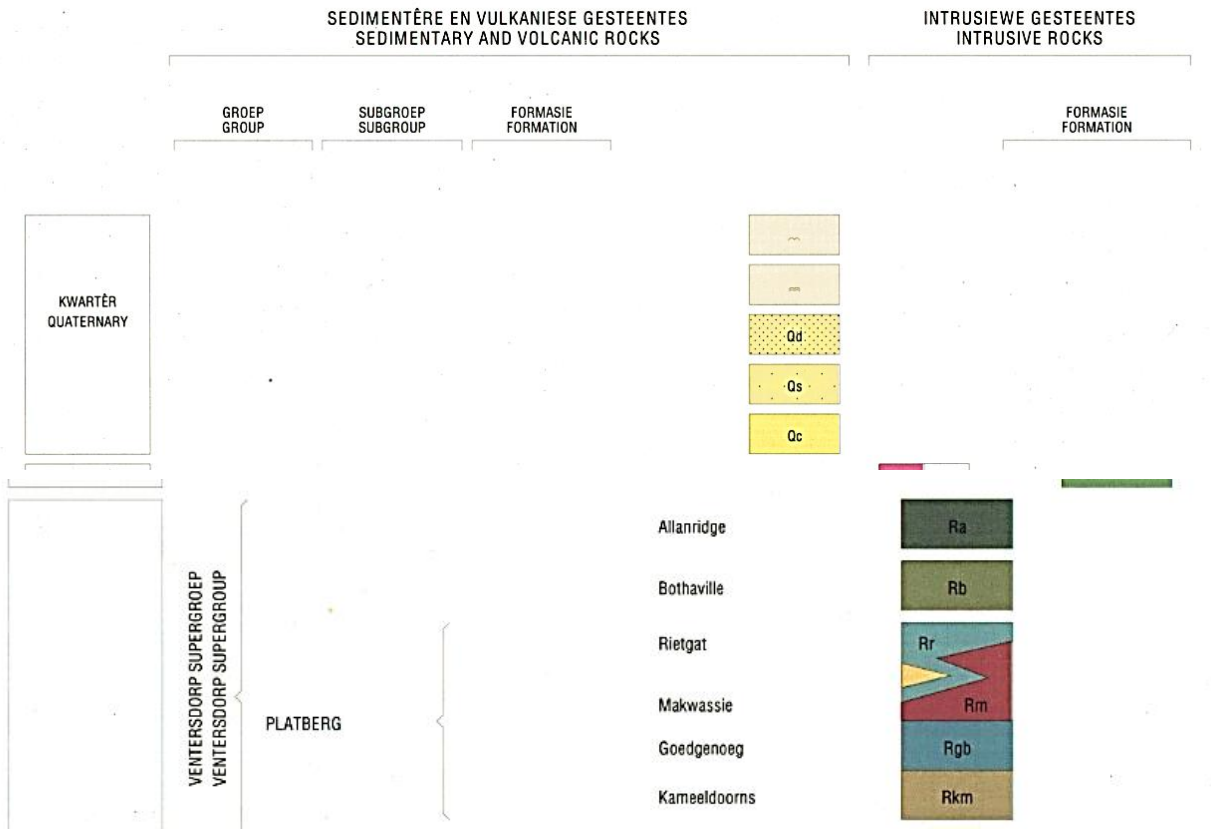


Figure 19: **Extract of the 1:250 000 2724 Kroonstad Geological Map (Council of Geoscience) indicating the proposed development.**
Surface geology indicates that the development footprint is underlain by the Late Cenozoic Superficial Sediments as well as a small portion of the Bothaville Formation (Ventersdorp Supergroup, Ecca Group, Karoo Supergroup). The grid connection of Phase 1 is indicated in black and Phase 2 in blue. (Banzai Environmental, 2020)



Legend to Map and short explanation.
Qs -Yellow - Quaternary Superficial Sediments- aeolian sand
Rb- Dark Green- Quartzite Conglomerate and greywacke

Mining activity

Au	Gold
Ag	Silwer
U	Uranium
He	Helium

The Quaternary superficial deposits are the youngest geological deposits formed during the most recent geological period (approximately 2.6 million years ago to present). The rocks and sediments are found at or near the Earth's surface. Most of the superficial deposits are unconsolidated sediments and consist of clay, gravel, sand, silt, that form relatively thin, discontinuous patches of sediments or larger spreads onshore. These sediments comprise of beach sand, channel, floodplain and stream deposits, talus gravels and glacial drift sediments.

The best exposures of the Ventersdorp Supergroup are in the North West Province, Northern Cape Province as well as Gauteng and southern Botswana. This Supergroup consists of the Klipriviersberg Group (oldest) which is overlain by the Platberg Group, followed by the sedimentary Bothaville Formation and the volcanic Allanridge Formation (uppermost Vensterdorp unit, youngest Formation). The Klipriviersberg Group consist of Basic and acid volcanics with subordinate siliciclastic sediments.

The Bothaville formation consists of conglomerate and quartzites. The conglomerates are found at the base of the formation and consists of rounded boulders and pebbles of chert, banded iron formation granite, quarts, quartzite, tuff lava and quarts porphyry of Ventersdorp and older formations. The ancient basement rocks, including the Bothaville Formation, are not known to be fossiliferous.

12.5 Soils

The information to follow was obtained from the Agricultural Impact Assessment (see **Appendix G4**). Refer to **Sections 13.6** and **14.14** for a synopsis of the study and a related impact assessment, respectively.

In general the soils are as follows:

- Deep Aeolian sands on underlying sand and mudstone. A small proportion of these soils are shallow. The clay content is around 10 to 20%, it is yellow or reddish coloured with a grainy structure. The water infiltration rate is high and the water holding capacity low. The dominant soil types are Clovelly and Hutton, with areas where the underlying clayey layers are exposed.
- Most of the land that is cultivated on surrounding farms falls into this group of soils. These soils are highly prone to wind erosion if the vegetation cover is removed. Sandstorms are common during late winter and spring when farmers start ploughing.

12.6 Topography

According to SAS (2020), the local topography of the power lines and associated infrastructure areas consist of flat to slightly undulating plains, with a slope of less than 2%. The power lines and associated infrastructure areas are located on the Highveld and the terrain morphology is described

as Plains and Pans of the Central Interior Plain. The most prominent topographical features are the mine dumps associated with the Harmony Gold Mine, which often dominate the skyline

12.7 Surface Water

The information to follow was obtained from the Water Resources Impact Assessment (see **Appendix G1**). Refer to **Sections 13.3** and **14.11** for a synopsis of the study and a related impact assessment, respectively.

12.7.1 Catchments

The watercourses associated with the Phase 1 development are located in the C43B quaternary catchment, within the Vaal Water Management Area (WMA). The Phase 2 development is located in the C25B quaternary catchment. The relevant Sub-Quaternary Reaches (SQRs) are the C43B-2578, and C25B-2337 and C25B-2423, for Phase 1 and Phase 2, respectively.

12.7.2 National Freshwater Ecosystem Priority Area Status

The National Freshwater Ecosystem Priority Areas (NFEPA) database forms part of a comprehensive approach for the sustainable and equitable development of South Africa's scarce water resources. This database provides guidance on how many rivers, wetlands and estuaries, and which ones, should remain in a natural or near-natural condition to support the water resource protection goals of the NWA.

According to Nel *et al*. (2011), in the Phase 1 project area one partial FEPA wetland can be found in the 500 m regulated area, while in the Phase 2 project area no FEPA wetlands can be found (refer to **Figure 20** and **Figure 21** below).

12.7.3 Sub Quaternary Reaches

The desktop Present Ecological Status (PES) of the Sand River tributary SQR associated with the Phase 1 Site was undefined, however the nearest classed SQR with similar land use was used for desktop data. This SQR was a class E or seriously modified in 2014, this has further been affected and in 2018 was classified as a class F. The seriously modified state of each reach is attributed to large to serious impacts to instream habitat, wetland and riparian zone continuity, flow modifications and serious potential impacts on physico-chemical conditions (water quality). The factors influencing the current PES status for the catchment include urban area and associated land use activities, industrial and mining activities, irrigation, road network, slimes dams, wastewater treatment works and return flows, alien vegetation, instream weirs and dams.

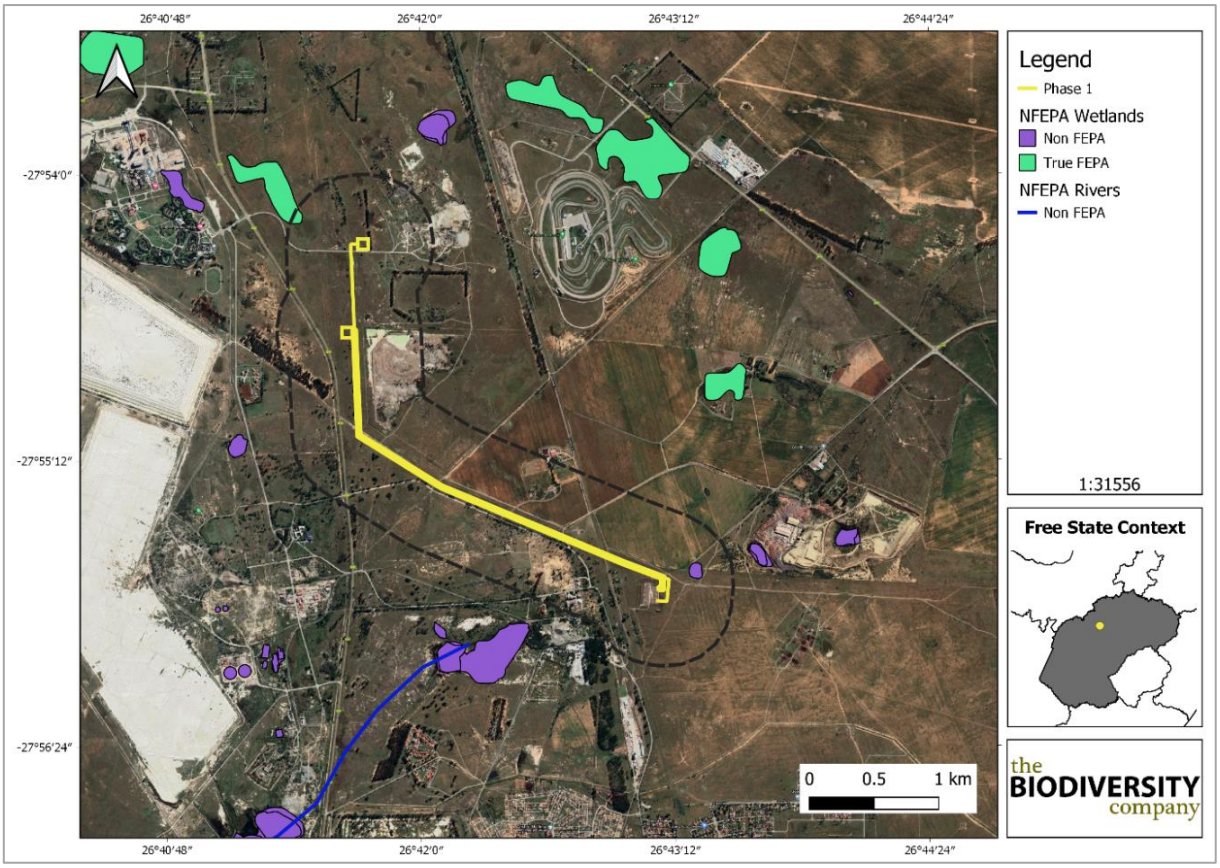


Figure 20: Phase 1 in relation to NFEPAs (TBC, 2020a)

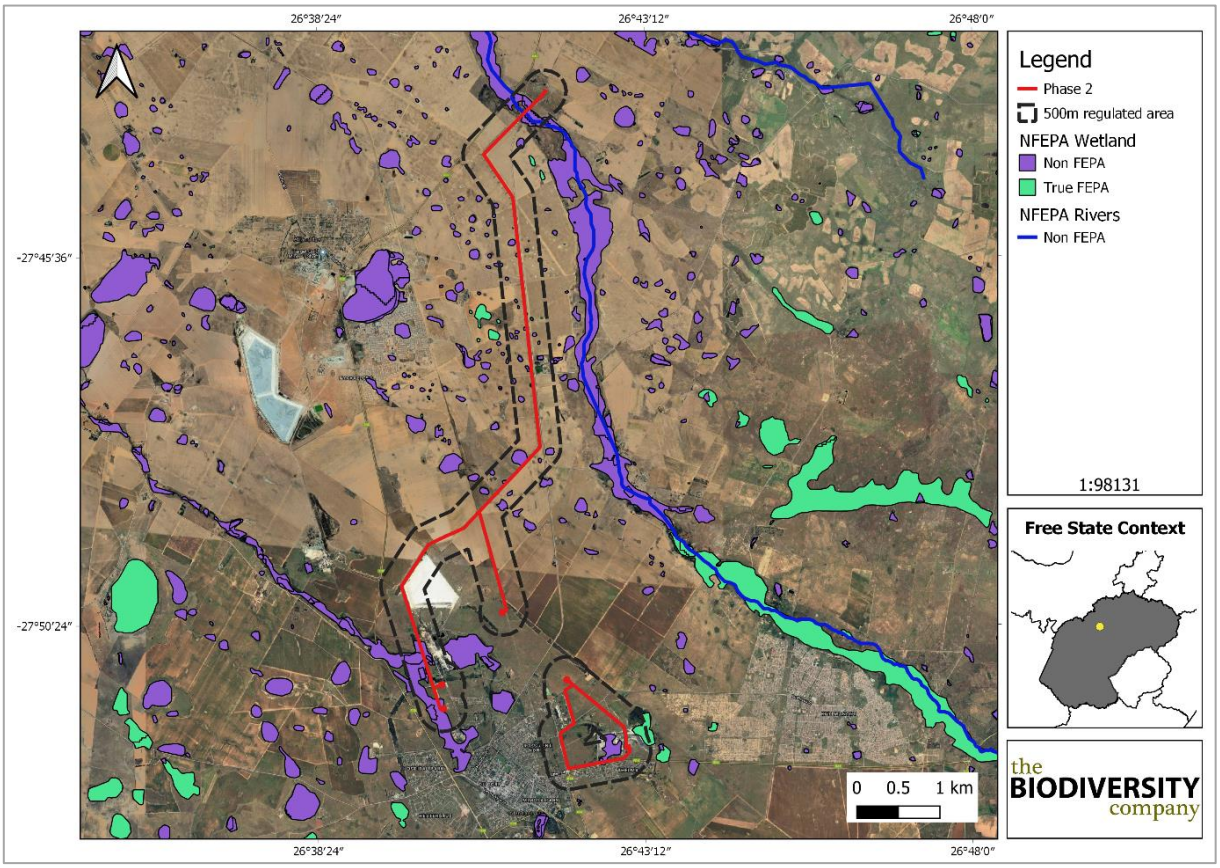


Figure 21: Phase 2 Site in relation to NFEPAs (TBC, 2020a)

The two Sandspruit SQRs associated with the Phase 2 Site were classified as class C in 2014 and in 2018 when the classification was reassessed it was still a class C. The ecological importance and sensitivity of the river reaches were all rated as moderate. The moderately modified state of each reach is attributed to small to large impacts to instream habitat, wetland and riparian zone continuity, flow modifications and large potential impacts on physico-chemical conditions (water quality). The factors influencing the current PES status for the catchment includes road network, degraded lands, human settlements, wastewater treatment works and return flows, and agricultural activities.

12.7.4 Spatially Sensitive Mapping

According to the National Web based Environmental Screening Tool the combined aquatic biodiversity for the area of Phase 1 is classified as having mostly a low sensitivity rating (see **Figure 22** below) while the combined aquatic biodiversity for the area of Phase 2 is classified as having mostly a low sensitivity rating, with small areas classified as very high sensitivity (see **Figure 23** below).

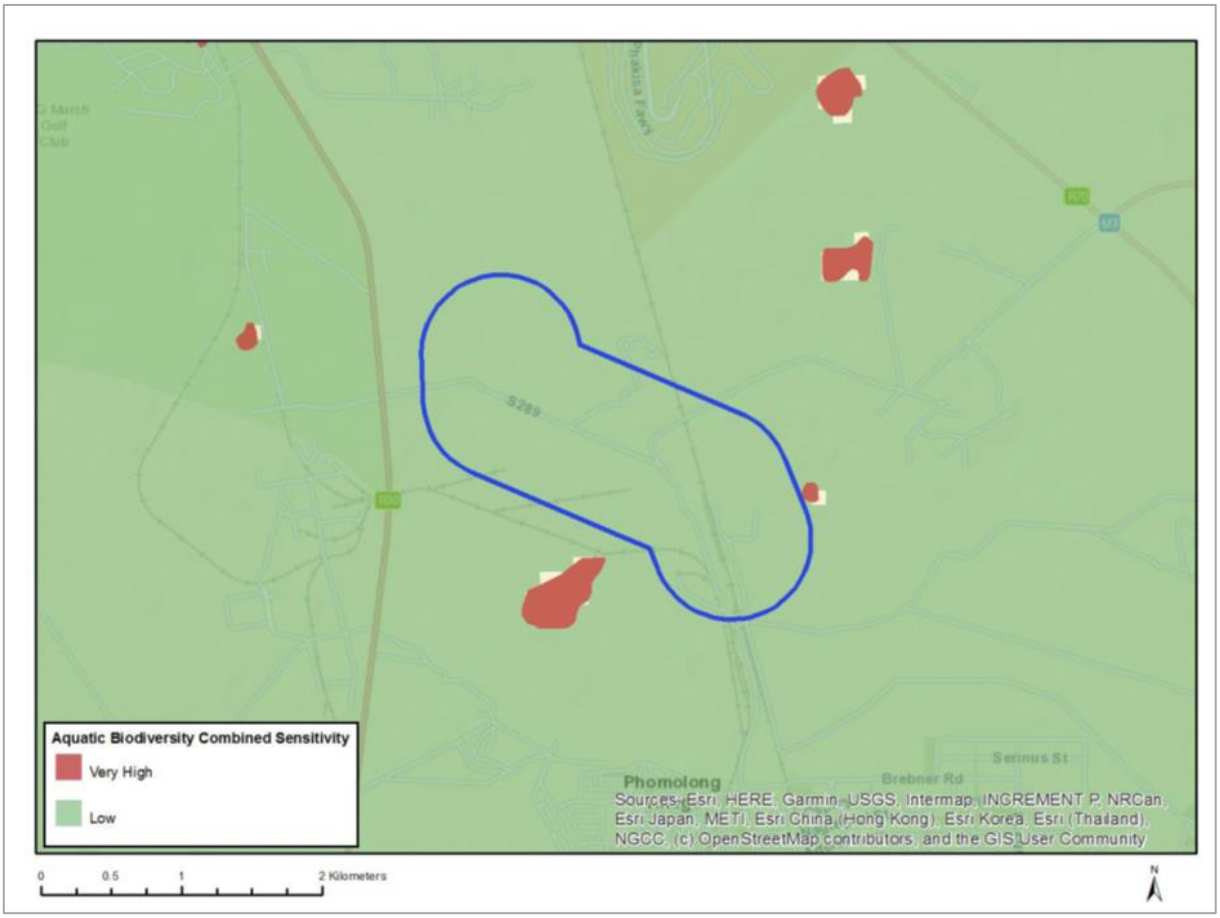


Figure 22: Aquatic Theme Biodiversity Combined Sensitivity of Phase 1 (National Web based Environmental Screening Tool) (TBC, 2020a)

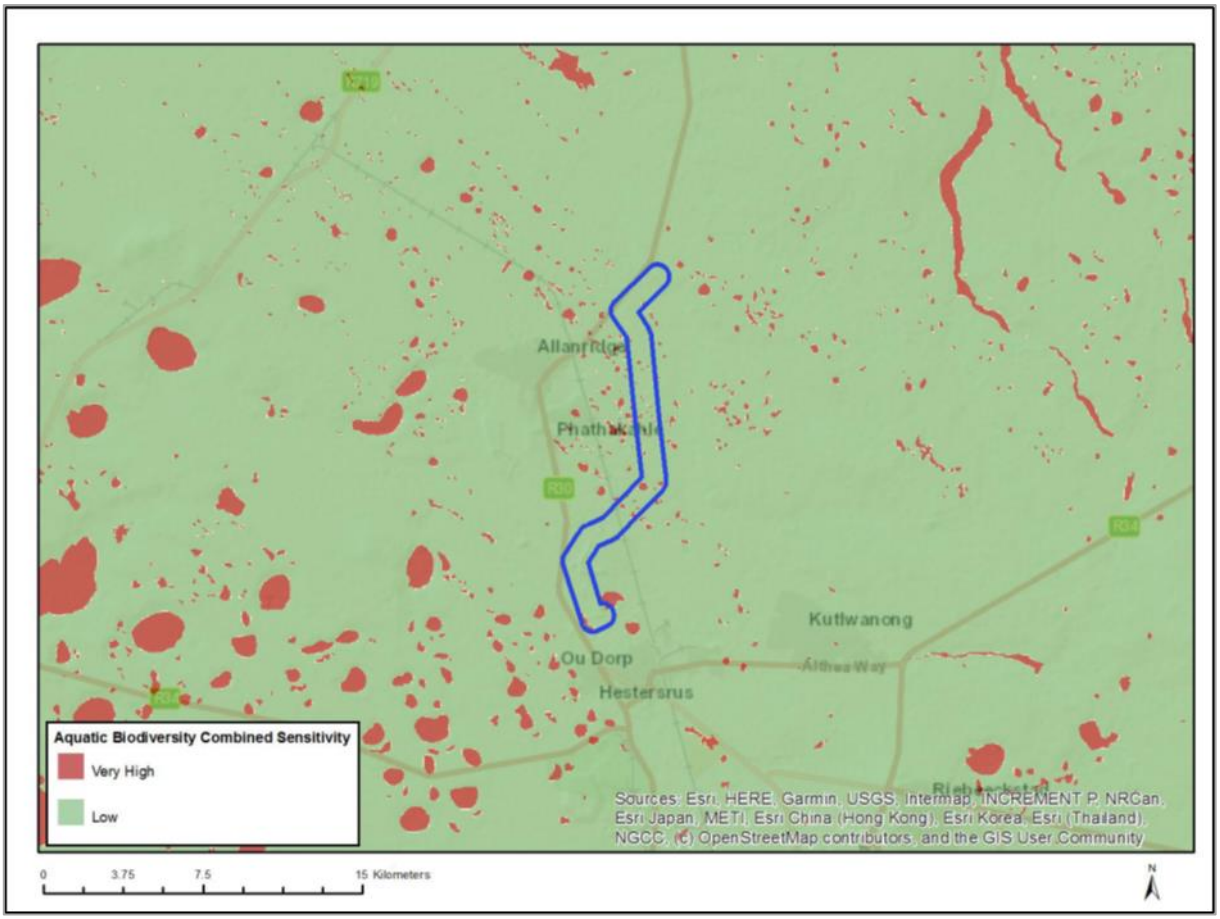


Figure 23: **Aquatic Theme Biodiversity Combined Sensitivity of Phase 2 (National Web based Environmental Screening Tool) (TBC, 2020a)**

Given the extent of wetlands within the project footprint, it is recommended that the wetland sensitivities be considered jointly with the aquatic sensitivities as these systems are interconnected in a hydrological sense.

12.7.5 National Biodiversity Assessment Wetlands and Rivers

This spatial dataset is part of the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) which was released as part of the National Biodiversity Assessment (NBA), 2018. National Wetland Map 5 includes inland wetlands and estuaries, associated with river line data and many other data sets within the SAIIAE 2018.

Figure 24 and **Figure 25** below show the ecosystem threat status as follows:

- Phase 1 - LC wetland; and
- Phase 2 - CR wetland in the south of the project area and a CR river in the north of the project area.

Figure 26 and **Figure 27** below show the protection level as follows:

- Phase 1 - Poorly protected wetlands; and

❖ Phase 2 – Not protected and poorly protected wetlands and poorly protected Sandspruit River.

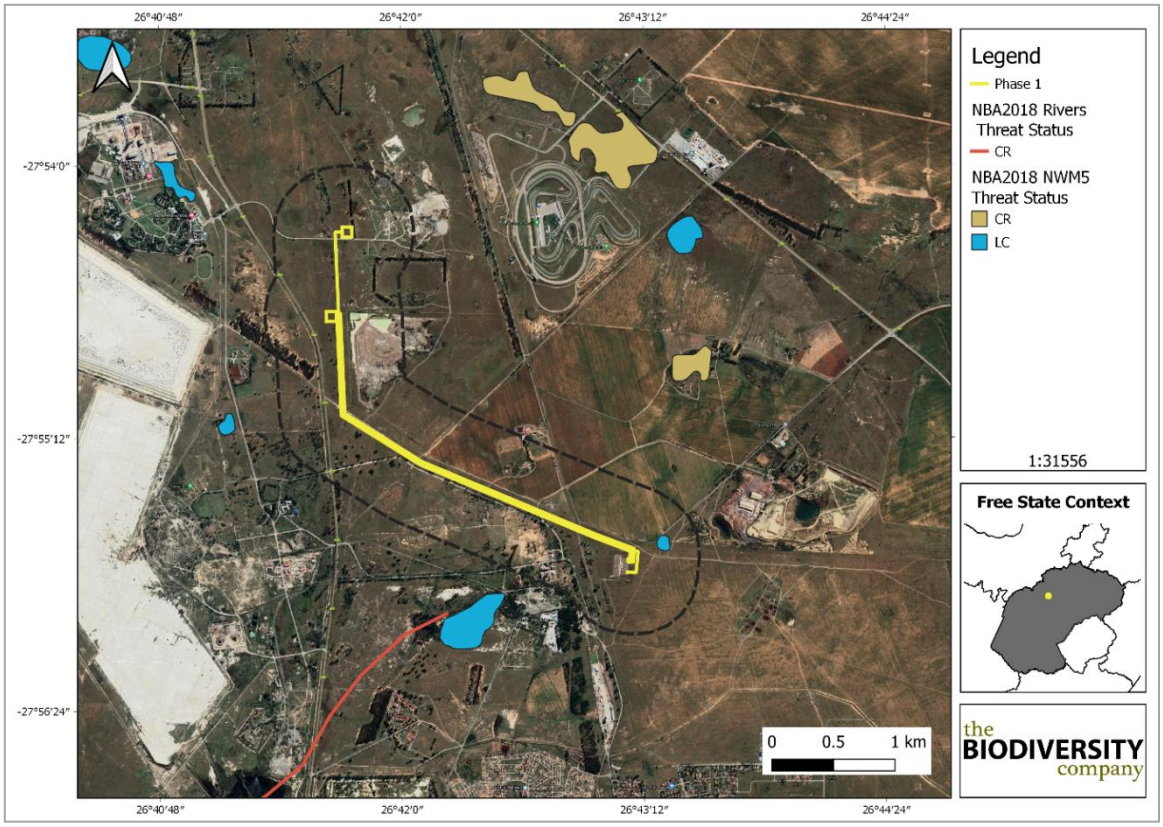


Figure 24: **Phase 1 in relation to the wetlands and rivers threat status (NBA, 2018) (TBC, 2020a)**

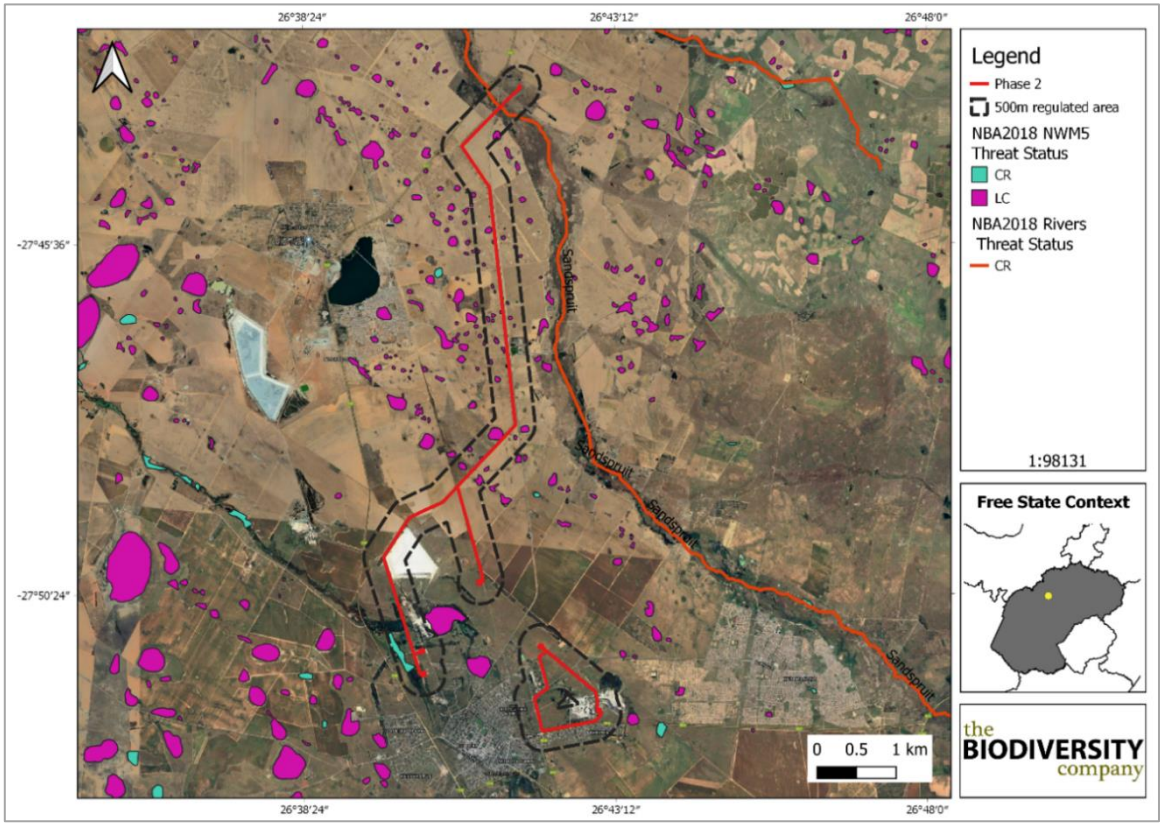


Figure 25: **Phase 2 Site in relation to wetlands & rivers threat status (NBA, 2018) (TBC, 2020a)**

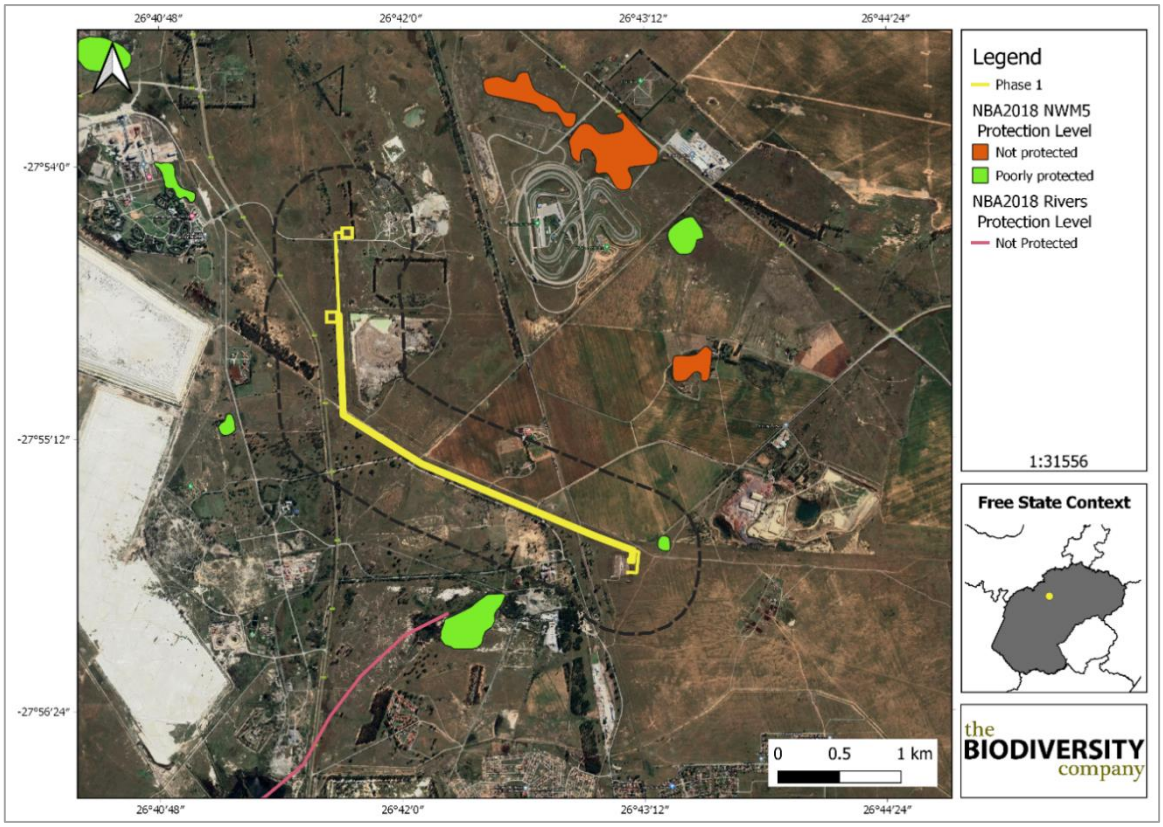


Figure 26: **Phase 1 Site in relation to wetlands & rivers protection level (NBA, 2018) (TBC, 2020a)**

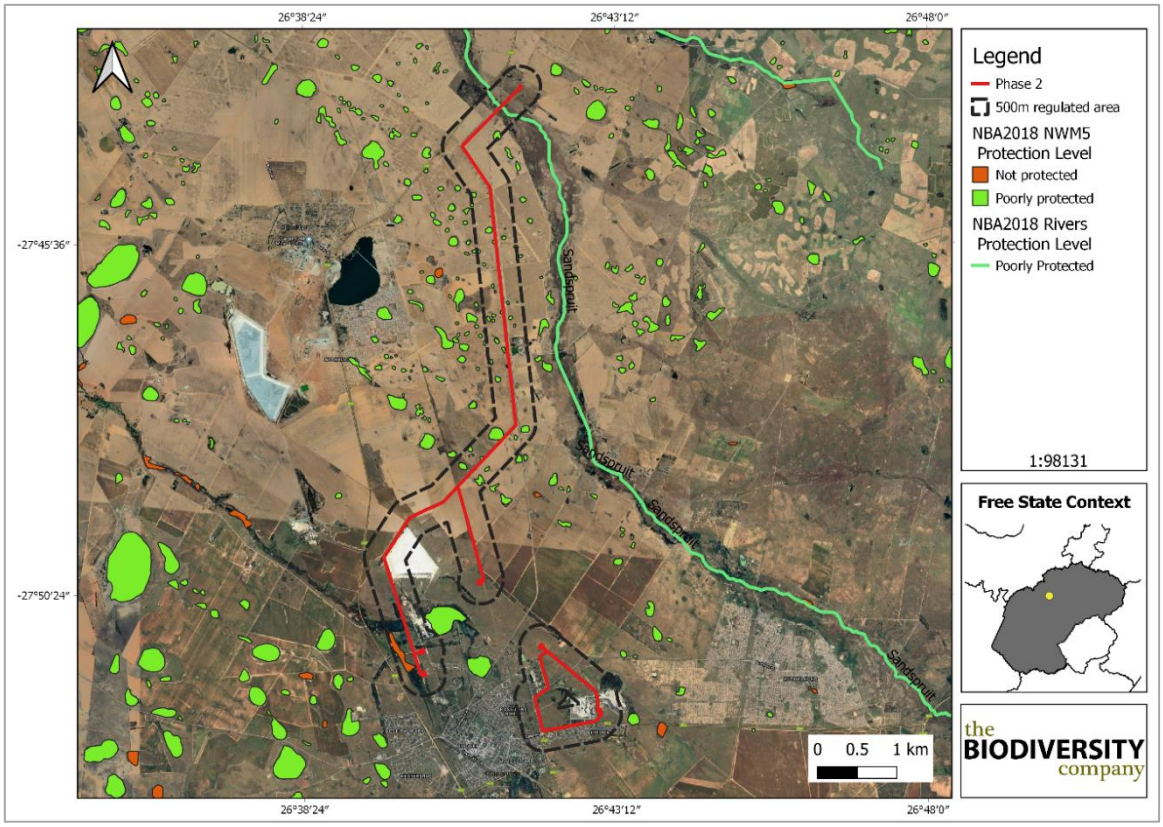


Figure 27: **Phase 2 Site in relation to wetlands & rivers protection level (NBA, 2018) (TBC, 2020a)**

12.7.6 Inland Water

The quarter degree data for the inland waters sets for the quarter degree square “2726” was applied to the 500m regulated area of the Phase 1 and Phase 2 project areas (see **Figures x** and **y** below).

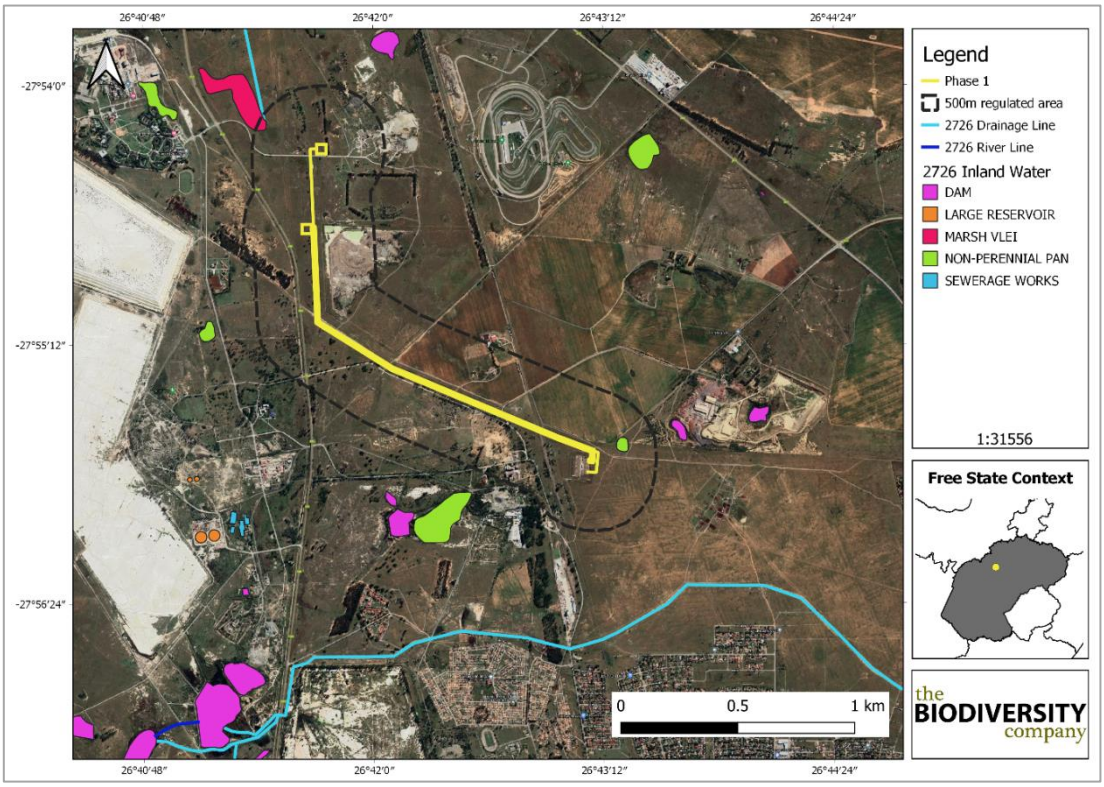


Figure 28: Phase 1 Site in relation to inland water data (TBC, 2020a)

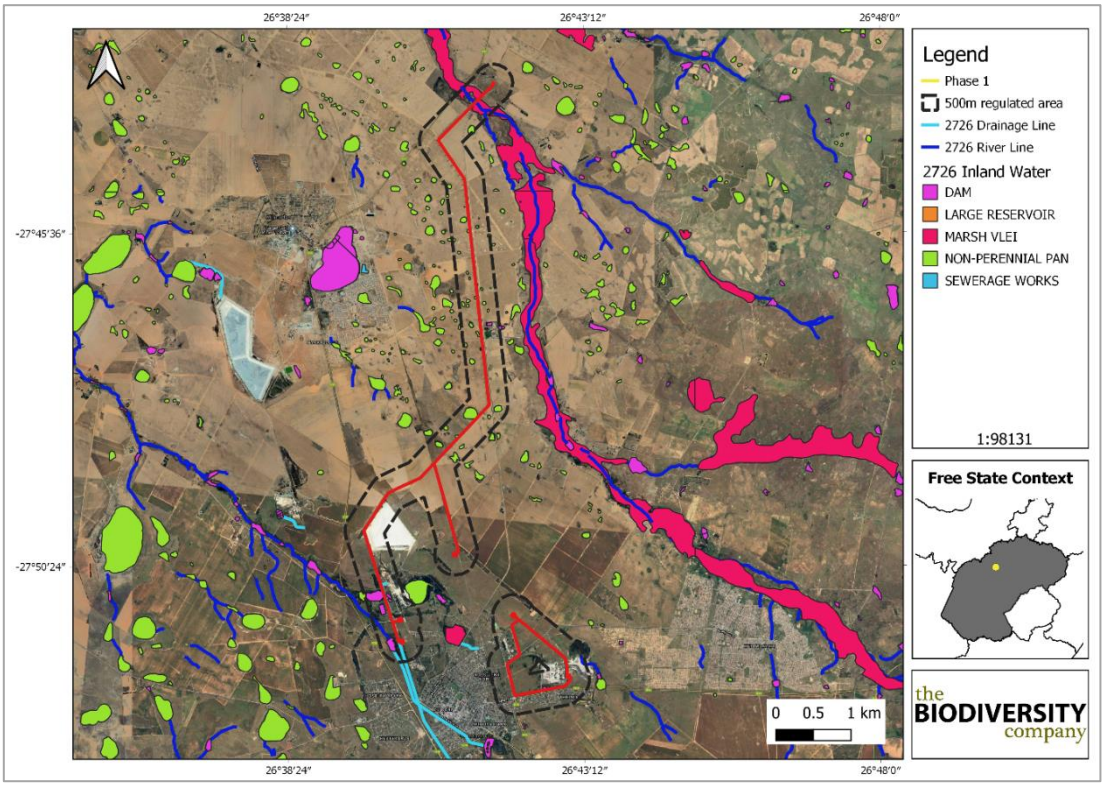


Figure 29: Phase 2 Site in relation to inland water data (TBC, 2020a)

The Phase 1 project area's 500 m regulated overlaps with a non-perennial pan, small portion of a marsh vlei and the end of a drainage line (see **Figure 28** above). Phase 2's 500 m regulated area overlaps with a dam, a number of non-perennial dams, a marsh vlei, sewage works and both drainage lines and river lines (see **Figure 29** above).

12.8 Flora & Fauna

The information to follow was sourced from the Terrestrial Ecology Assessment (see **Appendix G2**). Refer to **Sections 13.4** and **14.12** for a synopsis of the study and a related impact assessment, respectively.

12.8.1 Free State Biodiversity Conservation Plan

A Critical Biodiversity Areas (CBA) is considered a significant and ecologically sensitive area and needs to be kept in a pristine or near-natural state to ensure the continued functioning of ecosystems (SANBI, 2017). A CBA represents the best choice for achieving biodiversity targets. Ecological Support Areas (ESAs) are not essential for achieving targets, but they play a vital role in the continued functioning of ecosystems and often are essential for proper functioning of adjacent CBAs.

According to the Free State Biodiversity Conservation Plan, the proposed project area encroaches into the following areas:

- Phase 1 Site (shown in **Figure 30** below) –
  - ESA 1;
  - Degraded and
  - Other.
- Phase 2 Site (shown in **Figure 31** below) –
  - CBA1;
  - ESA1;
  - ESA2;
  - Other; and
  - Degraded.

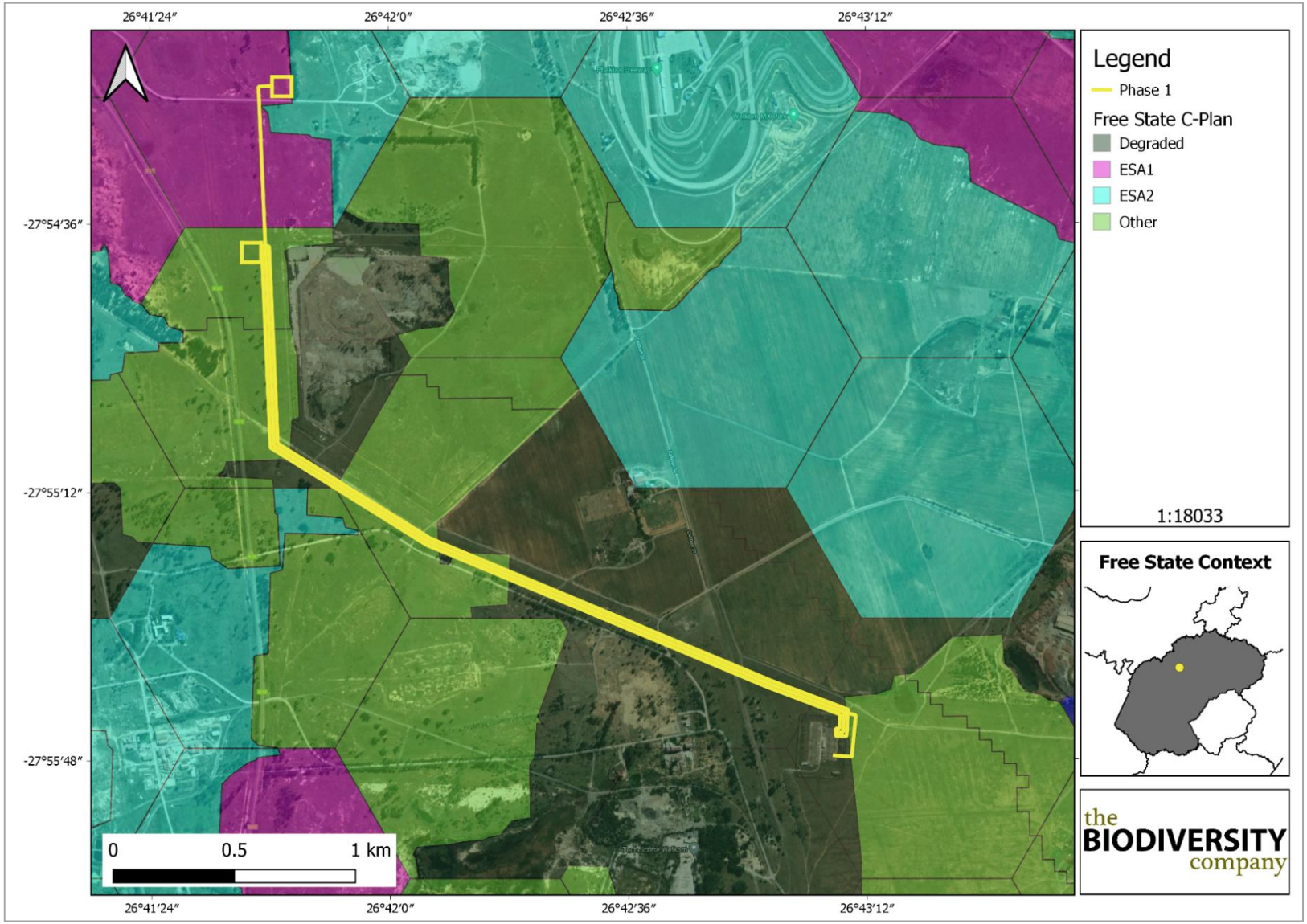


Figure 30: **Phase 1 superimposed on the Free States' Biodiversity Conservation Plan (TBC, 2020b)**

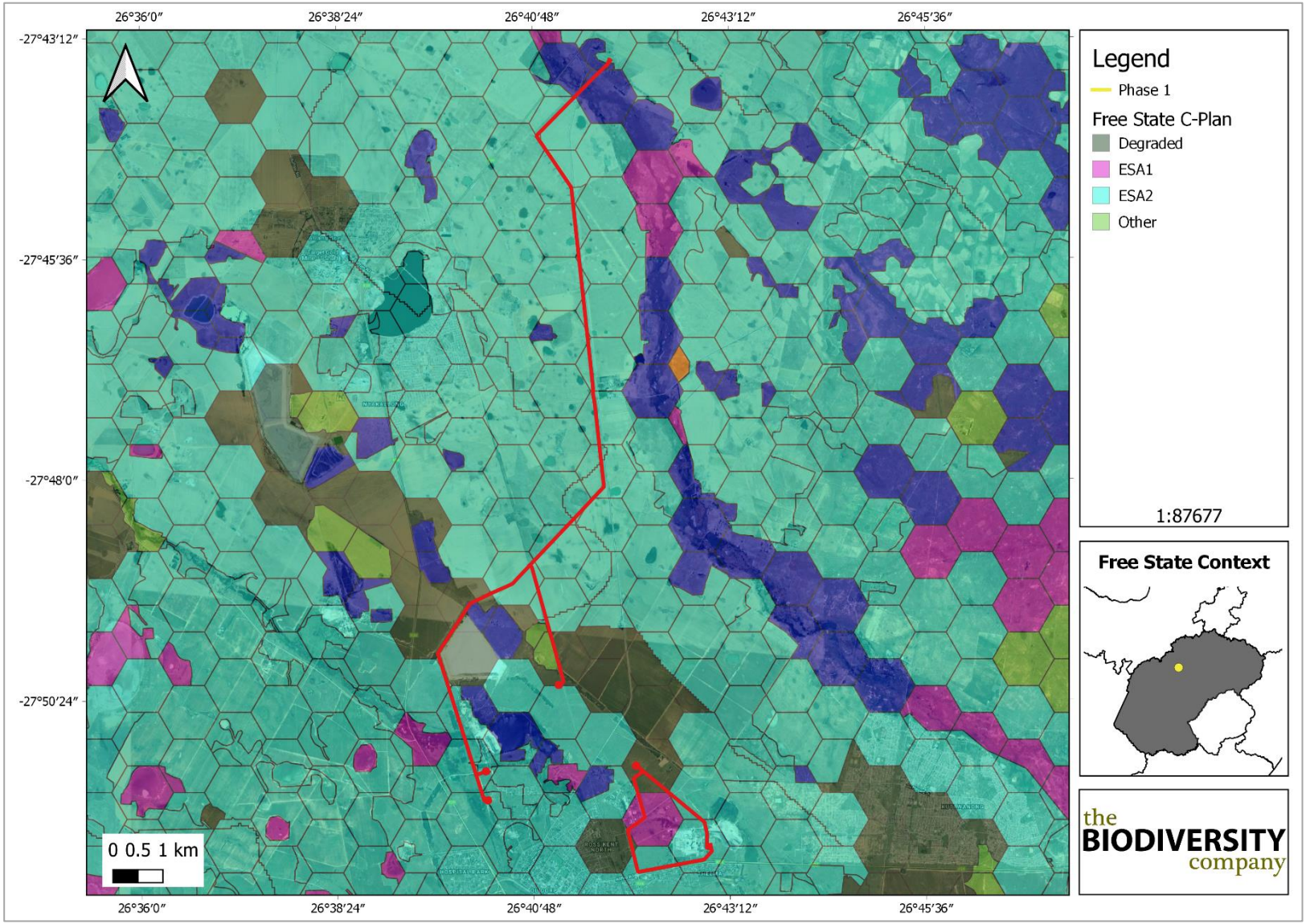


Figure 31: **Phase 2 superimposed on the Free States' Biodiversity Conservation Plan (TBC, 2020b)**

12.8.2 The National Biodiversity Assessment

The purpose of the National Biodiversity Assessment (NBA) is to assess the state of South Africa's biodiversity with a view to understanding trends over time and informing policy and decision-making across a range of sectors (Skowno *et al*., 2019). The two headline indicators assessed in the NBA are *ecosystem threat status* and *ecosystem protection level* (Skowno *et al*., 2019).

12.8.2.1 Ecosystem Threat Status

Ecosystem threat status outlines the degree to which ecosystems are still intact or alternatively losing vital aspects of their structure, function and composition, on which their ability to provide ecosystem services ultimately depends (Skowno *et al*., 2019). Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Concerned (LC), based on the proportion of each ecosystem type that remains in good ecological condition (Skowno *et al*., 2019).

The project area was superimposed on the terrestrial ecosystem threat status (shown in **Figure 32** below). Phase 1 is situated within an ecosystem that is listed as LC, while Phase 2 includes areas listed as EN and LC.

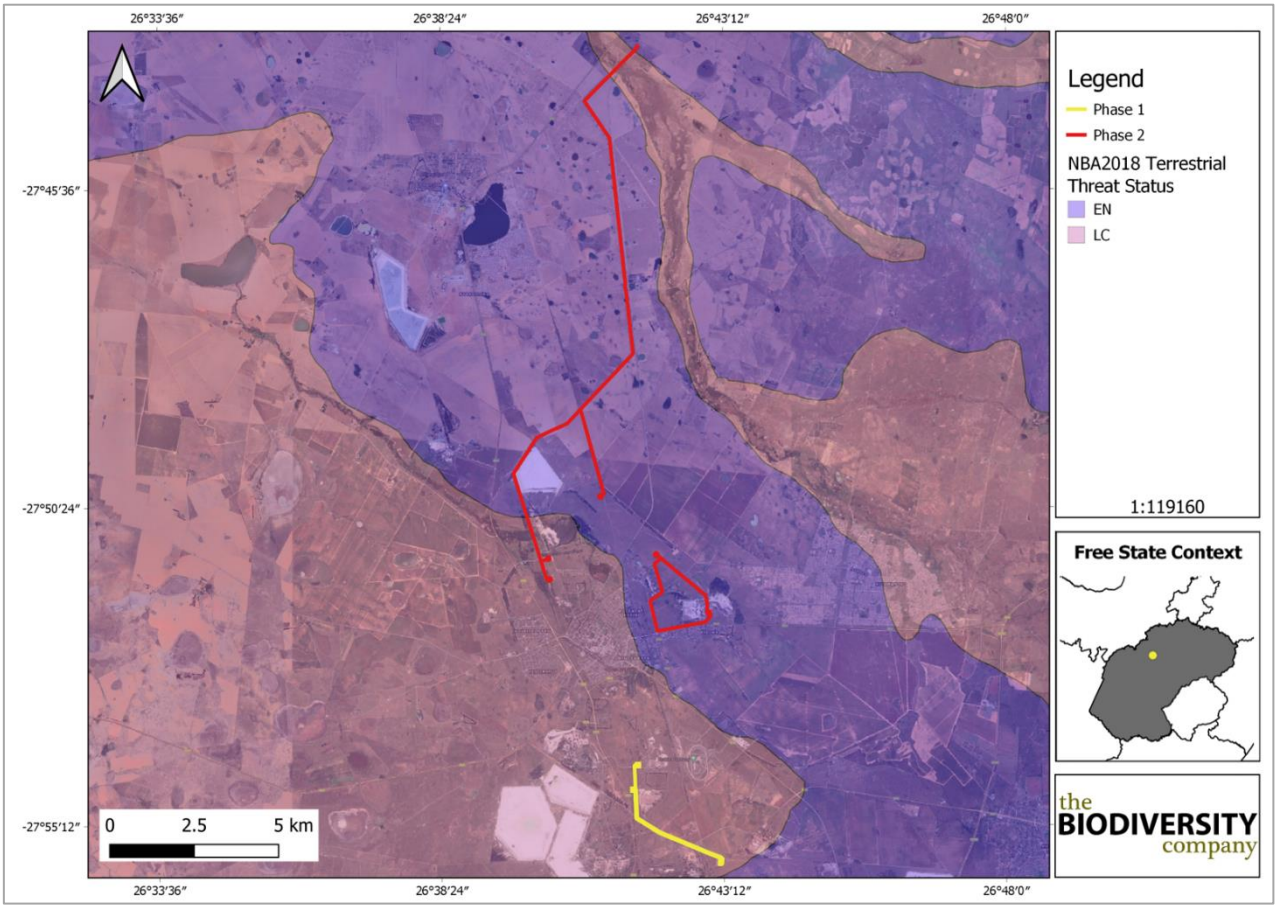


Figure 32: Regional ecosystem threat status of the associated terrestrial ecosystems (NBA, 2018) (TBC, 2020b)

12.8.2.1 Ecosystem Protection Level

Ecosystem protection level tells us whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as not protected, poorly protected, moderately protected or well protected, based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act (Skowno *et al*., 2019).

Based on **Figure 33** the terrestrial ecosystems associated with Phase 1 are rated as Poorly Protected and the protection level associated with Phase 2 is rated as Not Protected and Poorly Protected. This means that these ecosystems are considered not to be adequately protected in areas such as national parks or other formally protected areas.

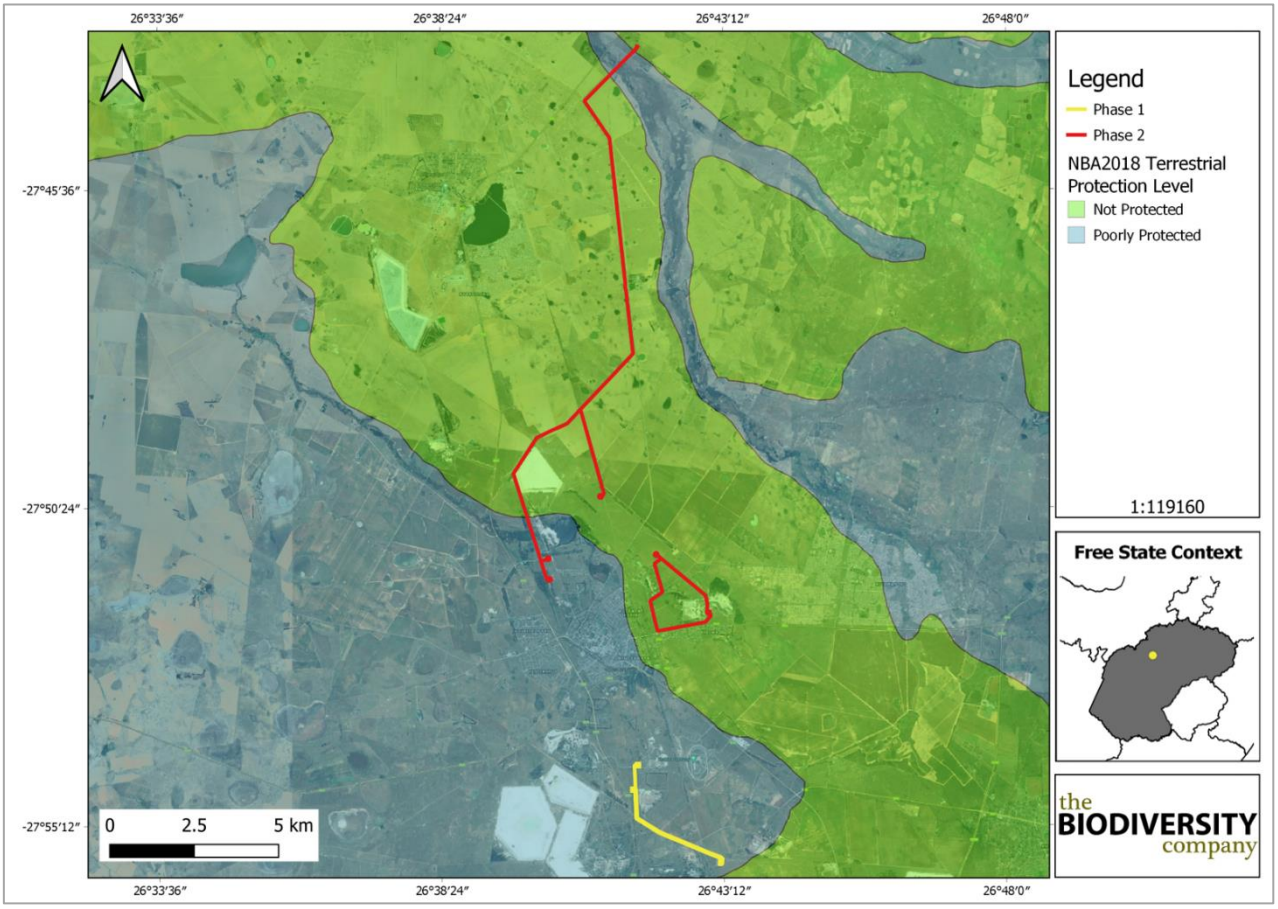


Figure 33: Regional level of protection of terrestrial ecosystems (NBA, 2018) (TBC, 2020b)

12.8.3 Flora

12.8.3.1 Biomes

The Phase 1 Site is situated within the grassland biome, while the Phase 2 Site falls in the grassland and azonal vegetation. The grassland biome is centrally located in southern Africa, and adjoins all except the desert, fynbos and succulent Karoo biomes (Mucina & Rutherford, 2006).

Grasslands are dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. The grassland biome experiences summer rainfall and dry winters with frost (and fire), which are unfavourable for tree growth. Thus, trees are typically absent, except in a few localized habitats. Geophytes (bulbs) are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees.

The Azonal vegetation is formed in and around flowing and stagnant freshwater bodies. Habitats with high levels of salt concentration form a highly stressed environment for most plants and often markedly affect the composition of plant communities. Invariably, both waterlogged and salt-laden habitats appear as 'special', deviating strongly from the typical surrounding zonal vegetation. They are considered to be of azonal character.

12.8.3.2 Vegetation Types

The grassland biome comprises many different vegetation types. The Phase 1 project area is situated in the Western Free State Clay Grassland, while the Phase 2 project area is situated within the Western Free State Clay Grassland, Vaalvet Sandy Grassland and the Highveld Alluvial Vegetation types according to SANBI (2018) (see **Figure 34** below).

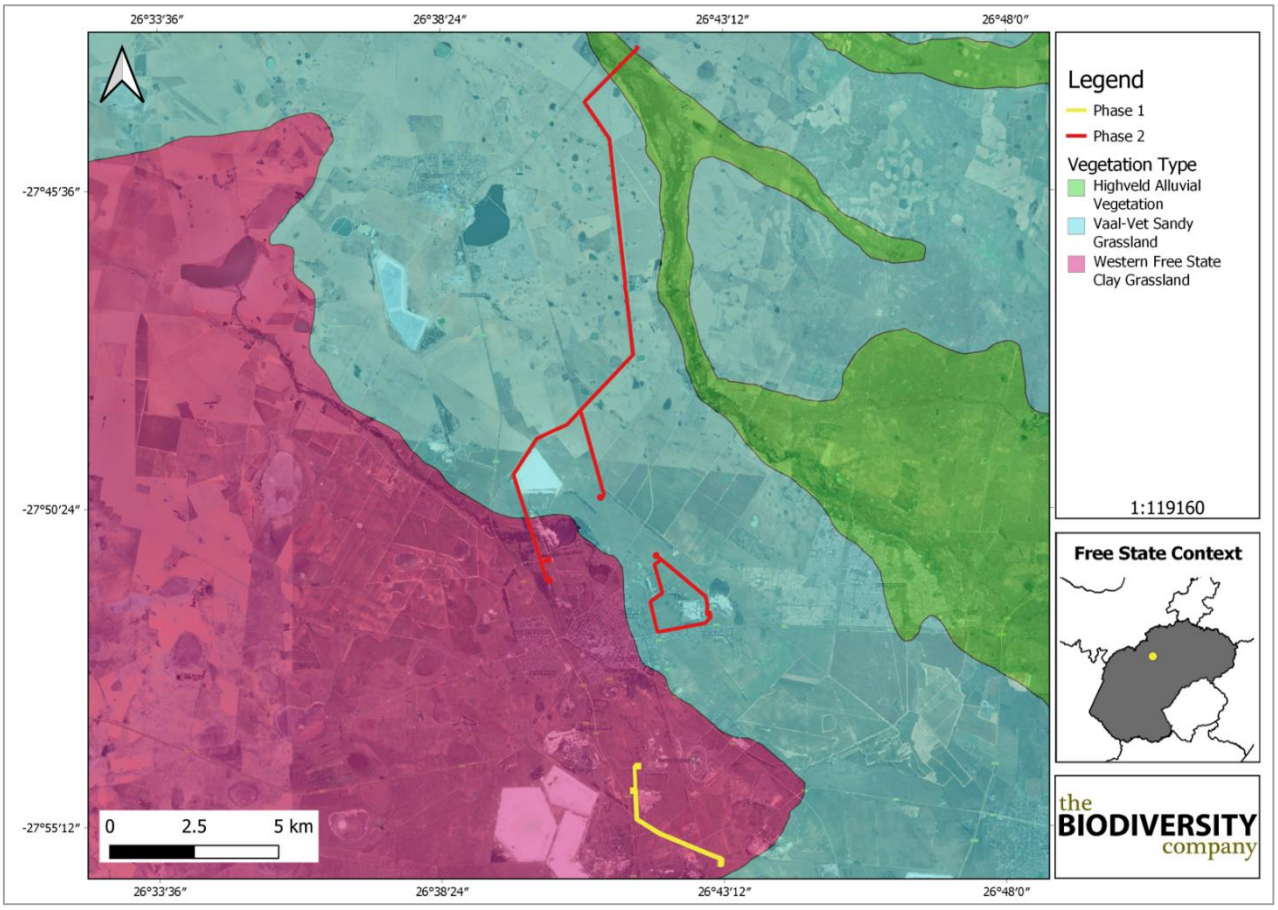


Figure 34: Vegetation types in the Project Area (BGIS, 2018) (TBC, 2020b)

12.8.3.1 Plant Species of Conservation Concern

Based on the Plants of Southern Africa (BODATSA-POSA, 2019) database, 515 plant species have the potential to occur in the Project area and its surroundings. Of these, one (1) species is listed as being Species of Conservation Concern (SCC), namely *Brachystelma dimorphum* subsp. *gratum*. This is a highly endemic species with one known area of occurrence, which is the salt clay pans surrounding Welkom. This CR species is threatened by habitat degradation due to urban and industrial expansion, mining, agriculture, alien invasive plants and pollution.

12.8.4 Fauna

12.8.4.1 Avifauna

The information contained in this sub-section was sourced from the Avifaunal Assessment (see **Appendix G3**). Refer to **Sections 13.5** and **14.13** for a synopsis of the study and a related impact assessment, respectively.

Important Bird and Biodiversity Area

Important Bird & Biodiversity Areas (IBAs) are the sites of international significance for the conservation of the world's birds and other conservation significant species as identified by BirdLife International. These sites are also all Key Biodiversity Areas; sites that contribute significantly to the global persistence of biodiversity (Birdlife, 2017).

The Project areas is approximately 60 km from both the Sandveld and Bloemhof Dam Nature Reserve IBA and the Willem Pretorius Game Reserve IBA.

Coordinated Avifaunal Roadcount (CAR)

The ADU/Cape bird club pioneered avifaunal roadcount of larger birds in 1993 in South Africa. Originally it was started to monitor the Blue Crane *Anthropoides paradiseus* and Denham's/Stanley's Bustard *Neotis denhami*. Today it has been expanded to the monitoring of 36 species of large terrestrial birds (cranes, bustards, korhaans, storks, Secretarybird and Southern Bald Ibis) along 350 fixed routes covering over 19 000 km.

Twice a year, in midsummer (the last Saturday in January) and midwinter (the last Saturday in July), roadcounts are carried out using this standardised method. These counts are important for the conservation of these larger species that are under threat due to loss of habitat through changes in land use, increases in crop agriculture and human population densities, poisoning as well as man-made structures like power lines. With the prospect of wind and solar farms to increase the use of renewable energy sources, monitoring of these species is most important (CAR, 2020). **Figure 35** below shows that Phase 2 lies adjacent to one of the routes.

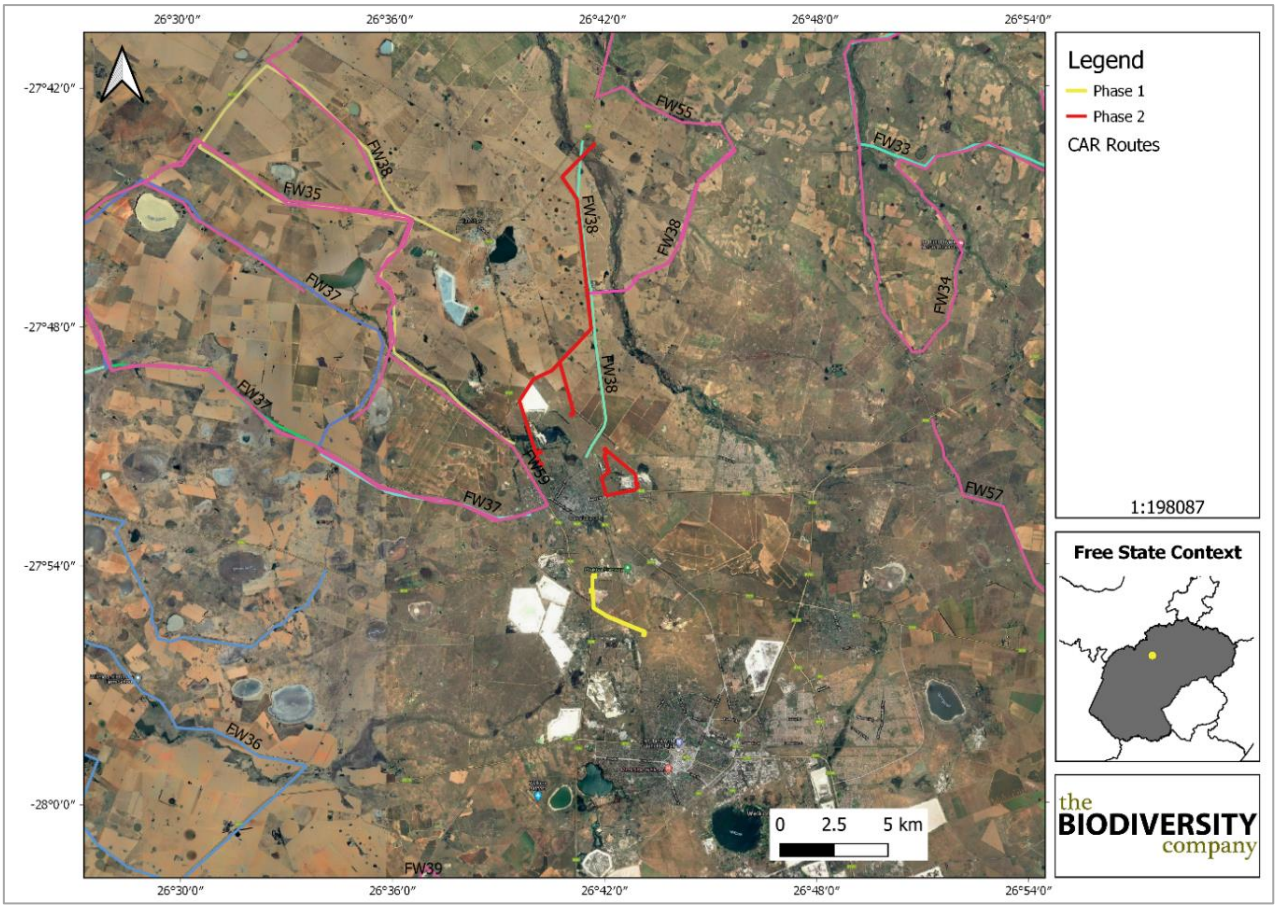


Figure 35: **Project Area in relation to the Coordinated Avifaunal Roadcount route (TBC, 2020c)**

Species of Conservation Concern

A total of 15 IUCN Red-listed species have the potential to occur within the AOI as defined by the six South African Bird Atlas Project, Version 2 (SABAP2) pentads covering the greater project area (refer to **Table 8** below). Of these, the majority (14 spp.) are likely to occur along the Phase 2 Power Line route while a lack of suitable habitat limits the SCC likely to occur along the Phase 1 Power Line route (4 spp.).

Except for Black Stork , the Phase 2 route traverses' habitat capable of supporting all the regionally occurring SCC avifauna and all remaining natural areas between the croplands (mostly associated with wetlands) should be considered to be of high avifaunal importance and sensitivity. The Phase 1 Power Line route, in contrast, is not considered sensitive or important from an avifaunal perspective as it is only likely to be visited by a small compliment of wider ranging and adaptable SCC such as Lanner Falcon, Falcon, Red-footed, Black-winged Pratincole and Abdim's Stork.

Table 8: List of present and potentially occurring red-listed avifauna. Species in bold were observed on site (TBC, 2020c)

Common Name	Scientific Name	Phase		SABAP2	Status (Regional, Global)
		P1	P2		
African Marsh Harrier	*Circus ranivorus*	4	3	x	EN, LC
Yellow-billed Stork	*Mycteria ibis*	4	2	x	EN, LC
Secretarybird	*Sagittarius serpentarius*	4	3	x	VU, VU
Lanner Falcon	*Falco biarmicus*	3	2	x	VU, LC
Black Stork	*Ciconia nigra*	4	4	x	VU, LC
Caspian Tern	*Sterna caspia*	4	2		VU, LC
Maccoa Duck	***Oxyura maccoa***	**4**	**1**	**x**	**NT, VU**
Falcon, Red-footed	*Falco vespertinus*	3	3		NT, NT
Chestnut-banded Plover	*Charadrius pallidus*	4	2	x	NT, NT
Black-winged Pratincole	*Glareola nordmanni*	3	2	x	NT, NT
Lesser Flamingo	***Phoeniconaias minor***	**4**	**1**	**x**	**NT, NT**
Blue Korhaan	*Eupodotis caerulescens*	4	2	x	LC, NT
Curlew Sandpiper	*Calidris ferruginea*	4	2	x	LC, NT
Greater Flamingo	***Phoenicopterus roseus***	**4**	**1**	**x**	**NT, LC**
Abdim's Stork	*Ciconia abdimii*	2	2		NT, LC

Coordinated Waterbird Count

Three sites are within a 20 km radius of the Project area, namely Flamingo Pan, St Helena Mine Dams and Toronto Pan. Six SCC were identified in these counts, which are listed in **Table 9** below.

Table 9: SCC that were identified in the coordinated waterbird count (TBC, 2020c)

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Calidris ferruginea	Sandpiper, Curlew	LC	NT
Charadrius pallidus	Plover, Chestnut-banded	NT	NT
Mycteria ibis	Stork, Yellow-billed	EN	LC
Oxyura maccoa	Duck, Maccoa	NT	NT
Phoenicopterus minor	Flamingo, Lesser	NT	NT
Phoenicopterus ruber	Flamingo, Greater	NT	LC

12.8.4.2 Mammals

The IUCN Red List Spatial Data (IUCN, 2017) lists 65 mammal species that could be expected to occur within the Project area. Species generally restricted to protected areas such as game reserves were not expected to occur in the area and were removed from the list. Of the 65 mammal species, ten (10) are listed as being of conservation concern on a regional or global basis. The list of potential species includes:

- Four (4) that are listed as VU on a regional basis; and
- Five (5) that are listed as NT on a regional scale.

On a global scale, one (1) species is listed as EN, two (2) are listed as VU and four (4) as NT (see **Table 10** below). Three (3) of the species are expected to have a low likelihood of occurrence due to a lack of suitable habitat and the proximity to urban areas and pressures.

Table 10: List of Mammal SCC that may occur in the Project area as well as their global and regional conservation statuses (TBC, 2020b)

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
Aonyx capensis	Cape Clawless Otter	NT	NT	**High**
Atelerix frontalis	South Africa Hedgehog	NT	LC	**Moderate**
Eidolon helvum	African Straw-colored Fruit Bat	LC	NT	**Moderate**
Felis nigripes	Black-footed Cat	VU	VU	**Low**
Hydrictis maculicollis	Spotted-necked Otter	VU	NT	**High**
Leptailurus serval	Serval	NT	LC	**High**
Mystromys albicaudatus	White-tailed Rat	VU	EN	**High**
Panthera pardus	Leopard	VU	VU	**Low**
Parahyaena brunnea	Brown Hyaena	NT	NT	**Low**
Poecilogale albinucha	African Striped Weasel	NT	LC	**High**

12.8.4.3 Herpetofauna (Reptiles & Amphibians)

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the ReptileMap database provided by the Animal Demography Unit (ADU, 2019) 31 reptile species have the potential to occur in the Project area. One (1) of the expected species is a SCC (IUCN, 2017), which is *Smaug giganteus* (Giant Dragon Lizard). This species is categorised as vulnerable on both a regional and an international scale. It is endemic to South Africa, where it is found only in the grasslands of the northern Free State and the southwestern parts of Mpumalanga (IUCN, 2017). Habitat loss due to agriculture is a continuing threat. Large portions of the grassland habitat are underlain by coal beds of varying quality and extent, and exploitation of coal for fuel has and will result in further habitat loss. The likelihood of finding the species in the Project area is moderate, based on the ADU ReptileMap 13 records of this species has been made in in this QDS, these records were however from 2013 and 2005 it is therefore likely that this species is not present in the area anymore.

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the AmphibianMap database provided by the Animal Demography Unit (ADU, 2020) 17 amphibian species have the potential to occur in the Project area. No amphibian SCCs are expected to occur in the project area.

12.8.5 Protected Areas

Figure 36 below shows that the Project area is more than 10 km away from the Newlands and Thabong Nature Reserves.

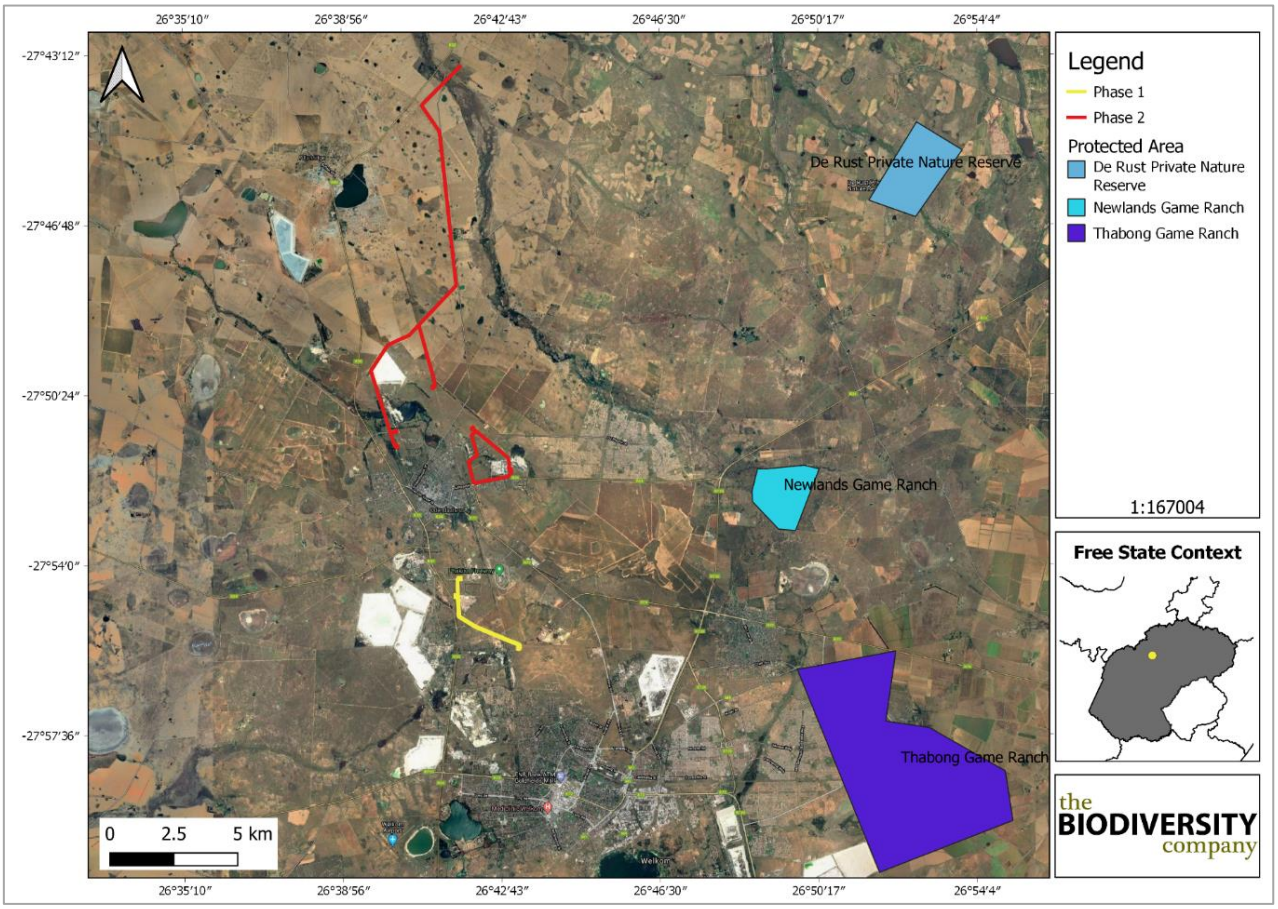


Figure 36: Protected Areas in relation to the Project Area (SAPAD, 2018; SACAD, 2018) (TBC, 2020c)

12.9 Socio-Economic Environment

12.9.1 General

According to the 2019 - 2020 IDP for the MLM, key features of the MLM include the following:

- MLM is a category B municipality established in terms of Section 12 of the Municipal Structures Act (117 of 1998);
- The municipality covers an area of 514.4 km^2 consisting of Welkom, Odendaalsrus, Allanridge, Hennenman, Virginia and Ventersburg;
- The municipality has a total of 116,712 proclaimed stands for both residential purpose;
- The rural areas of MLM cover an area of approximately 2500 farms; and
- MLM is the largest municipality in the District and it contains most of the mining activities, especially gold mining. Recently the mining sector has been on a downward trend as a result of closure of many of the shafts as a result of high costs of production among others and the

need for deep mining. The recent decline in world commodity prices, has aggravated the situation in general with many businesses that have traditionally dependent on the mining sector either have closed down or are in the process of closing down.

According to MetroGIS (2015), the sites earmarked for the Project are located within an area that has a distinct rural character. The agricultural areas are interspersed with gold mining operations that are predominantly concentrated between Welkom and Odendaalsrus, and northwards towards Allanridge.

A map showing the municipal wards is provided in **Figure 37** below. The Phase 1 Power Line is located in Ward 35 and Ward 10, while the Phase 2 Power Line falls within Ward 36.

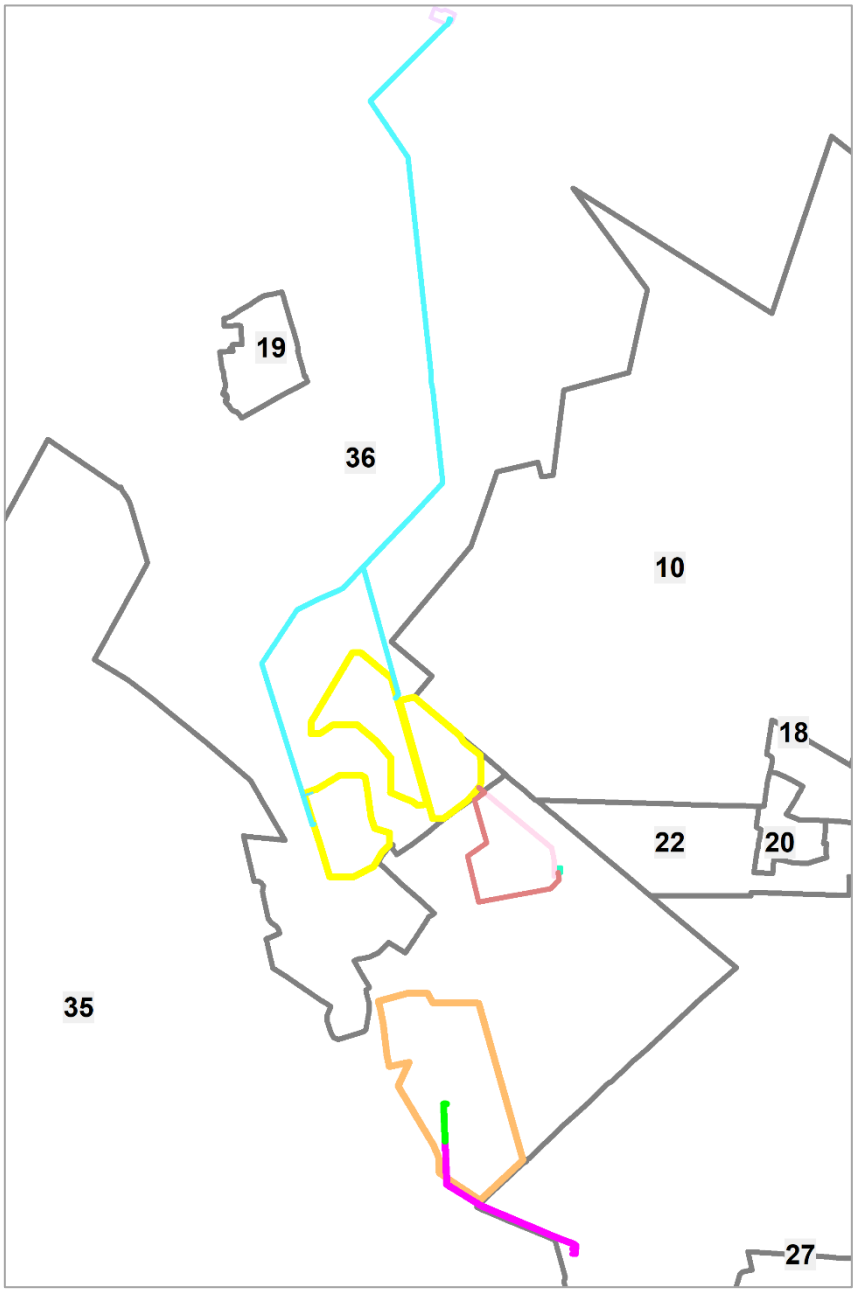


Figure 37: Municipal wards

12.9.2 Settlement Patterns

The population density for the larger part of the study area (i.e. the agricultural land) is less than 4 people per km^2. Residents within this area are primarily located at homesteads/farmsteads that are scattered throughout the region. Higher population densities occur at the towns and built-up areas of Allanridge, Odendaalsrus, Kutloanong and Welkom (exceeding 600 people per km^2) (MetroGIS, 2015).

12.9.3 Socio-Economic Baseline

The information to follow was sourced from the previous Scoping Report (JIS Environmental Engineers, 2019).

12.9.3.1 Population

According to Statistics 2011, the population of MLM is 406,461. There was a slight decline in the population growth (see **Table 11** below), which can be attributed to a number of factors such as migration due to the diminishing mining activities and HIV/AIDS, amongst others. **Table 12** below shows the population groups in the MLM.

Table 11: Population Growth Rate (Stats SA 2011)

Gender	2011	%	2001	%
Male	201 509	49.6	200 370	49.1
Female	204 952	50.4	207 799	50.9
Total	**406 461**	**100**	**408 169**	**100**

Table 12: Population groups within the MLM (Stats SA 2011)

	Male	Female	Total
Black	180 913	182 467	363 380
Coloured	2 623	2729	5 352
Indian or Asian	766	470	1 236
White	17 613	17 451	35 064
Total	**203 915**	**205 117**	**406 461**

12.9.3.2 Economic Activities

Table 13 below shows the employment levels within MLM in all economic sectors. The table shows both growth and decline from one sector to the other. Of importance to note, is a decline of mining and quarrying sector and agriculture while other sectors have shown growth. The Project intends to promote economic growth.

Table 13: Employment by sector (Stats SA 2011)

Sector	2009	2010	2011	%
Agriculture, forestry and fishing	358	339	381	1.4
Mining and quarrying	7087	10629	11495	42.8
Manufacturing	1332	1342	1429	5.3
Electricity, gas and water	418	502	556	2.1
Construction	442	493	549	2.0
Wholesale and retail trade, catering and accommodation	2162	2479	2793	10.4
Transport, storage and communication	1059	1096	1183	4.4
Finance, insurance, real estate and business services	2472	2737	2943	11.0
Community, social and personal services	2080	2562	2852	10.6
General government	2043	2343	2692	10.0
Total	**19452**	**24522**	**26873**	**100**

The annual household income in MLM is shown in **Table 14** below.

Table 14: Annual household income (Stats SA 2011)

Annual Household Income	2011	%	2001	%
No income	20 069	16.3	35 646	27.7
R 1 - R 4800	6 606	5.4	12 072	9.4
R 4801 - R 9600	9 081	7.4	19 196	14.9
R 9601 - R 19 600	21 416	17.4	24 583	19.1
R 19 601 - R 38 200	22 394	18.2	17 985	14
R 38 201 - R 76 400	18 854	15.3	9 293	7.2
R 76 401 - R 153 800	11 703	9.5	6 152	4.8
R 153 801 - R 307 600	7973	6.5	2674	2.1
R 307 601 - R 614 400	3 789	3.1	614	0.5
R 614 001 - R 1 228 800	858	0.7	172	0.1
R 1 228 801 - R 2 457 600	262	0.2	149	0.1
R 2 457 601 or more	188	0.2	104	0.1
Unspecified	1	0.001	-	-
Total	**123 195**	**100**	**128 640**	**100**

12.9.3.3 Education levels

Education levels in MLM are shown in **Table 15** below. There has been considerable progress towards higher education levels since 2001. The proportion of persons with no schooling has dropped from 11.3% to 4%. This has important implications for employment.

Table 15: Education levels (Stats SA 2011)

Education Level	2011	%	2001	%
Grade 0	10 973	2.7	-	-
Grade 1 / Sub A	10 651	2.6	16 074	3.9
Grade 2 / Sub B	10 713	2.6	12 395	3.0
Grade 3 / Std 1/ABET 1	11 206	2.8	16 522	4.0

Education Level	2011	%	2001	%
Grade 4 / Std 2	13 989	3.4	20 957	5.1
Grade 5 / Std 3/ABET 2	14 659	3.6	22 160	5.4
Grade 6 / Std 4	17 170	4.2	25 846	6.3
Grade 7 / Std 5/ ABET 3	21 155	5.2	31 422	7.7
Grade 8 / Std 6 / Form 1	32 268	7.9	34 324	8.4
Grade 9 / Std 7 / Form 2/ABET 4	26 433	6.5	26 826	6.6
Grade 10 / Std 8 / Form 3	37 178	9.1	33 535	8.2
Grade 11 / Std 9 / Form 4	31 023	7.6	22 084	5.4
Grade 12 / Std 10 / Form 5	73 537	18.1	47 387	11.6
NTC 1-6	5 155	1.3	0	0
Certificate with less than Grade 12 / Std 10	3 97	0.1	912	0.2
Diploma with less than Grade 12 / Std 10	448	0.1	505	0.1
Certificate with Grade 12 / Std 10	3 529	0.9	4 527	1.1
Diploma with Grade 12 / Std 10	4 624	1.1	6 062	1.5
Higher Diploma	4 255	1.0	-	-
Post Higher Diploma Masters; Doctoral Diploma	700	0.2	-	-
Bachelors Degree	2 789	0.7	2 066	0.5
Bachelors Degree and Post graduate Diploma	1 022	0.3	849	0.2
Honours degree	1 325	0.3	446	0.1
Higher Degree Masters / PhD	685	0.2	378	0.1
Other	661	0.2	-	-
No schooling	16 172	4	46 157	11.3
Not applicable	53 741	13.2	36 735	9.0
Total	**406 461**	**100**	**408 167**	**100**

12.10 Planning

The map of MLM's spatial vision, which forms part of the municipal SDF, is shown in **Figure 38** below. The following is noted with regards to the Project's location in relation to the MLM's spatial vision:

- The Phase 1 Power Lines run alongside existing power lines, which traverse areas designated as "future urban development" and "intensive agricultural areas (amongst others); and
- The Phase 2 Power Lines run alongside existing power lines, which traverse areas designated as "intensive agricultural areas", "future urban development" and "land reform project" (amongst others).

A map showing the municipal wards is provided in **Figure 37** above. The Phase 1 Site is located in Ward 35 and the Phase 2 Site falls within Ward 36.

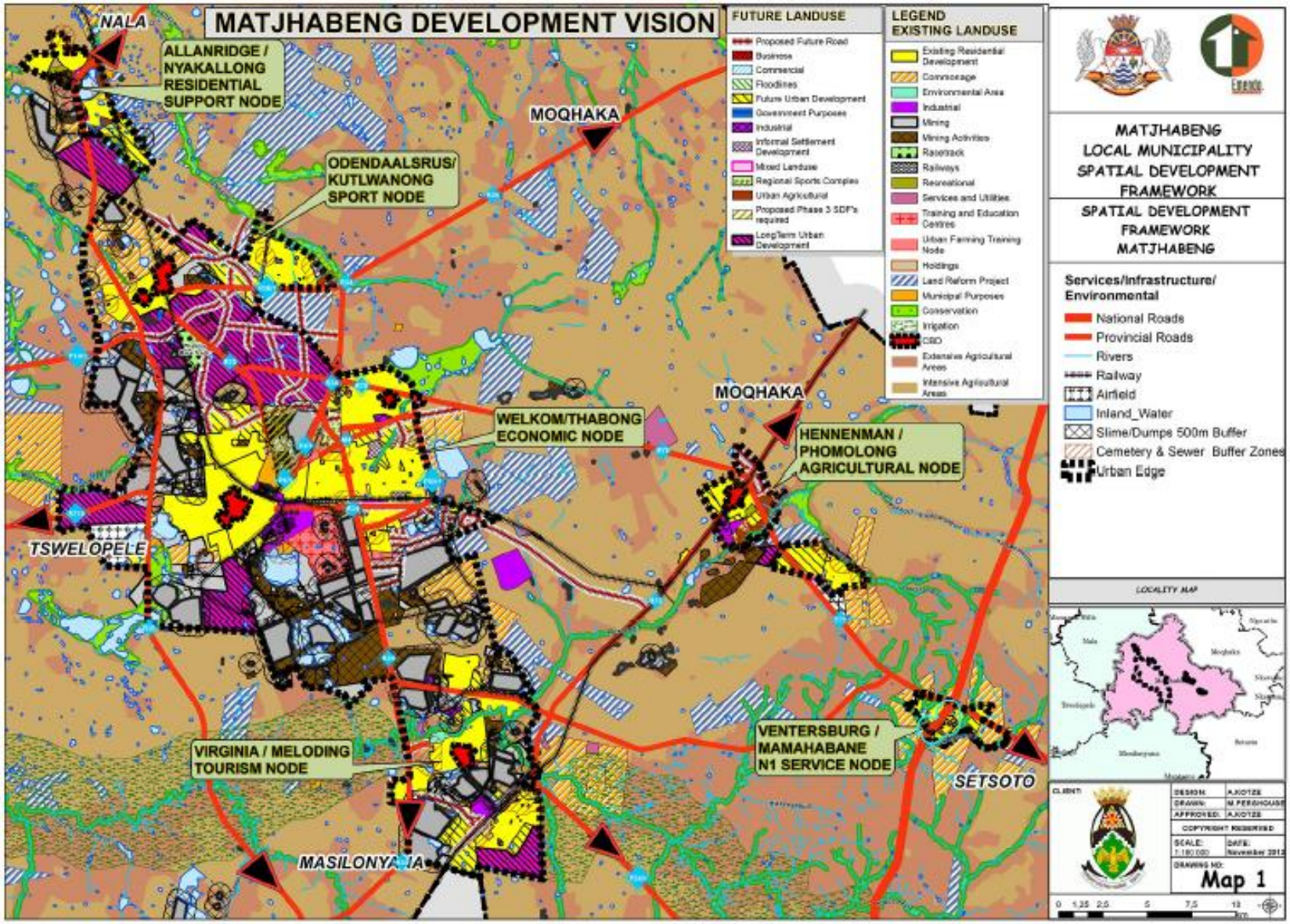


Figure 38: MLM SDF

12.11 Existing Structures and Infrastructure

The following is noted with regards to existing structures and infrastructure that occur along the power line routes:

- Phase 1 Power Lines –
  - The route runs alongside existing power lines (see **Figure 39** below);
  - The route runs to the west of an existing tailings dam;
  - The route follows the S289 gravel road for approximately 1.4km (see **Figure 40** below); and
  - The route crosses a regional railway line.

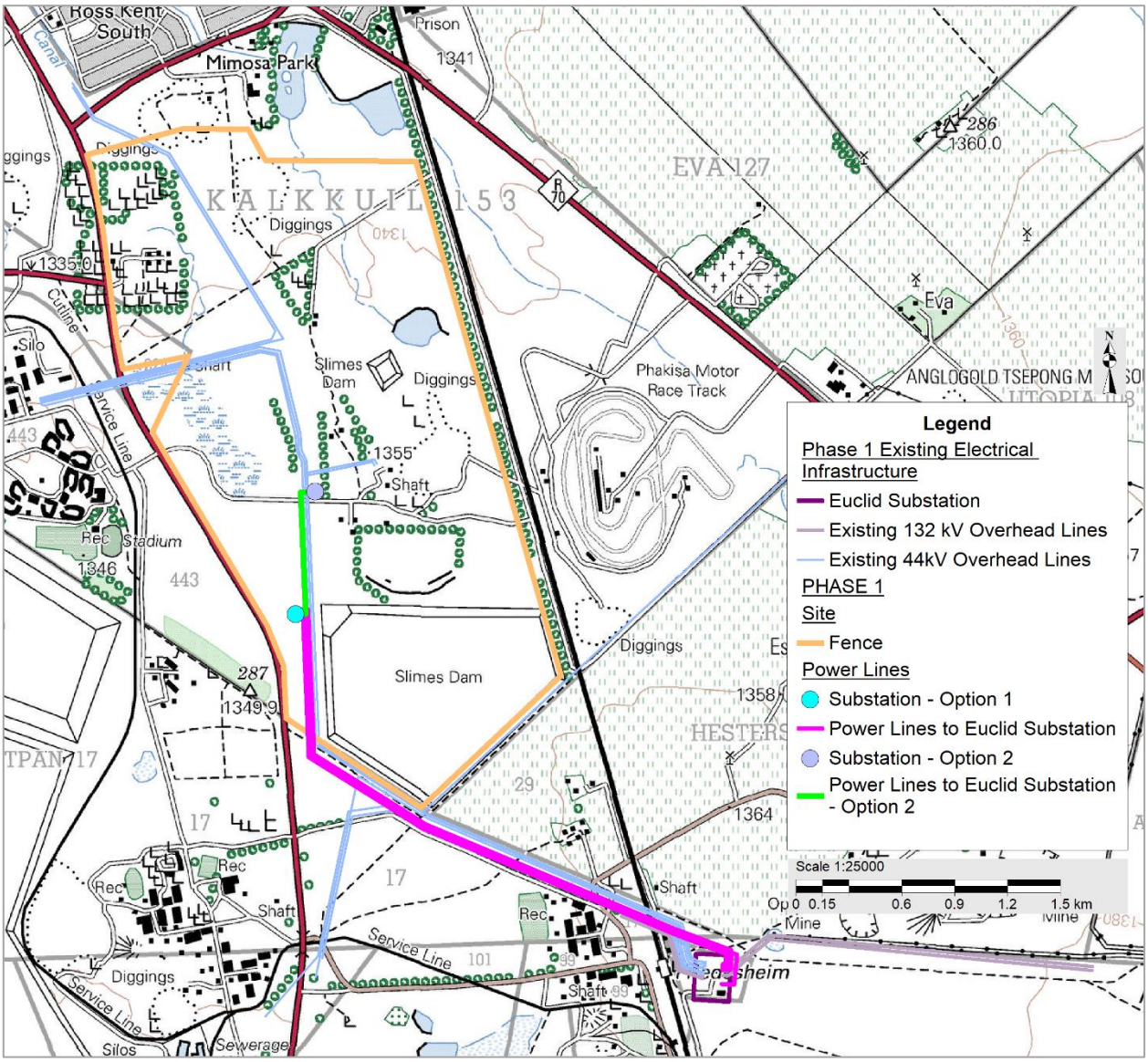


Figure 39: Phase 1 Power Line route following existing power lines

Figure 40: Route of Phase 1 Power Line alongside S289 gravel road and existing power lines

- Phase 2 Power Lines –
  - Power lines to Grootkop Substation:
    - The route runs alongside existing power lines (see **Figure 41** below);
    - The route crosses a regional railway line;
    - The route runs to the west and north-west of an existing tailings dam; and
    - The route follows the A48 / S86 gravel road for approximately 6km and crosses this road before connecting to the existing Grootkop Substation.
  - Power lines to Geduld Substation - Option 1:
    - The route crosses roads and passes between the Harmony Tshepong North Mine and its adjoining mine dump.
  - Power lines to Geduld Substation - Option 2:
    - The route follows existing roads (including the R34) for approximately 3.3km;
    - The route crosses the access road to the Harmony Tshepong North Mine; and
    - The route crosses a railway service line and roads.

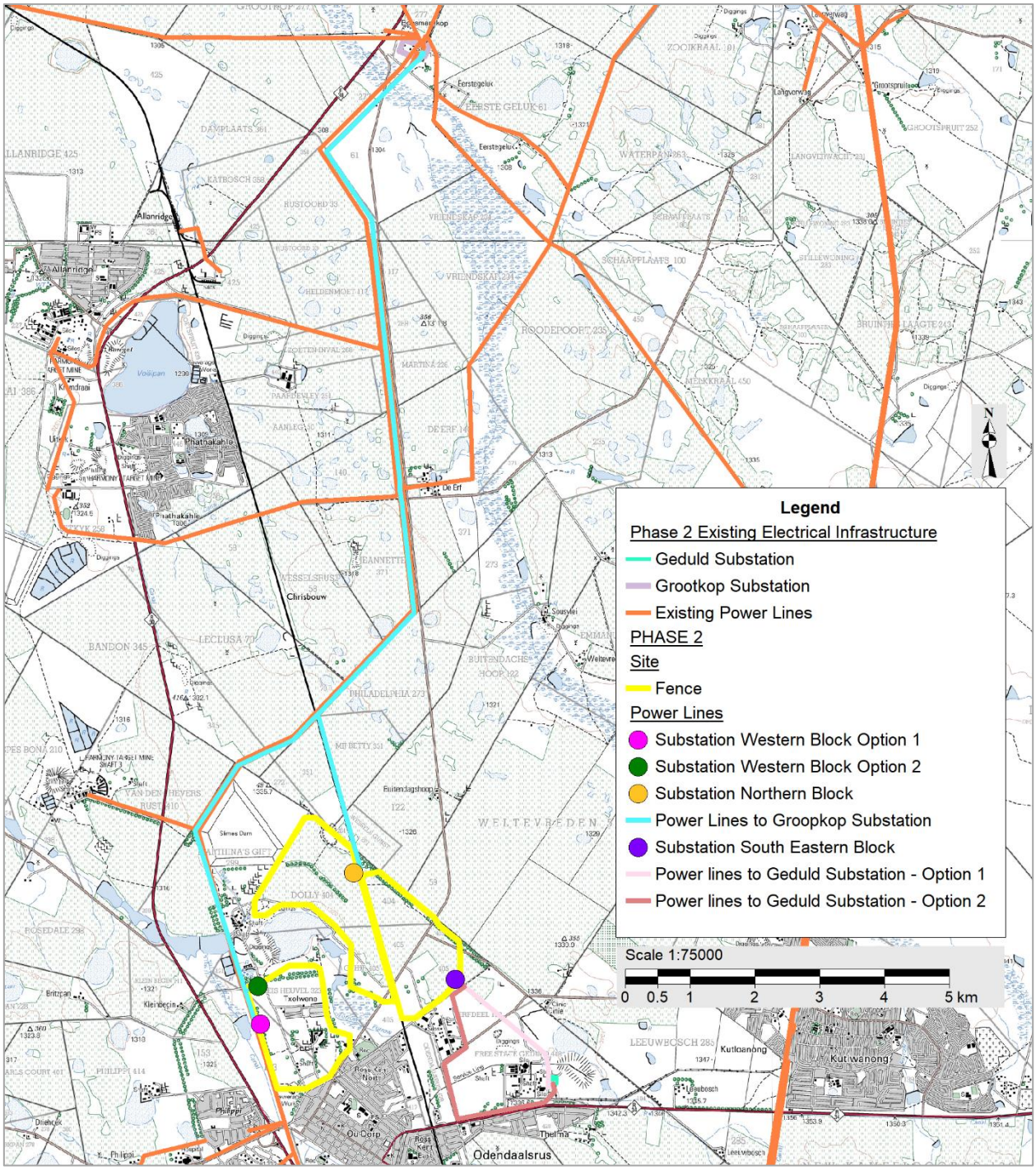


Figure 41: Phase 2 Power Line route following existing power lines

Apart from the abovementioned infrastructure, there is a possibility that other infrastructure may also occur along the power line routes or at the substation sites, which will be identified as part of the design phase. Various organisations and custodians of infrastructure, for example Eskom, Transnet, Telkom, SANRAL and the Free State Department of Police, Roads and Transport (DPRT) were notified during the Basic Assessment's public participation process.

Figure 42: Route of Phase 2 Power Line alongside existing power lines (TBC, 2020c)

12.12 Transportation

Based on the Traffic Impact Assessment (KMA Consulting Engineers, 2020), which was undertaken for the Phase 1 and Phase 2 PV Sites, the most important roads in the area are the following (as shown in **Figure 43** below):

- R30 (P1/2 & P43/3) –
  - This road connects Bloemfontein with Rustenburg via Brandfort, Odendaalsrus, Klerksdorp and Ventersdorp. The road is in general a two lane undivided road.
- A48 / S86 –
  - This Provincial road links Odendaalsrus with the R30 to the north of the town. The road extends Hauptfleish Street in the town. The road is a paved road becoming a gravel road to the north.
- Other Roads –
  - Most other potentially affected roads are urban streets in the Odendaalsrus Urban Area. Most streets are two-lane undivided local streets.

A regional railway line also runs in a north-west to south-east direction in the Project area, which is crossed by the Phase 1 and Phase 2 Power Lines. The Welkom Airport is located approximately 9 km to the south-west of the Phase 1 Site.

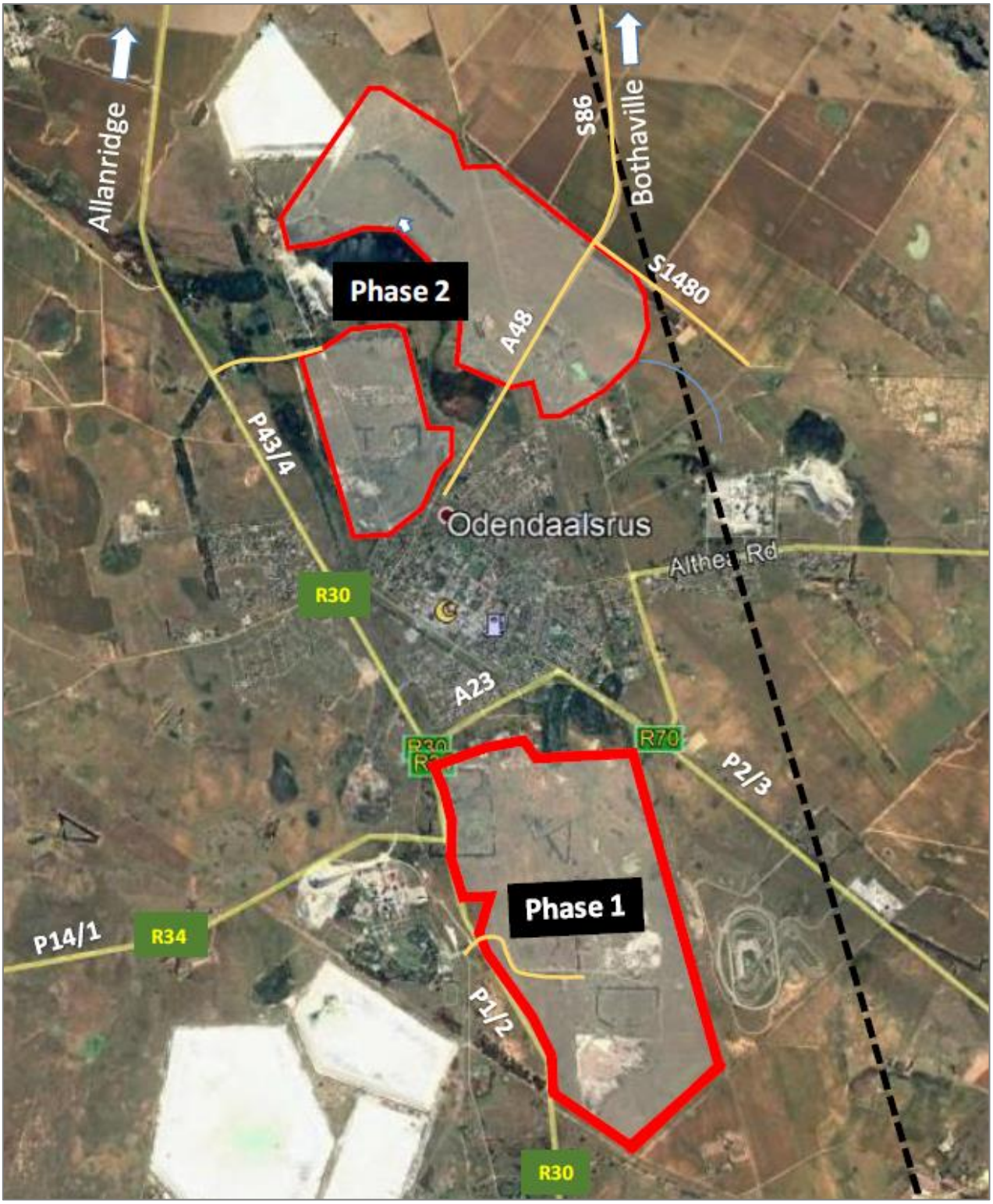


Figure 43: **Road network (KMA Consulting Engineers, 2020)**

12.13 Air quality

Potential sources of air pollution in the region include the following:

- Stack, vent and fugitive dust emissions from existing mining operations, as well as windblown dust emissions from tailings storage facilities;

- Fugitive dust emissions from agricultural activities;
- Vehicle exhaust emissions from vehicles traveling on paved and unpaved roads, including on the R30 regional road as well as on roads inside the settlements of Allanridge, Nyakallong, Kutlwanong and Odendaalsrus;
- Biomass burning (veld fires);
- Domestic fuel burning;
- Industrial operations;
- Waste treatment and disposal;
- Other fugitive dust sources such as wind erosion from exposed areas.

12.14 Noise

In terms of the local acoustical environment, the background noise levels are expected to be typical of a rural area.

Noise in the greater area emanates primarily from mining activities, farming operations (e.g. use of farming equipment), vehicles on the surrounding road network, racing events at the Phakisa Freeway circuit, human activities in surrounding settlements and trains passing on the railway.

12.15 Cultural Heritage & Palaeontological Features

12.15.1 Cultural Heritage

The information to follow was obtained from the Cultural Heritage Impact Assessment (van Schalkwyk, 2020) (contained in **Appendix G5**). Refer to **Sections 13.7** and **14.15** for a synopsis of the study and a related impact assessment, respectively.

The cultural landscape qualities of the larger region surrounding the study area consists two components. The first is a limited Stone Age occupation, which in most cases clustered in the vicinity of the various water sources as well as preferred habitable areas such as hills and outcrops. This period, spanning many thousands of years, was followed by a much shorter Late Iron Age occupation and an even shorter farming component. Urban centres that evolved as part of this latter period of occupation, e.g., Odendaalsrus, only came into being since the 1880s.

Some observations from a site-specific assessment are as follows:

- The Phase 1 Project area formed part of the Free State Geduld Mine. The Free State or Welkom gold field came into being in 1945 when a mining lease was granted to the St Helena Gold Mine. Eventually the gold field consisted of some 20 mines that were exploiting five principal ore bodies. Eventually, they were amalgamated into larger and more cost-effective units, of which Free State Geduld is one unit of the larger Freegold North mine (Robb & Robb, 1998). From the various maps and aerial photographs assessed, it is clear that the proposed power line

routes as well as the substation locations will not impact on any built features (see **Figure 44** and **Figure 45** below).

- The Phase 2 Project area formed part of the Freddies Consolidated Mines Limited which ceased operations some years ago. Freddies became part of Harmony Gold's Free State Operations. All of the shafts were dormant when Harmony took over but they have restarted the Nyala shaft which is used to hoist rock and is available as a second escape route for the Phakisa Mine which is 5,5km away (www.harmony.co.za/b/ops_sa_ phakisa.asp). From the various maps and aerial photographs assessed, it is clear that the proposed power routes as well as the substation locations would not impact on any built features, succeeding to bypass whatever remains still occurs in the landscape.

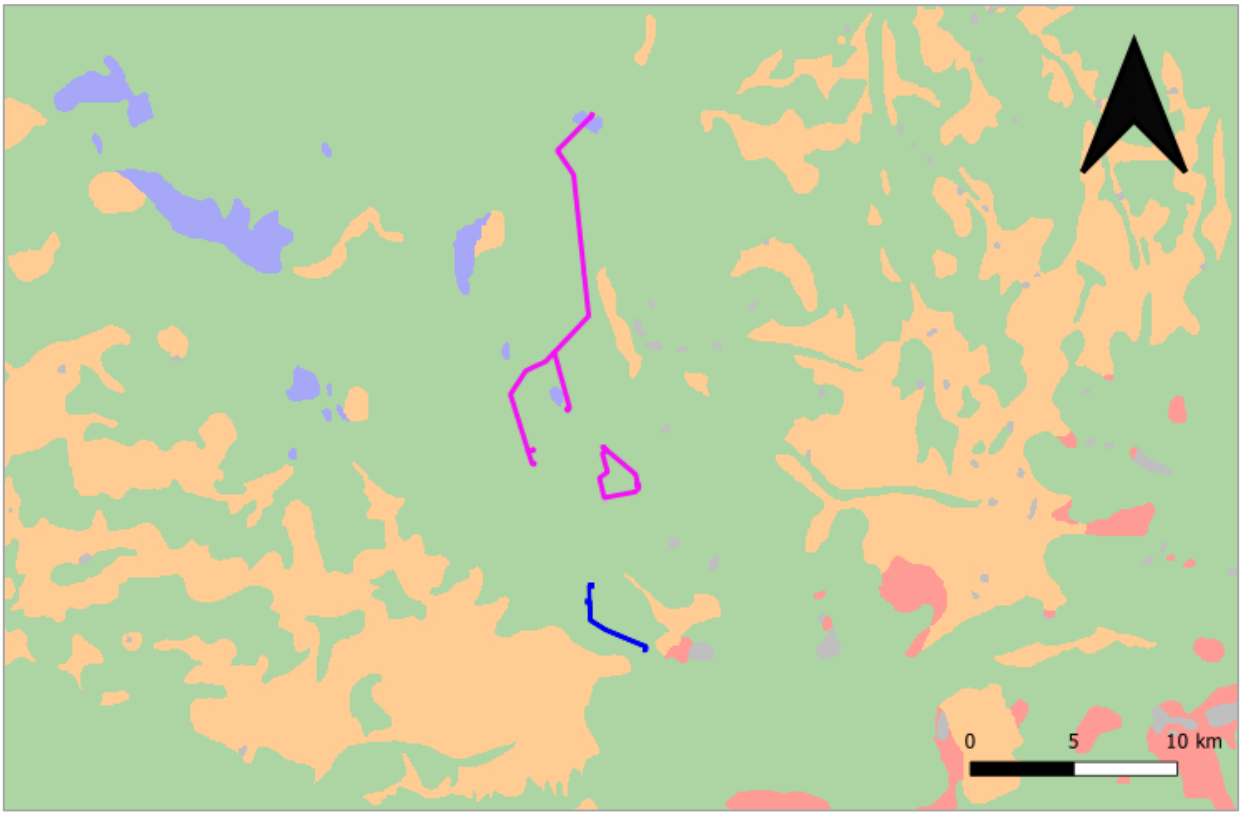
Figure 44: Views of the Phase 1 Power Line route (van Schalkwyk, 2020)

Figure 45: **Views of the Phase 2 Power Line route (from north to south) (van Schalkwyk, 2020)**

12.15.2 Palaeontological Features

The information to follow was obtained from Desktop Paleontological Assessment (Banzai Environmental, 2020) (contained in **Appendix G6**).

According to the South African Heritage Resources Information System (SAHRIS) Palaeosensitivity Map (shown in **Figure 46** below), there is a moderate chance of finding fossils in the Project area.



Colour	Sensitivity	Required Action
RED	VERY HIGH	Field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	Desktop study is required and based on the outcome of the desktop study; a field assessment is likely
GREEN	**MODERATE**	**Desktop study is required**
BLUE	LOW	No palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	No palaeontological studies are required
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

Figure 46: Extract of the 1 in 250 000 SAHRIS PalaeoMap map (Council of Geosciences) (Banzai Environmental, 2020)

12.16 Aesthetic Qualities

The information to follow was obtained from the Visual Impact Assessment (SAS, 2020) (contained in **Appendix G8**). Refer to **Sections 13.9** and **14.16** for a synopsis of the study and a related impact assessment, respectively.

The sense of place associated with the proposed power line routes and associated substations is related to the landscape character type, defined as semi-rural, with settlements / villages interspersed, relatively flat terrain dominated by grassland and agricultural activities where cattle grazing and mining activities are taking place. The proposed power line routes and areas associated with the substations can further be described as calm, tranquil and peaceful. The sense of place is, however, not unique to the proposed power line routes and areas associated with the substations as it extends to the larger Free State region. As the landscape is already accustomed to mand-made structures such as mining activities, existing overhead power lines and substations, the proposed Project will not have a significant effect on the sense of place of the area.

12.17 Health

12.17.1 Health Care Facilities

Health care facilities in Odendaalsrus include the Thusanong District Hospital and Bophelong Clinic.

12.17.2 Health Risks

The primary health risks identified for the sites are associated with the previous mining activities, which include mining infrastructure, excavations and other land disturbances, dump sites and contamination (e.g. radiological sources).

13 SUMMARY OF SPECIALIST STUDIES

13.1 Specialist Studies undertaken as part of the Basic Assessment

According to Münster (2005), a 'trigger' is "*a particular characteristic of either the receiving environment or the proposed project which indicates that there is likely to be an issue and/or potentially significant impact associated with that proposed development that may require specialist input*".

The requisite specialist studies 'triggered' by the nature of the proposed development and its receiving environment, which aimed at addressing the key issues and compliance with legal obligations, include the following:

1. Water Resources Impact Assessment;
2. Terrestrial Ecology Assessment;
3. Avifaunal Assessment;
4. Agricultural Impact Assessment;
5. Phase 1 Cultural Heritage Impact Assessment;
6. Desktop Paleontological Assessment;
7. Visual Impact Assessment; and
8. Socio-Economic Impact Assessment.

The Applicant had previously initiated an EIA for the Project, which did not progress beyond the Scoping Phase. Information pertaining to the environmental baseline, which was contained in the previous Scoping Report (JIS Environmental Engineers, 2019), was obtained from the following scoping-level specialist studies (contained in the Scoping Report under the current application), as relevant:

- Biodiversity Assessment;
- Visual Assessment;
- Cultural Heritage Impact Assessment;
- Preliminary Desktop Agricultural Study;
- Wetland Scoping Study;
- Social Impact Assessment; and
- Radiological Survey.

13.2 Incorporating the Findings from Specialist Studies

The *Guideline for the review of specialist input in EIA processes* (Keatimilwe & Ashton, 2005) was used for including the findings of the specialist studies into the BAR. Key considerations included the following:

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

The information obtained from the respective specialist studies was incorporated into the BAR in the following manner:

6. The assumptions and limitations identified in each study were included in **Section 9** above;
7. The information was used to complete the description of the receiving environment (**Section 12** above) in a more detailed and site-specific manner;
8. A summary of each specialist study is contained in the sub-sections to follow (**Sections 13.3 – 13.10** below), focusing on the approach to each study, key findings and conclusions drawn;
9. The specialists' impacts assessment, and the identified mitigation measures, were included in the overall project impact assessment contained in **Section 14** below;
10. The evaluations performed by the specialists on the alternatives of the Project components were included in **Section 15** below to identify the most favourable option;
11. Specialist input was obtained to address comments made by IAPs that related to specific environmental features pertaining to each specialist discipline; and
12. Salient recommendations made by the specialists were taken forward to the final Conclusions (**Section 17**).

Refer to **Appendix G9** for declarations from the respective specialists.

13.3 Water Resources Impact Assessment

A summary of the Water Resources Impact Assessment (TBC, 2020a) (contained in **Appendix G1**) follows.

13.3.1 Details of the Specialist

The details of the specialist that undertook the Water Resources Impact Assessment follow.

Organisation:	The Biodiversity Company
Name:	A. Husted
Qualifications:	MSc Aquatic Health
Affiliation (if applicable):	South African Council for Natural Scientific Professions (SACNASP) Professional Natural Scientist (Registration No.: 400213/11)

13.3.2 Objectives of the Study

The following tasks were completed in fulfilment of the terms of reference for this study:

- Review existing desktop information and literature;
- Determine the integrity and functionality of the water resources;
- Undertake an impact assessment for the proposed activities; and
- Prescribe mitigation measures and provide recommendations for the identified risks.

13.3.3 Methodology

The assessment included the following tasks (amongst others):

- Identification and mapping of wetlands. The National Wetland Classification Systems (NWCS) developed by the South African National Biodiversity Institute (SANBI) was considered for this study. The wetland areas were delineated in accordance with the guideline: *A practical field procedure for identification and delineation of wetlands and riparian areas* (DWAF, 2005).
- Determining the Present Ecological Status (PES);
- Determining the Ecological Importance and Sensitivity (EIS); and
- Determining buffer requirements.

A survey was conducted in early November 2020, which constitutes a wet season assessment.

13.3.4 Key Findings of the Study

A description of the surface water features in the Project area is contained in **Section 12.7** above.

Key findings from the study follow.

13.3.4.1 Wetland Classification

Based on a combination of desktop and in-field delineations, a total of 4 and 18 individual natural wetland hydrogeomorphic (HGM) units were identified and delineated within the 40m survey corridor for Phase 1 and Phase 2 Power Lines, respectively. Two non-HGM types are associated with Phase 2, and also three relic depressions. The dams are regarded as artificial systems and have been delineated for the purposes of the study, but no further ecological or functional assessment was undertaken for these systems. Photographs of some of the HGM types identified for the study are presented in **Figure 47** below.

Three (3) relic wetland system were identified, these are located in cultivated areas. Due to this, no natural vegetation remains while infilling and other soil disturbances have greatly altered the soil profile precluding its reliable identification as wetland. For the purposes of practicality, these areas have been referred to as a relic wetland. The extent of these systems has been delineated, but no further ecological or functional assessment was undertaken for these systems.

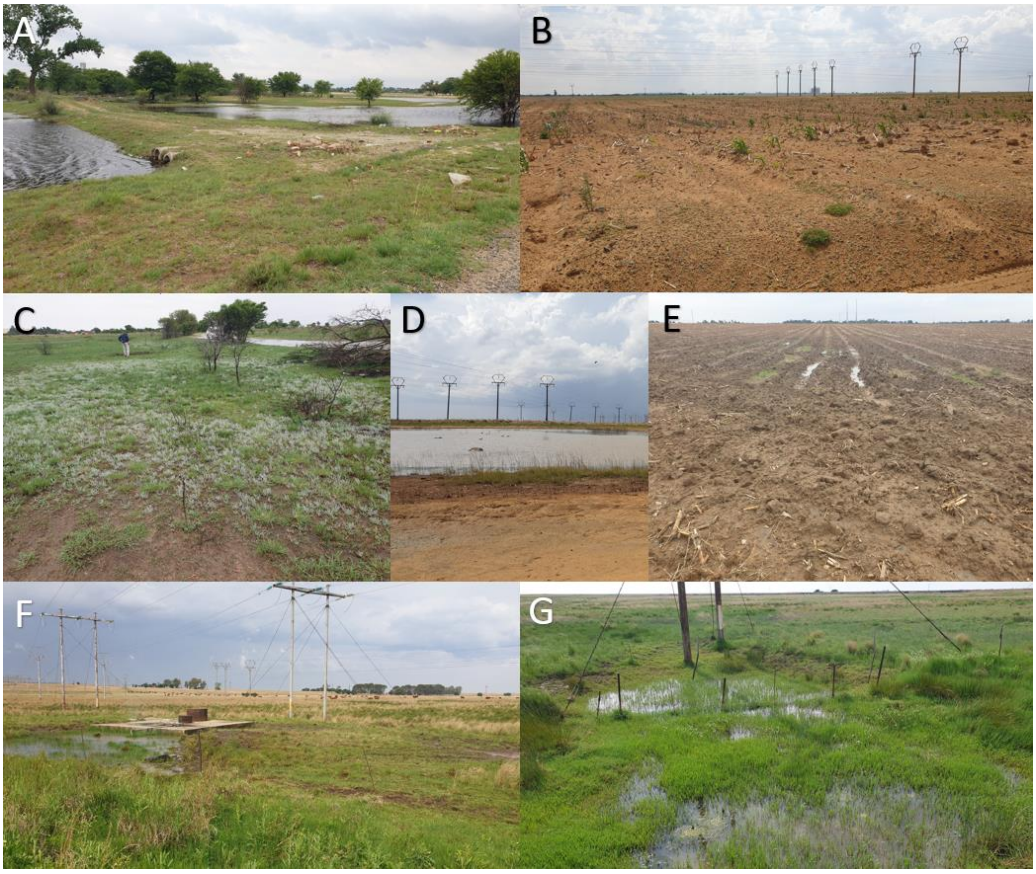


Figure 47: Photographs of wetlands identified for the assessment A) Dams, B & E) Relic depression, C& D) Depressions, F & G) Unchanneled valley bottom (TBC, 2020a)

The location and extent of the delineated wetland systems are presented in **Figure 48** (Phase 1) and **Figures 49 - 51** (Phase 2) below. Each wetland was classified following the national wetland classification system (level 1-4) into one of six main types (see **Table 16** below). These included depressions, seepage wetlands and unchanneled valley bottom system. Together these wetlands occupied a total of 1.96 ha and 5.89 ha within the 40m corridors for the Phase 1 and Phase 2 Power Lines, respectively.

Table 16: Wetland classification as per SANBI guideline (Ollis *et al.*, 2013) (TBC, 2020a)

Wetlands (n)	Area (ha)	Level 1	Level 2		Level 3	Level 4		
		System	DWS Ecoregion/s	NFEPA Wet Veg Group/s	Land-scape Unit	4A (HGM)	4B	4C
Phase 1								
1	1.9	Inland	Highveld	Dry Highveld Grasslands Group 3	Slope	Seep	With and without channeled outflow	N/A
3	0.05				Bench	Depression	Endorheic	Without outflow
Phase 2								
3	0.86	Inland	Highveld	Dry Highveld Grasslands Group 3	Slope	Seep	With and without channeled outflow	N/A
13	2.89				Bench	Depression	Endorheic	Without outflow
2	2.13				Valley-bottom	Unchanneled valley-bottom	N/A	N/A

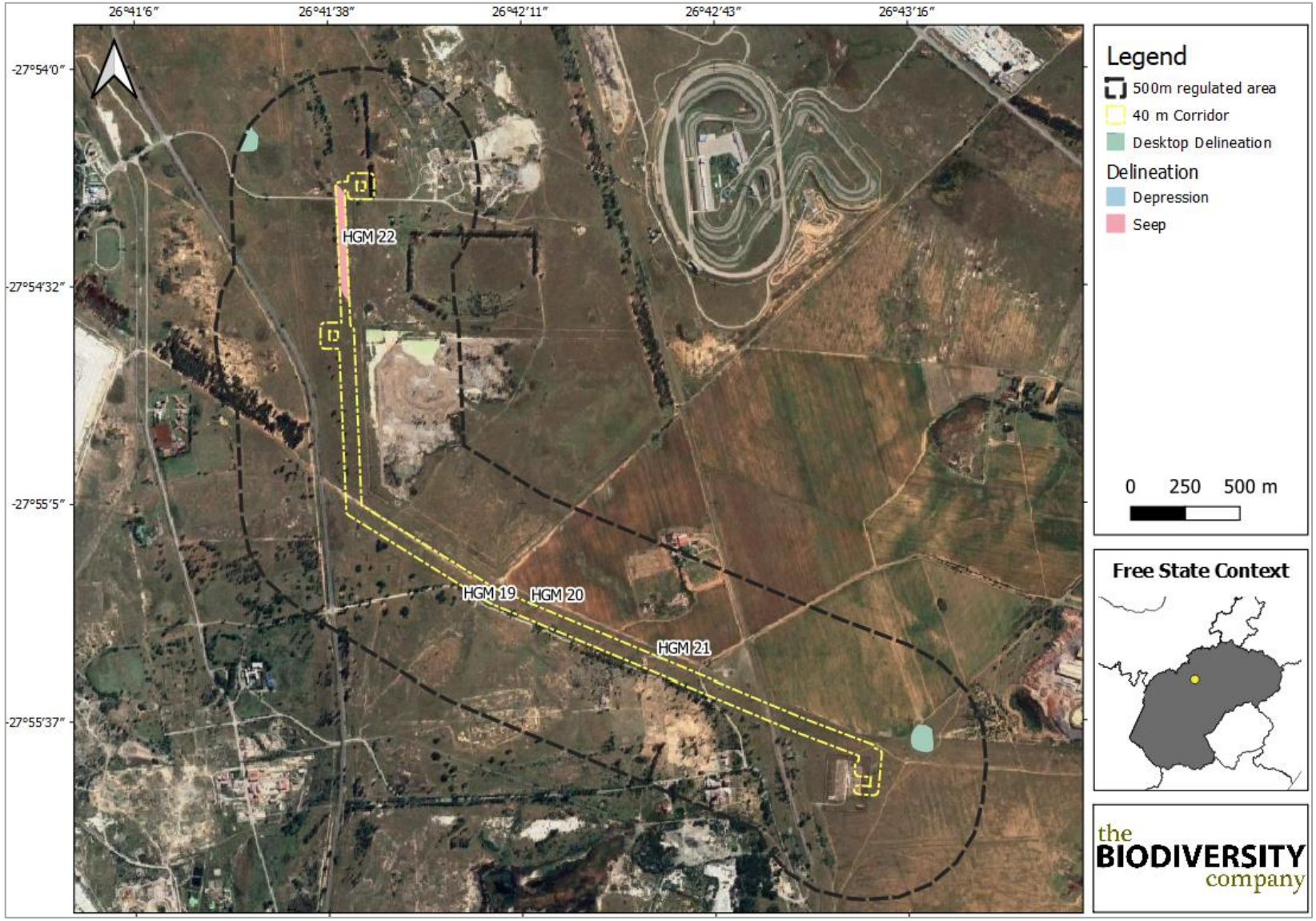


Figure 48: **Wetland delineation for Phase 1 (TBC, 2020a)**

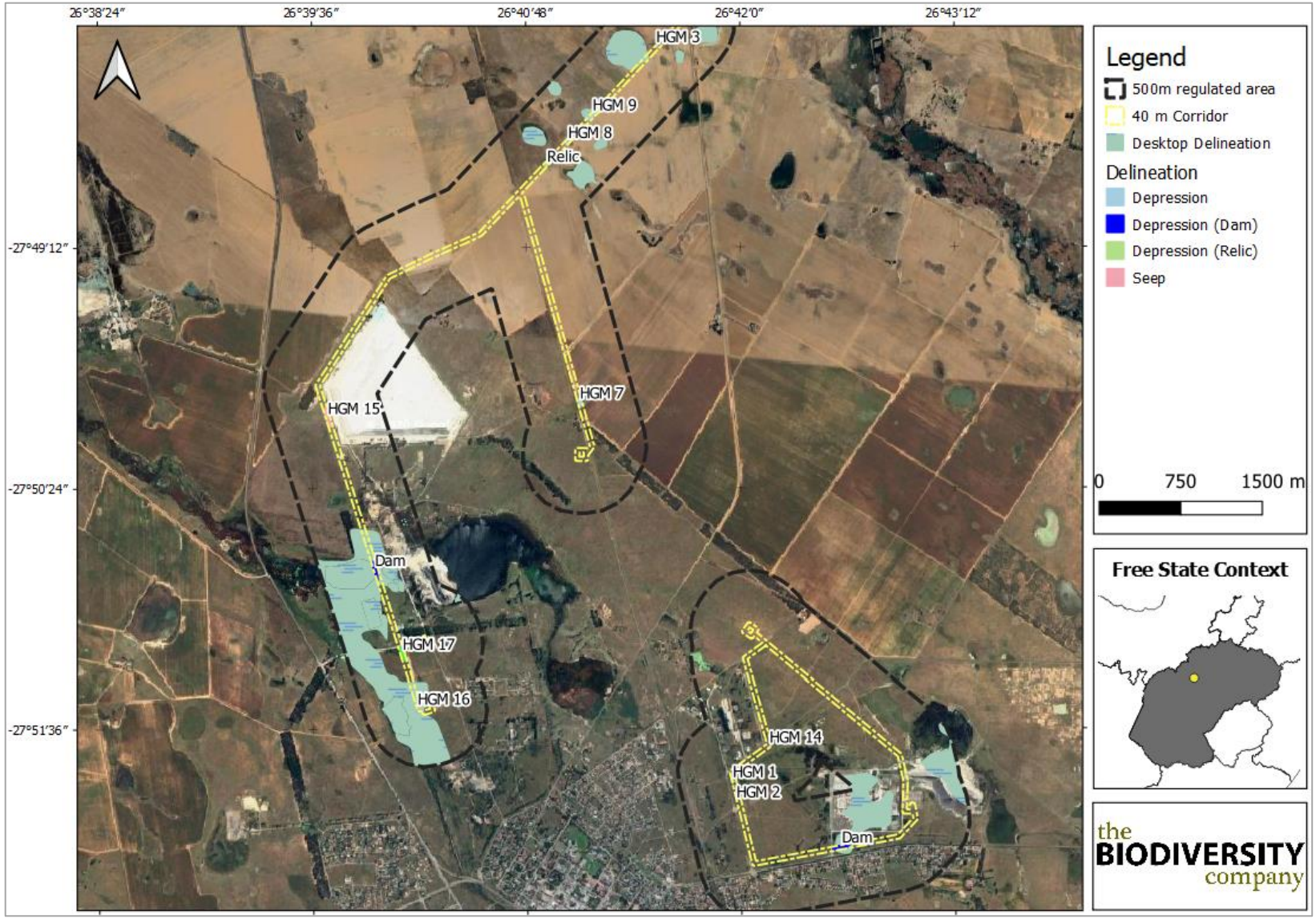


Figure 49: **Wetland delineation for Phase 2 (south) (TBC, 2020a)**

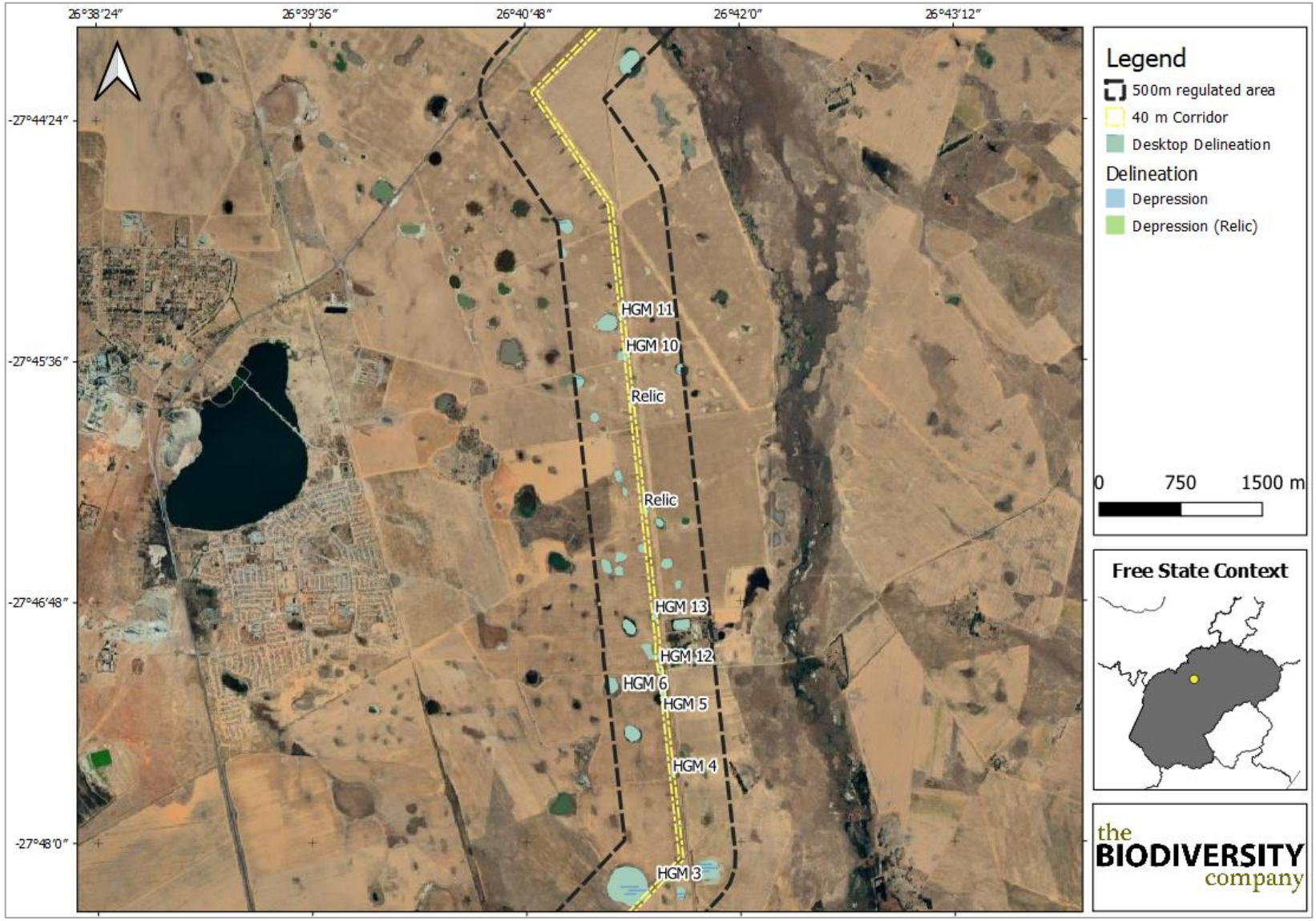


Figure 50: **Wetland delineation for Phase 2 (central) (TBC, 2020a)**

Figure 51: **Wetland delineation for Phase 2 (north) (TBC, 2020a)**

13.3.4.2 Wetland Health

The overall wetland health for Phase 1 ranges from largely modified (class D) to seriously modified (class E). The overall wetland health for Phase 2 ranges from moderately modified (class C) to seriously modified (class E). Examples of some the impacts influencing the PES ratings include transport routes, power lines, mining activities, causeways and crossings, crop farming and stormwater management.

13.3.4.3 Ecological Importance and Sensitivity

The EIS of all four HGM units associated with Phase 1 corridor was determined to be low / marginal (class D). Most wetlands along the Phase 2 corridor have a low / marginal (class D) EIS and only four (4) systems have a moderate (class C) EIS.

13.3.4.4 Buffer Assessment

Under normal circumstances the installation of power line infrastructure has the potential to cause loss of vegetation (along route), an increase in sediment inputs and turbidity, alter flow volumes and increase inputs of toxic contaminants. This affords power line infrastructure a desktop buffer of 35m. However, the presence of existing power line infrastructure along portions of the routes together with the implementation of Eskom best practice protocols and the prescribed mitigation reduces the required buffer to 15m for both construction and operational phases.

It is important to note that this buffer determination tool does not make provision for biodiversity and it should be borne in mind that many large terrestrial birds may utilise these systems and be more concentrated around them and consequently the risk for collision is higher near them.

13.3.4.5 Sensitivity Assessment

A sensitivity map was produced to visually represent the sensitivity of each HGM unit to the proposed development based on the findings of the assessment. Refer to **Figure 52** (Phase 1) and **Figures 53 – 55** (Phase 2) below.

All identified wetland HGM units were classified as having a High sensitivity while their associated 15m buffers were assigned a Moderate sensitivity. All other non-wetland areas within the 40m corridor were assigned a Low sensitivity from a water resource perspective. It is important to note that this map does not replace any local, provincial or government legislation relating to these areas or the land use capabilities or sensitivities of these environments.

Figure 52: Wetland sensitivity for Phase 1 (TBC, 2020a)

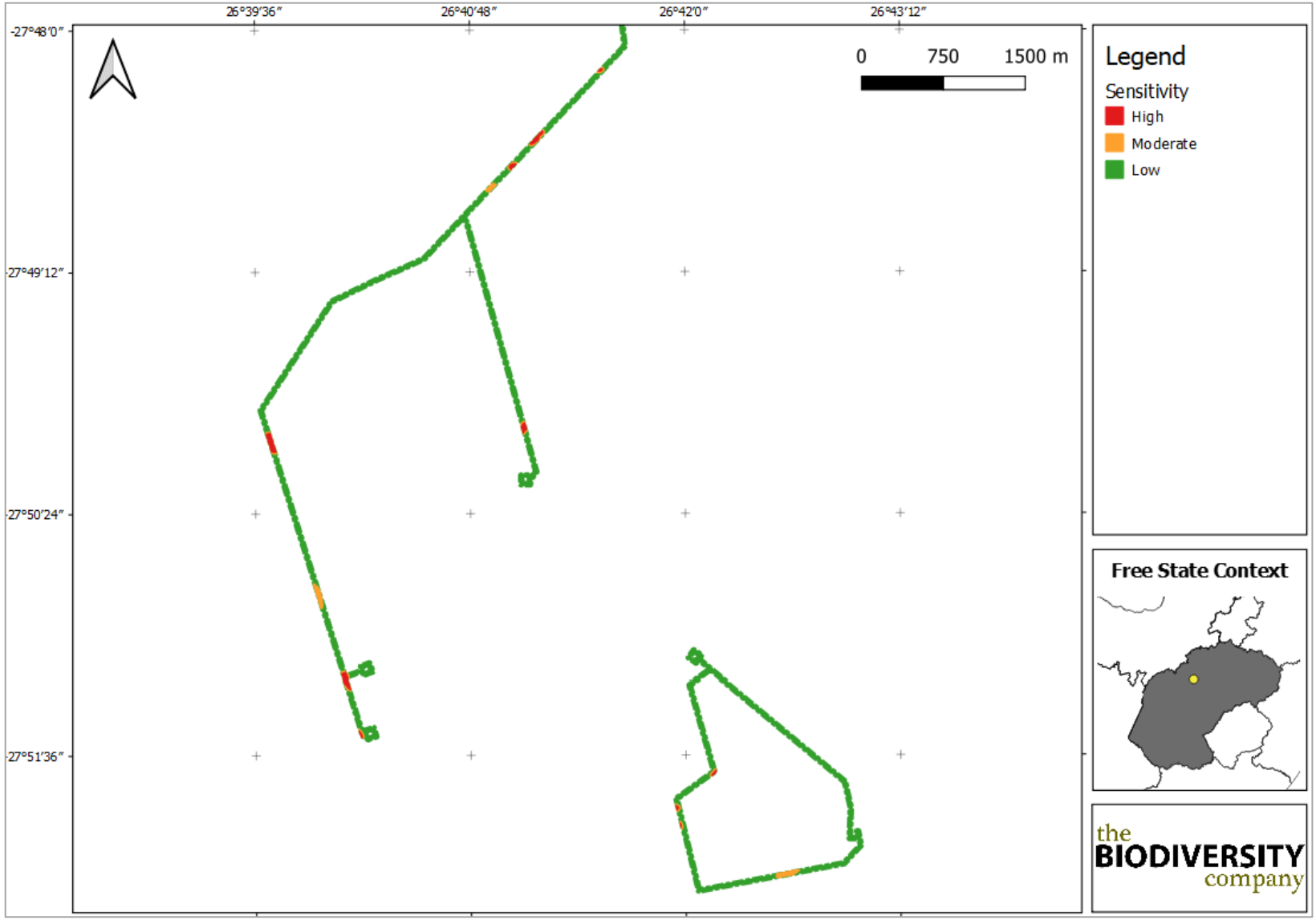


Figure 53: **Wetland sensitivity for Phase 2 (south) (TBC, 2020a)**

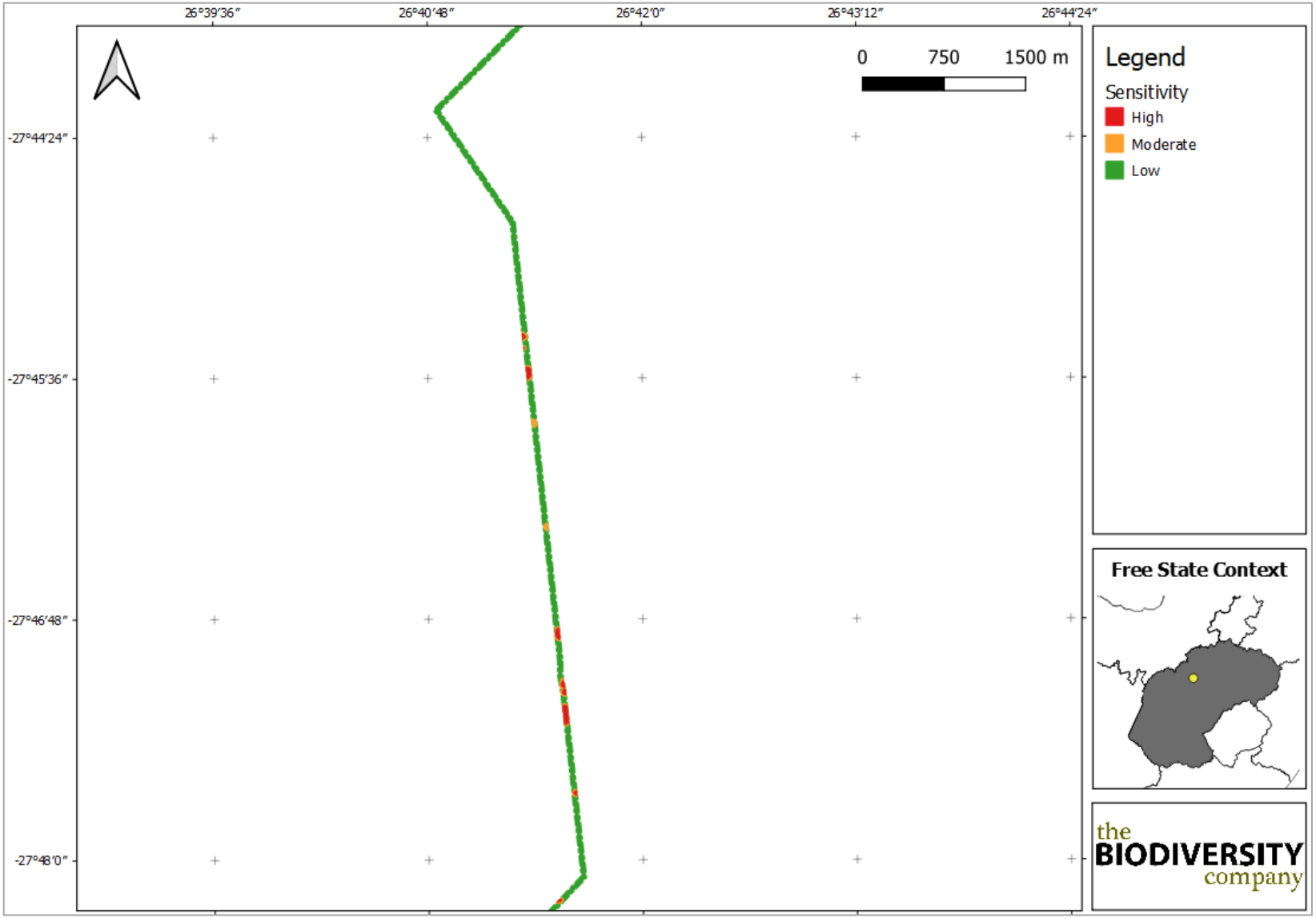


Figure 54: Wetland sensitivity for Phase 2 (central) (TBC, 2020a)

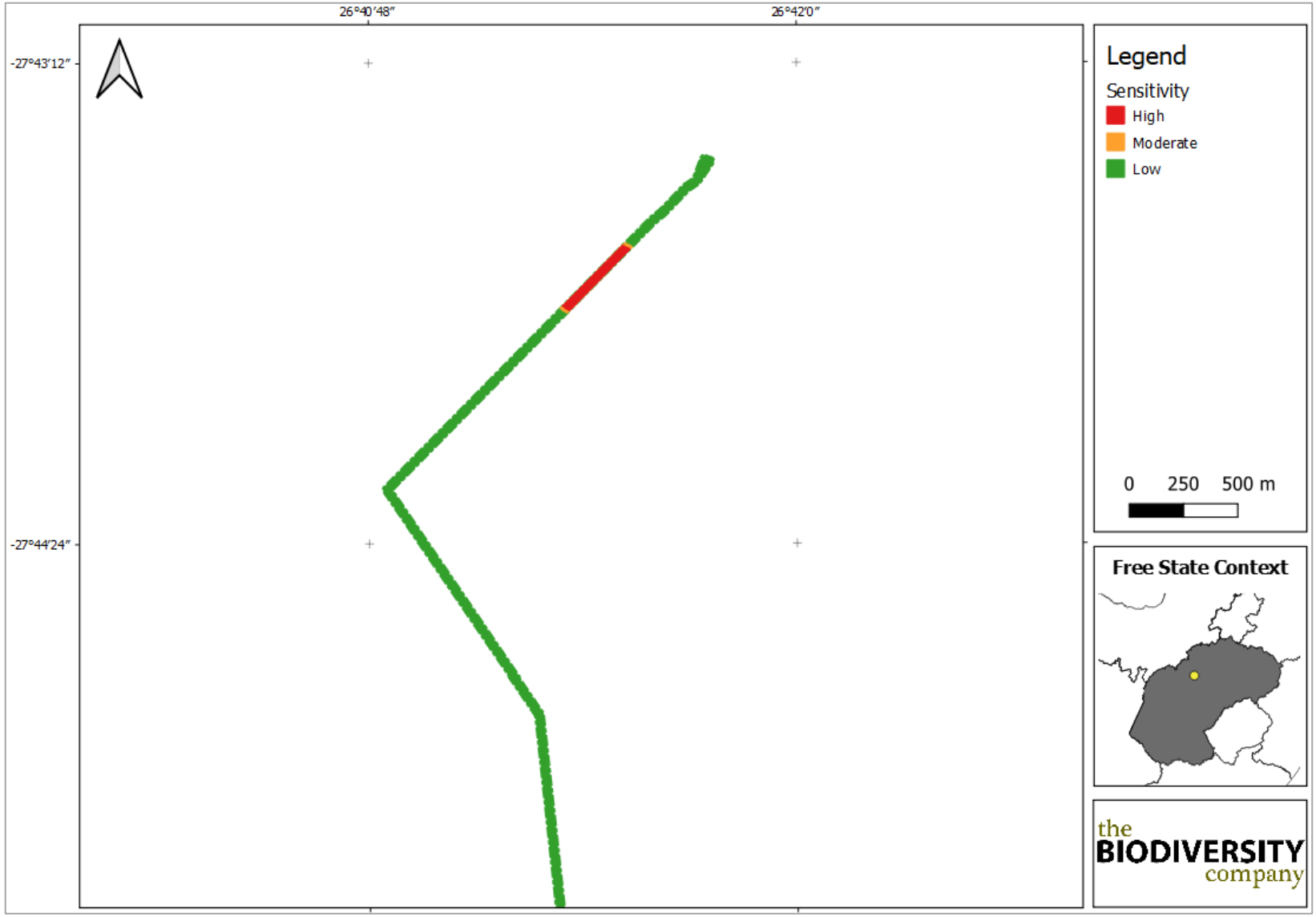


Figure 55: **Wetland sensitivity for Phase 2 (north) (TBC, 2020a)**

13.3.5 Impact Assessment

Refer to **Section 14.11.12** below for the results from the impact assessment from this study.

13.3.6 Conclusions

A total of 4 and 18 individual natural wetland HGM units were identified and delineated within the 40m survey corridor for the Phase 1 and Phase 2 Power Lines, respectively. Two non-HGM types are associated with Phase 2, and also three relic depressions.

The overall wetland health for Phase 1 ranges from largely modified (class D) to seriously modified (class E). The overall wetland health for Phase 2 ranges from moderately modified (class C) to seriously modified (class E). The EIS of all four HGM units associated with Phase 1 was determined to be low / marginal (class D). Most wetlands along the Phase 2 corridor have a low / marginal (class D) EIS. Only four (4) systems have a moderate (class C) EIS.

A 15m buffer area was determined to be suitable for the Project components. This is largely attributed to the presence of existing power line infrastructure along portions of the routes together with the implementation of Eskom best practice protocols and the prescribed mitigation.

All identified wetland HGM units were classified as having a High sensitivity while their associated 15m buffers were assigned a Moderate sensitivity. All other non-wetland areas within the 40m corridor were assigned a Low sensitivity from a water resource perspective.

Overall, all anticipated risks are considered to have a Low impact significance provided that the mitigation measures are effectively implemented. Under this assumption, it is the opinion of the specialist that the proposed development should not warrant any more than a General Authorisation in terms of water use licensing.

13.4 Terrestrial Ecology Assessment

A summary of the Terrestrial Ecology Assessment (TBC, 2020b) (contained in **Appendix G2**) follows.

13.4.1 Details of the Specialist

The details of the specialists that undertook the Terrestrial Ecology Assessment follow.

Organisation:	The Biodiversity Company
Name, Qualifications:	▪ L. Steyn - PhD Biodiversity and Conservation ▪ M. Erasmus - B-Tech Degree in Nature Conservation ▪ A. Husted - MSc Aquatic Health
Affiliation (if applicable):	South African Council for Natural Scientific Professions (SACNASP) Professional Natural Scientist (Registration No.: 400213/11)

13.4.2 Objectives of the Study

The objectives of this study included the following:

- Describe the baseline receiving environment specific to the field of expertise (general surrounding area as well as site specific environment);
- Identify and describe any sensitive receptors in terms of fauna & flora that occur in the Project area, and the manner in which these sensitive receptors may be affected by the activity;
- Identify 'significant' ecological, botanical and faunal features within the proposed Project areas;
- Identify conservation significant habitats around the Project area which might be impacted;
- Identify any critical issues (potential fatal flaws) that may result in Project delays or rejection of the application;
- Compile a map showing sensitive receptors in the Project area;
- Conduct risk assessments relevant to the proposed activity; and
- Suggest mitigation measures to address possible impacts.

13.4.3 Methodology

The assessment included the following tasks (amongst others):

- Existing data layers were incorporated into GIS software to establish how the proposed Project might interact with any ecologically important features;
- A botanical assessment was undertaken, which encompassed an assessment of all the vegetation units and habitat types within the Project area. This focused on an ecological assessment of habitat types as well as identification of any Red Data species within known distribution of the Project area;
- A faunal assessment was undertaken, which included the following:
  - The faunal desktop assessment encompassed:
    - Compilation of expected species lists;
    - Identification of any Red Data or SCC potentially occurring in the area; and
    - Emphasis was placed on the probability of occurrence of species of provincial, national and international conservation importance.
  - The field survey component of the assessment utilised a variety of sampling techniques including, but not limited to, the following -

- Visual observations;
- Identification of tracks and signs; and
- Utilization of local knowledge.

- Site selection for trapping focussed on the representative habitats within the Project area.

The survey was conducted in November 2020, during the wet season.

13.4.4 Key Findings of the Study

A description of the terrestrial ecological features in the Project area is contained in **Section 12.8** above.

Key findings from the study follow.

13.4.4.1 Vegetation Assessment

Protected Plant Species

Several protected plant species that are protected by the Free State Nature Conservation Ordinance 8 of 1969 were observed in various parts of the Project area and occurred throughout. According to the list of protected species under Schedule, if any individuals of these plant species are to be disturbed, permits must be obtained from the DESTEA.

Alien and Invasive Plants

Nine (9) alien and/or invasive plants were recorded during the field survey within the Project area.

13.4.4.2 Faunal Assessment

Three (3) mammal species were recorded in the Project area during the survey; based on either direct observation or the presence of visual tracks and signs. These species included Yellow Mongoose, Scrub Hare and Cape Ground Squirrel.

Two (2) reptile species, and no amphibian species were recorded in the Project area during the surveys, namely Wahlberg's Snake-eyed Skink and Cape Skink.

13.4.4.3 Habitat Assessment

The delineated habitat types identified in the Project area are shown in **Figures 56 – 57** (Phase 1) and **Figures 58 - 64** (Phase 2) below. A description of each habitat type follows below.

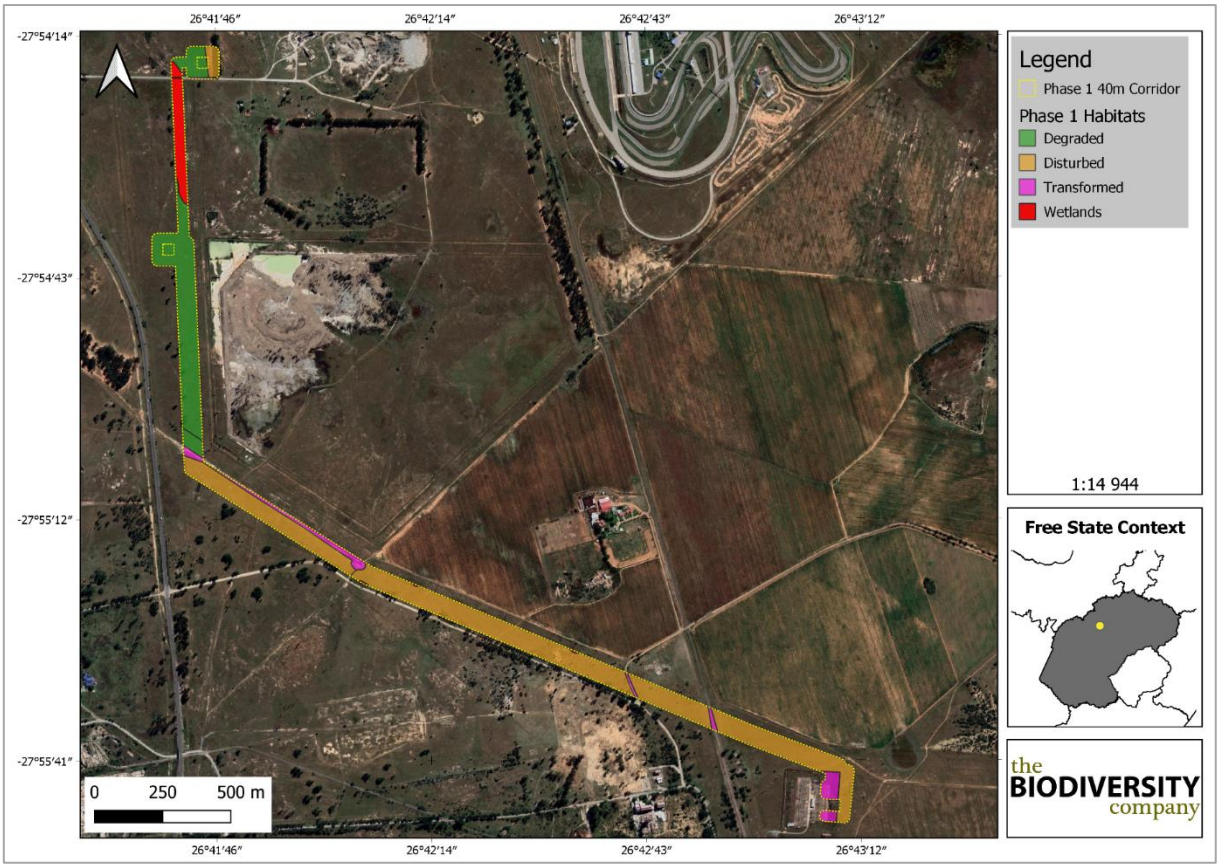


Figure 56: Habitats identified and delineated for Phase 1 (TBC, 2020b)

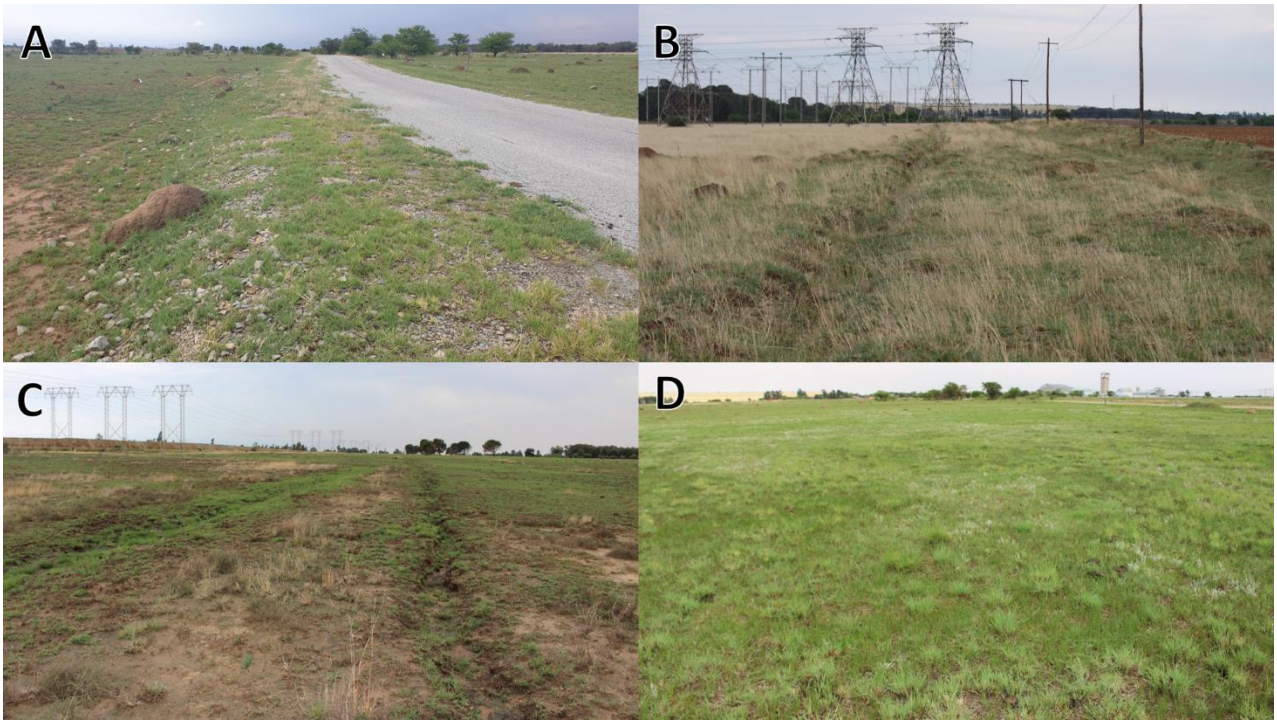


Figure 57: Habitats identified within the Phase 1 project area: A)Transformed, B) Disturbed, C) Degraded and D) Wetlands (TBC, 2020b)

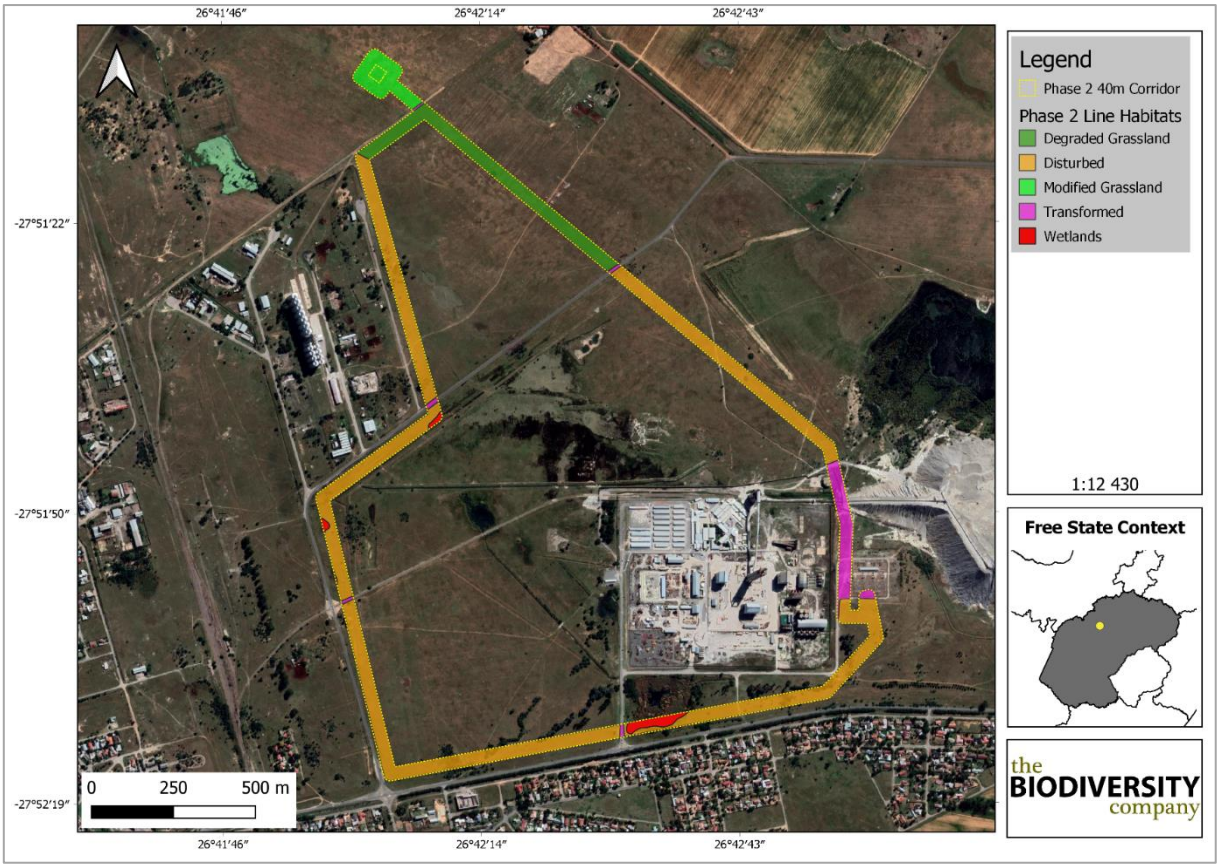


Figure 58: Habitats identified and delineated for Phase 2 – Map 1 (TBC, 2020b)

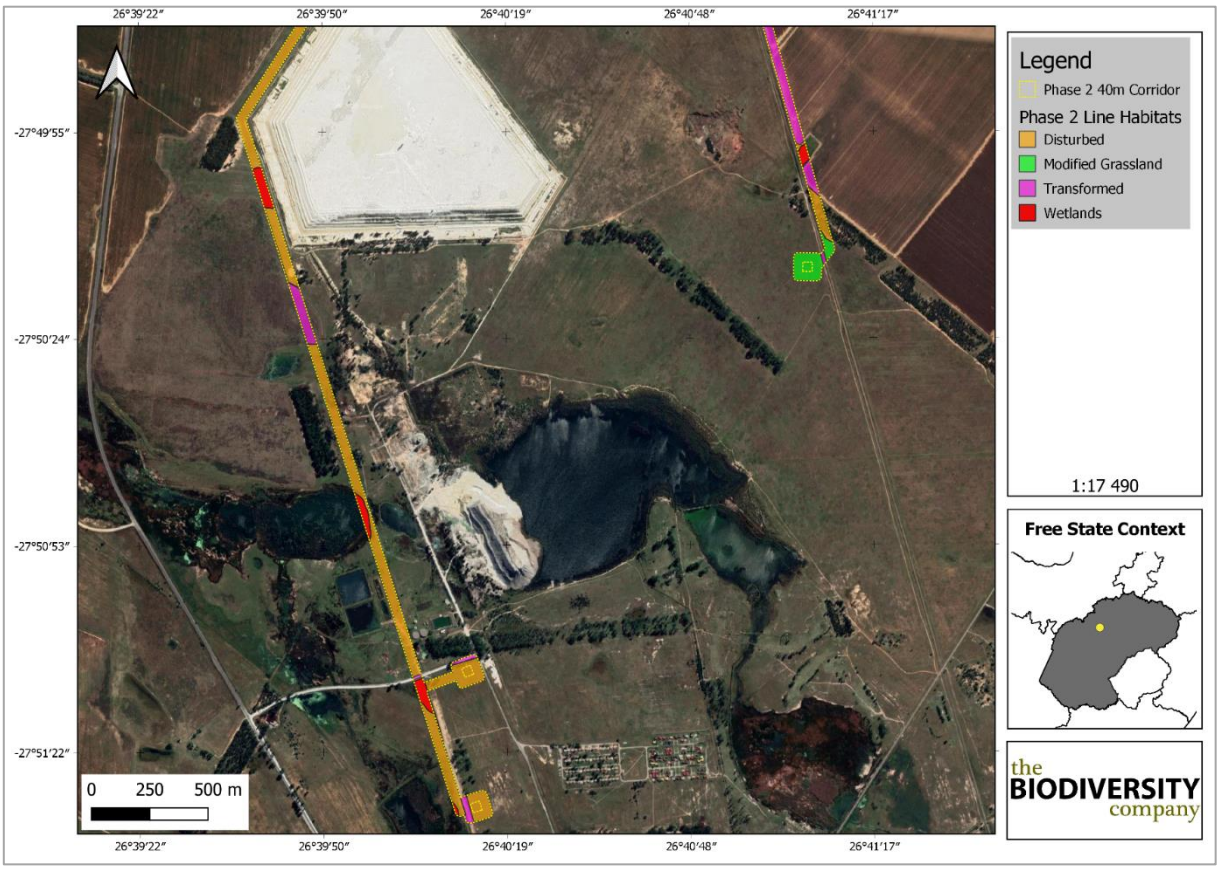


Figure 59: Habitats identified and delineated for Phase 2 – Map 2 (TBC, 2020b)

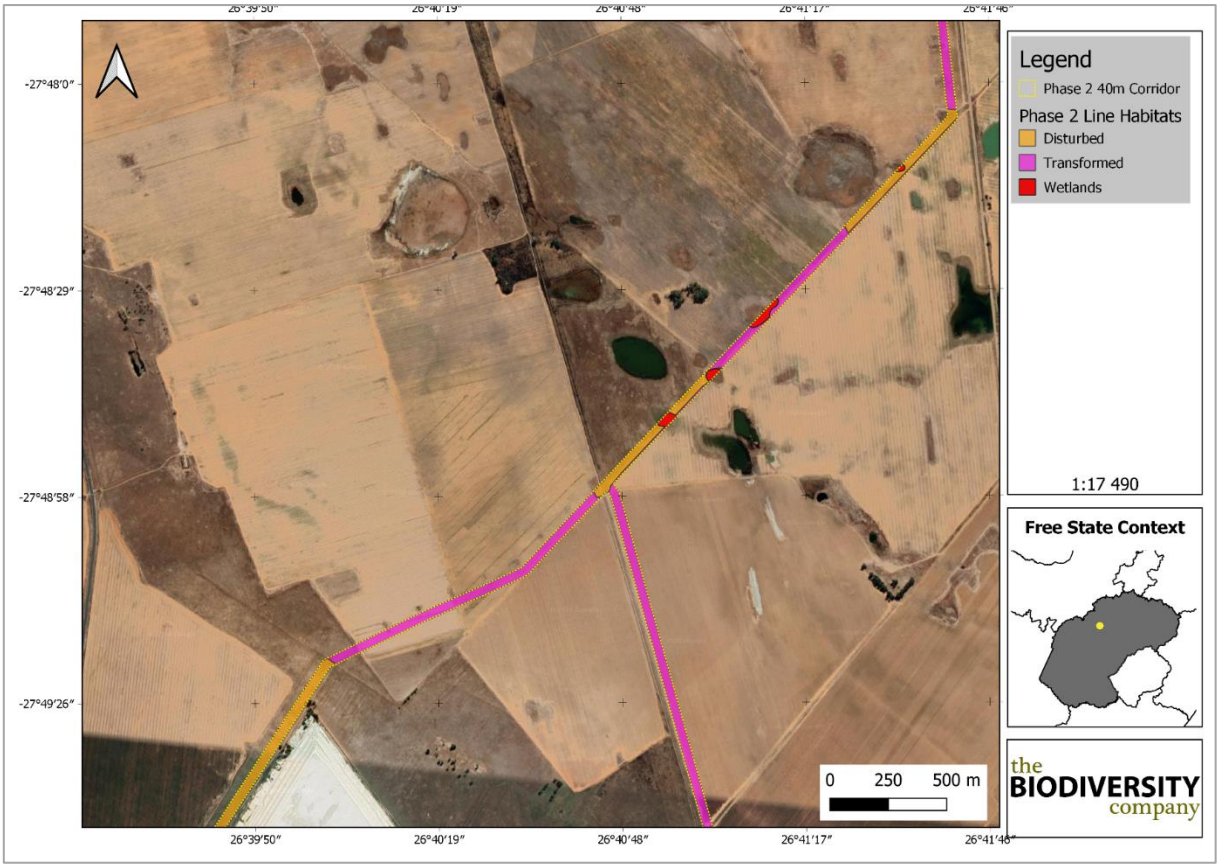


Figure 60: Habitats identified and delineated for Phase 2 – Map 3 (TBC, 2020b)

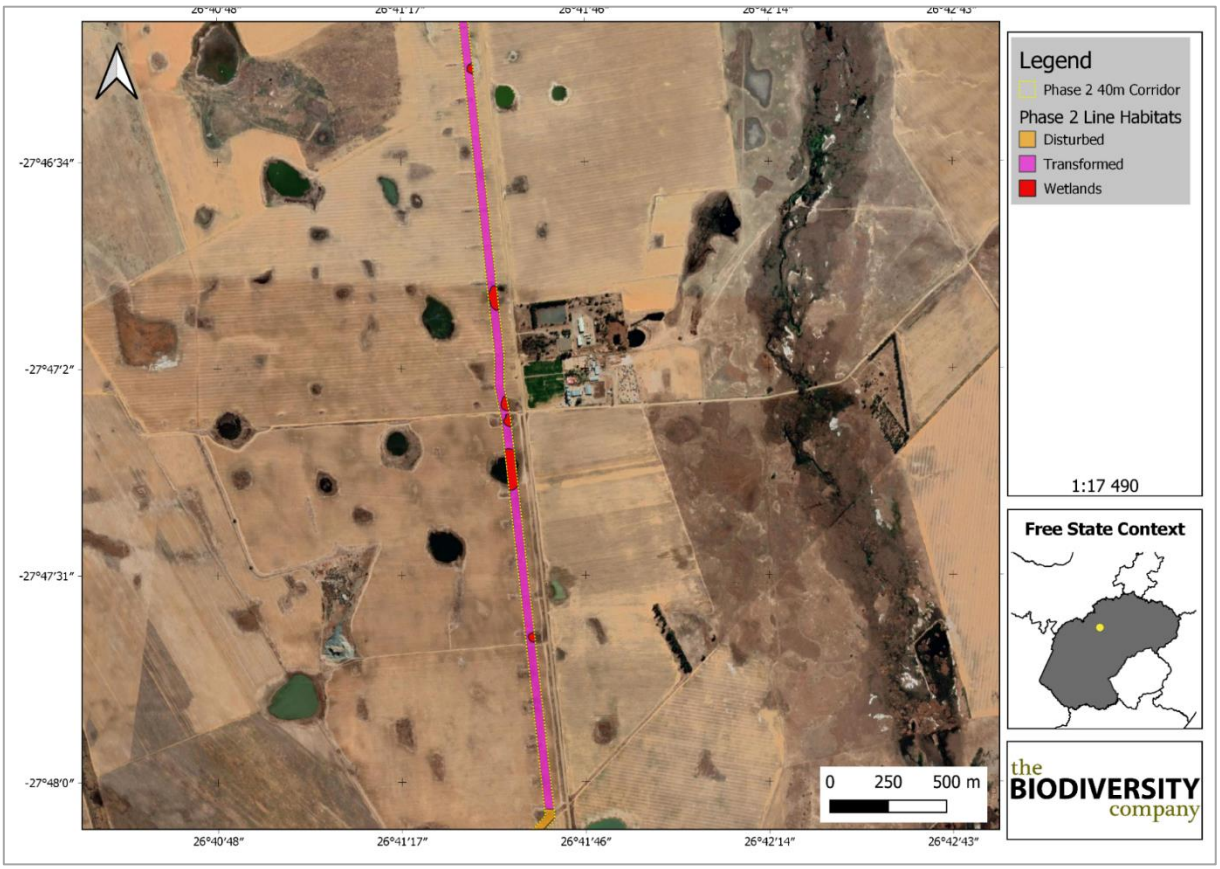


Figure 61: Habitats identified and delineated for Phase 2 – Map 4 (TBC, 2020b)

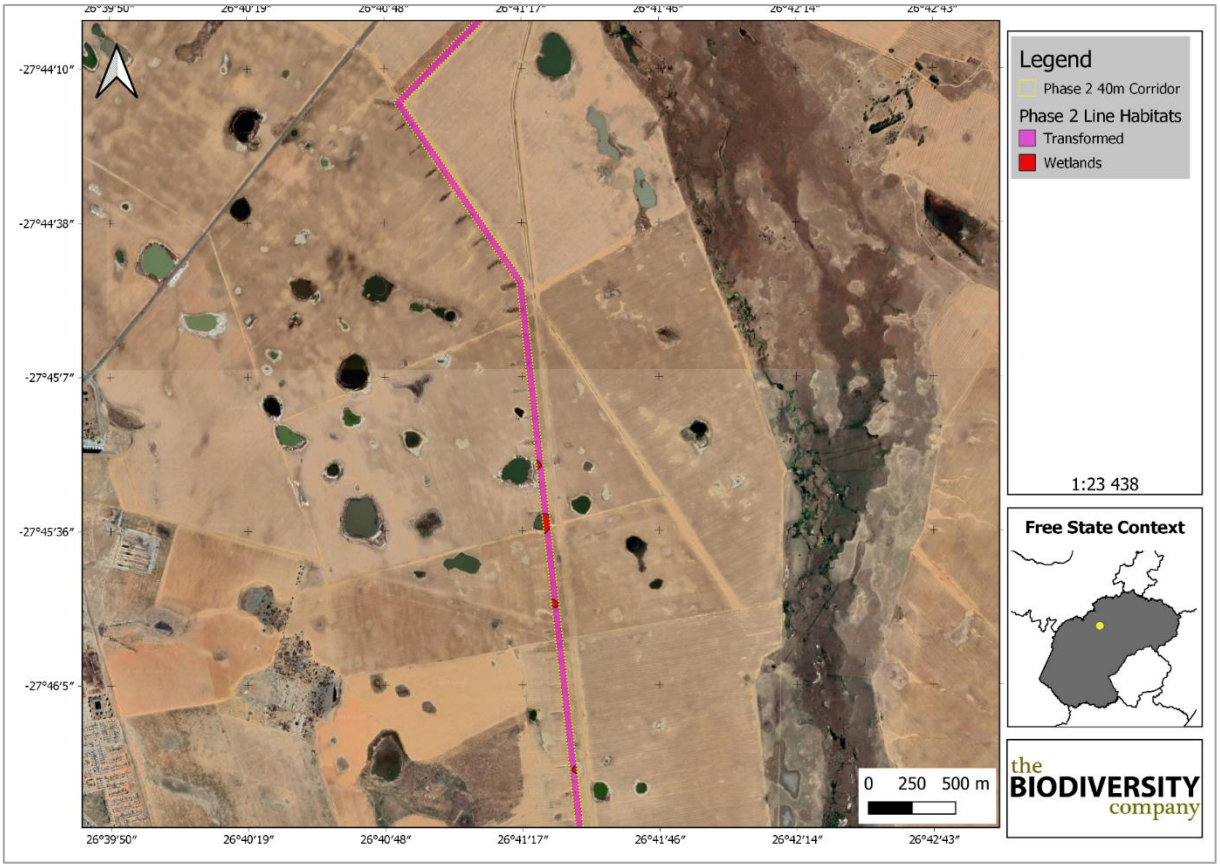


Figure 62: Habitats identified and delineated for Phase 2 – Map 5 (TBC, 2020b)

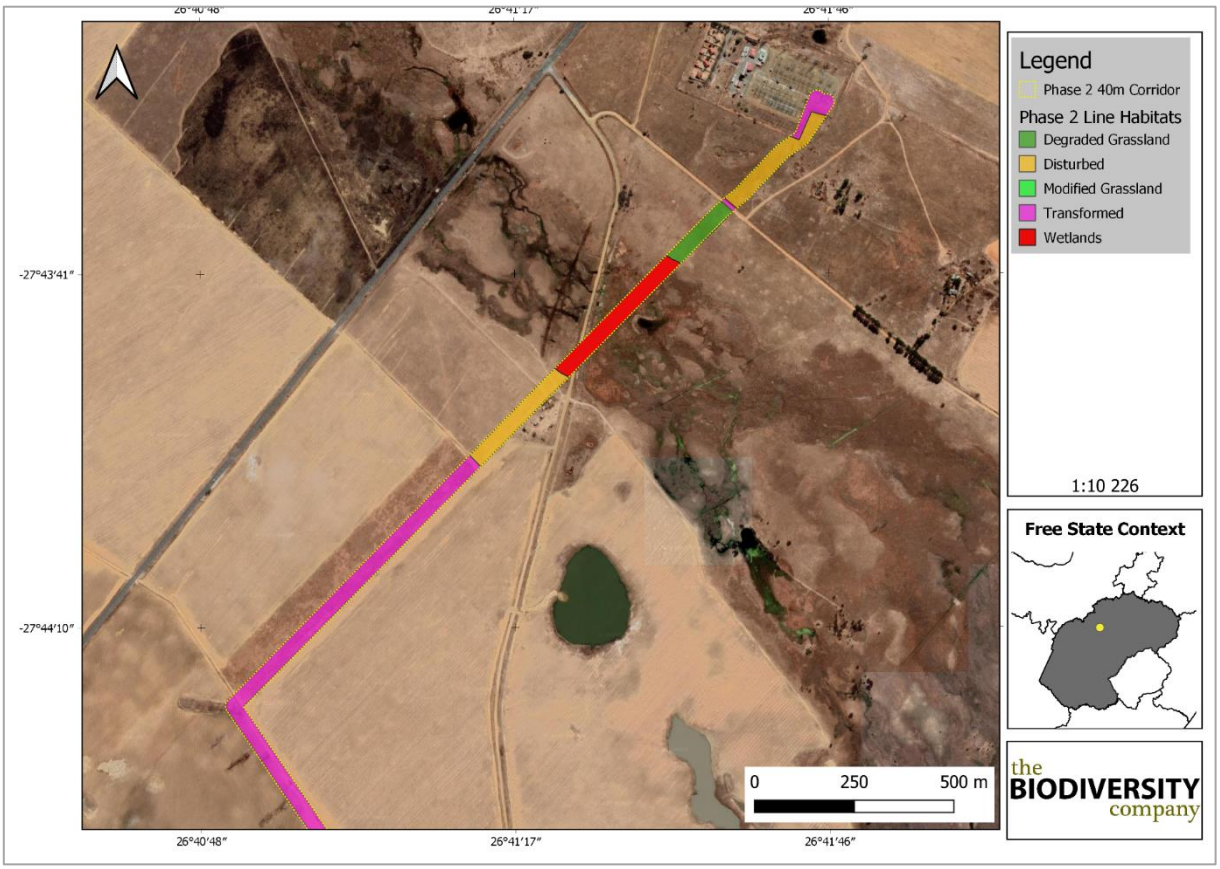


Figure 63: Habitats identified and delineated for Phase 2 – Map 6 (TBC, 2020b)

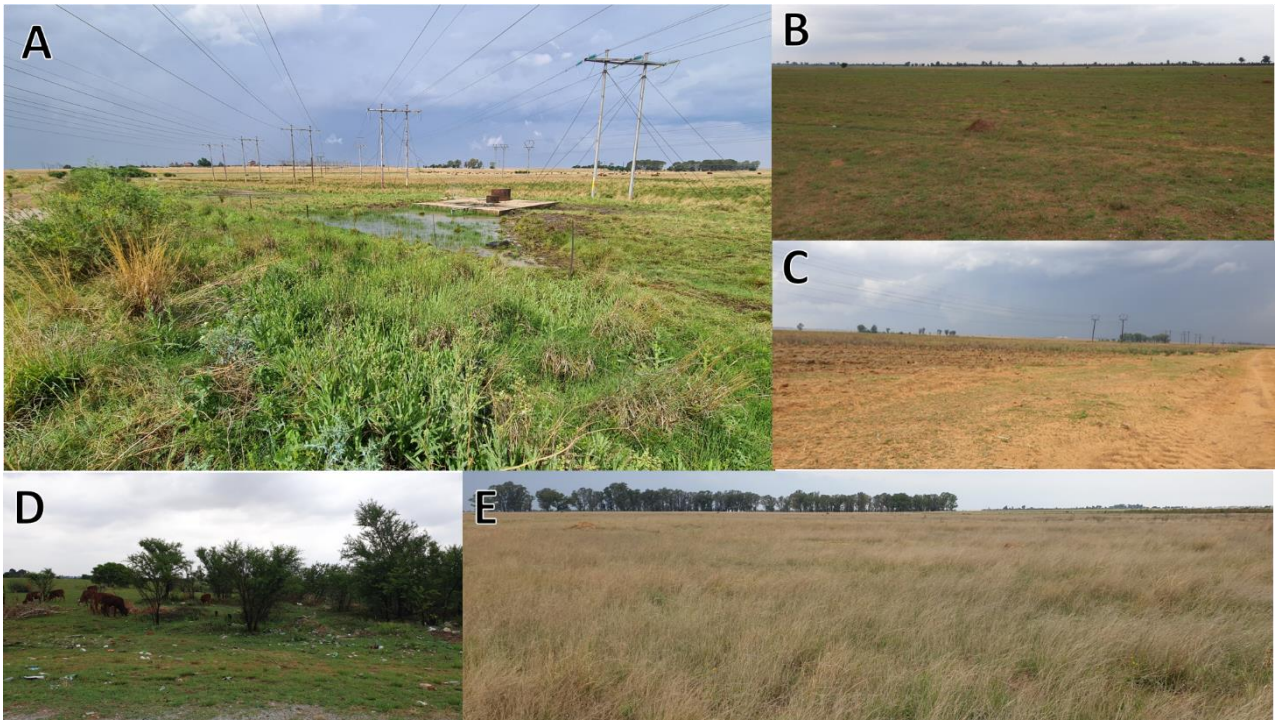


Figure 64: Photographs of the habitats identified in the Phase 2 project area: A) Wetlands , B & E) Modified Grassland, C) Transformed and D) Disturbed (TBC, 2020b)

Degraded Grassland

The condition of these grassland has been degraded, mainly due to overgrazing by livestock (cattle and goats). The current ecological condition of this habitat in regard to the main driving forces, are intact; which is evident in the amount of, and importance of the species recorded in the faunal assessment, and also to the high species diversity and number of plant species recorded. This habitat includes areas where the grassland has been altered due to historic and/or current human activity and the associated incidental impacts. The sensitivity of these areas is regarded as moderate due to the fact that these areas are connected to more sensitive habitats, thus not only forms a buffer but also part of the movement corridor. This habitat also has a higher potential to returning to a more natural state if left undisturbed.

The degraded Grassland was rated with a moderate sensitivity because it:

- May serve as and represent CBA and ESA if enabled to recover, as per the Conservation Plan; and
- May support various species and may play an important role in the ecosystem if left to recover from the superficial impacts.

Modified Grassland

This habitat includes areas where the grassland has been altered due to historic agriculture where these areas were used for agricultural lands. This habitat is regarded as modified due to the nature of the modification of the area however has been able to recover

somewhat to a point where it can support biodiversity. Due to the nature of this habitat, it is regarded as having a moderate sensitivity.

Disturbed

This habitat is regarded as areas that has been impacted by edge effects of transformed areas as well as direct impacts from livestock, dumping and infringement. These habitats are not entirely transformed but in a constant disrobed state as it can't recover to a more natural state due to ongoing disturbances and impacts it receives from the transformed areas. These areas are considered to have a low-moderate sensitivity due to the fact that these areas may be used as a movement corridor and in many cases form a barrier between the more natural grassland and the disturbed/transformed areas.

Transformed

This habitat unit represents all areas of urban area, mining areas, agriculture and infrastructure such as roads .This habitat is regarded as transformed due to the nature of the modification of the area to such a point where it wouldn't be able to return to its previous state. Due to the transformed nature of this habitat, it is regarded as having a low sensitivity.

Wetlands

This habitat unit represents the watercourse and wetland areas with the grasslands that it is connected to. The wetlands habitats are according to the Water Resource Assessment report (TBC, 2020a). This habitat type is regarded as intact and therefore natural, but slightly disturbed due to grazing by livestock and the surrounding land uses like mining and agriculture. Despite this and due to its limited distribution in the landscape, this habitat is regarded as having a high sensitivity.

13.4.4.4 Sensitivity Analysis

The sensitivity maps for Phase 1 and Phase 2 are shown in **Figure 65** and **Figure 66 – 71** below, respectively.

In terms of terrestrial habitats, areas that were classified as having a low-moderate sensitivity are those areas which were deemed by the specialists to have been impacted upon and/or were disturbed from their original condition due to historic and recent impacts associated the anthropogenic presence throughout. Areas with a high sensitivity are the wetland habitats identified.

It is important to note that this map does not replace any local, provincial or government legislation relating to these areas or the land use capabilities or sensitivities of these environments but is done in relation to the legislation.

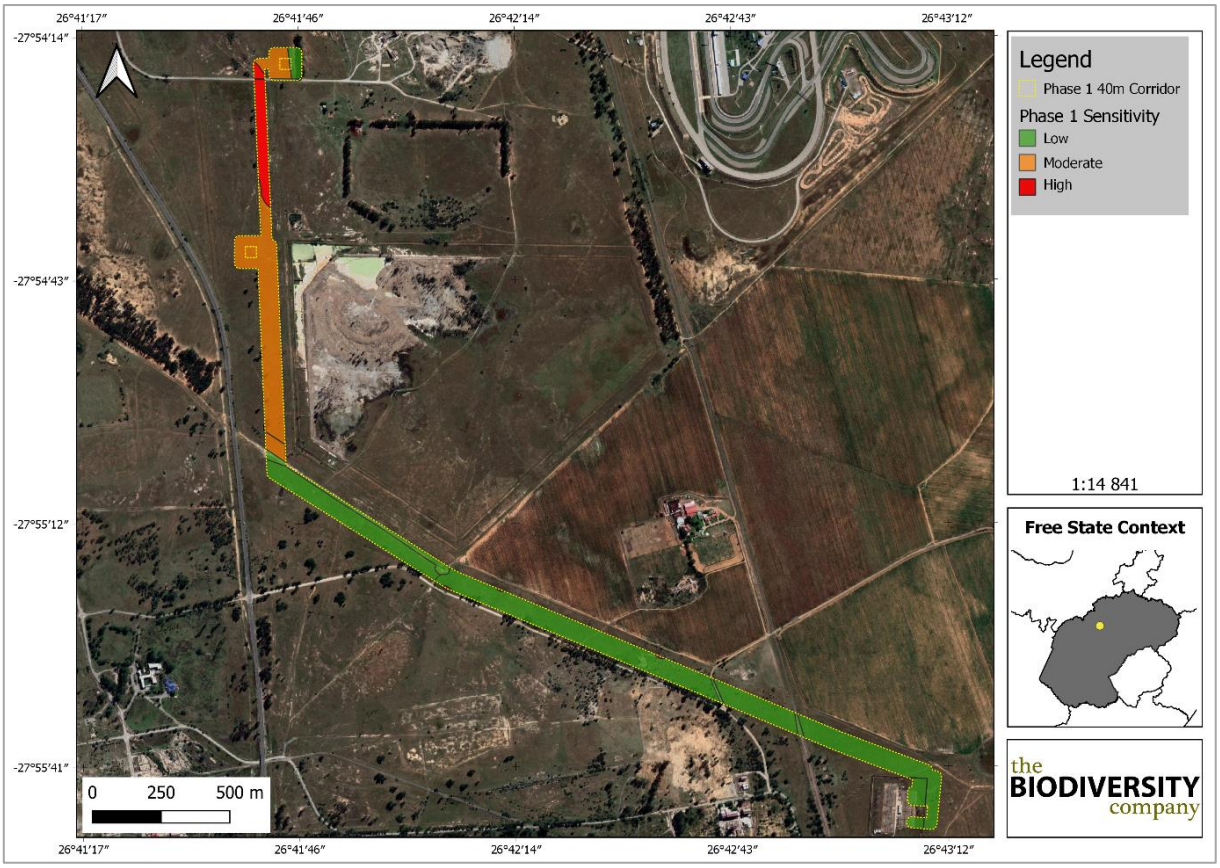


Figure 65: Terrestrial biodiversity sensitivity for Phase 1 (TBC, 2020b)

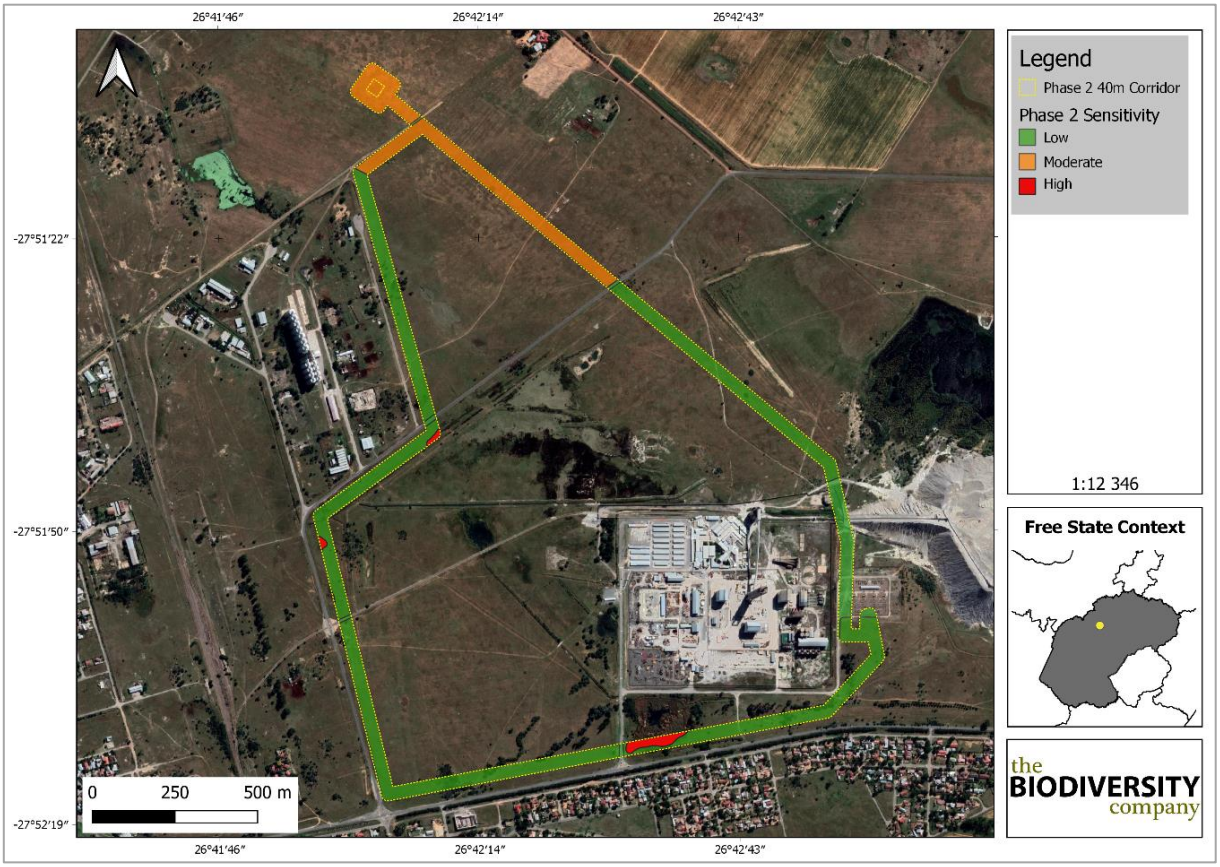


Figure 66: Terrestrial biodiversity sensitivity for Phase 2 – Map 1 (TBC, 2020b)

Figure 67: Terrestrial biodiversity sensitivity for Phase 2 – Map 2 (TBC, 2020b)

Figure 68: Terrestrial biodiversity sensitivity for Phase 2 – Map 3 (TBC, 2020b)

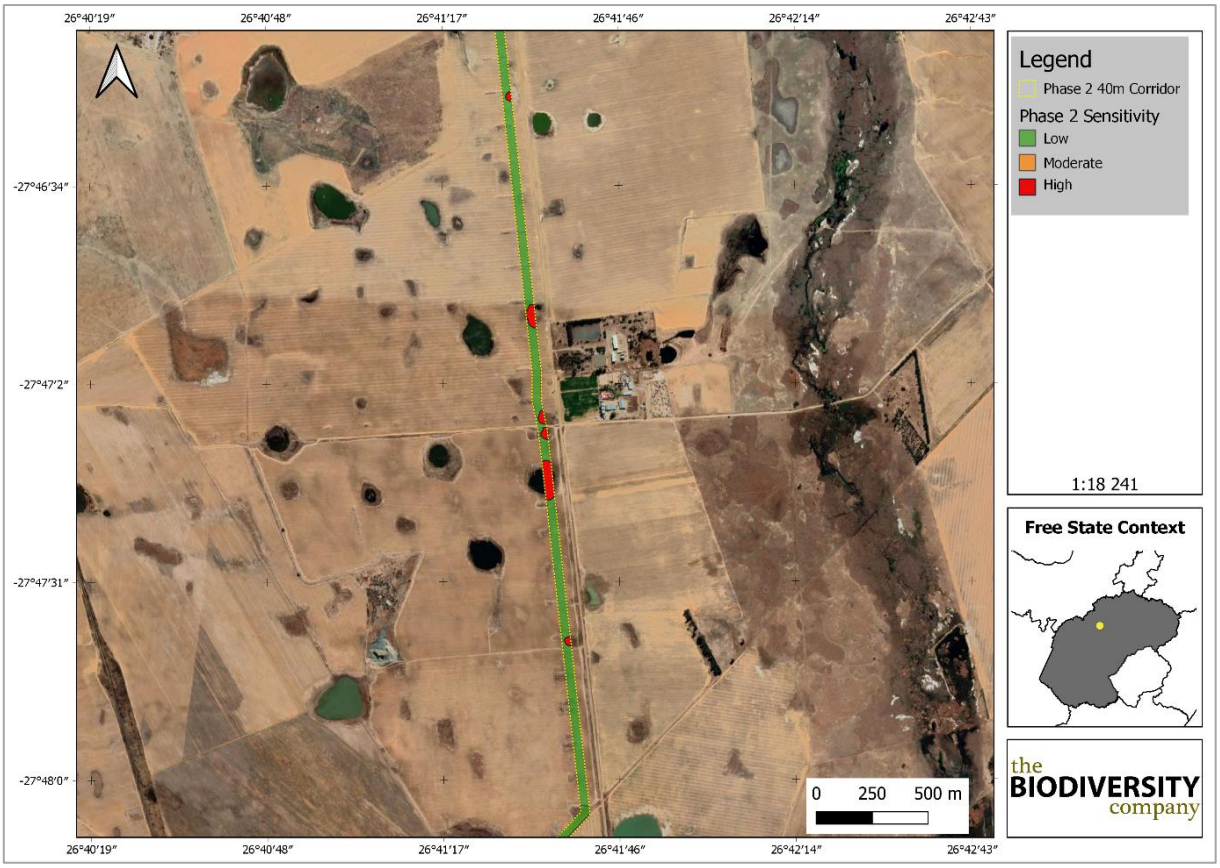


Figure 69: Terrestrial biodiversity sensitivity for Phase 2 – Map 4 (TBC, 2020b)

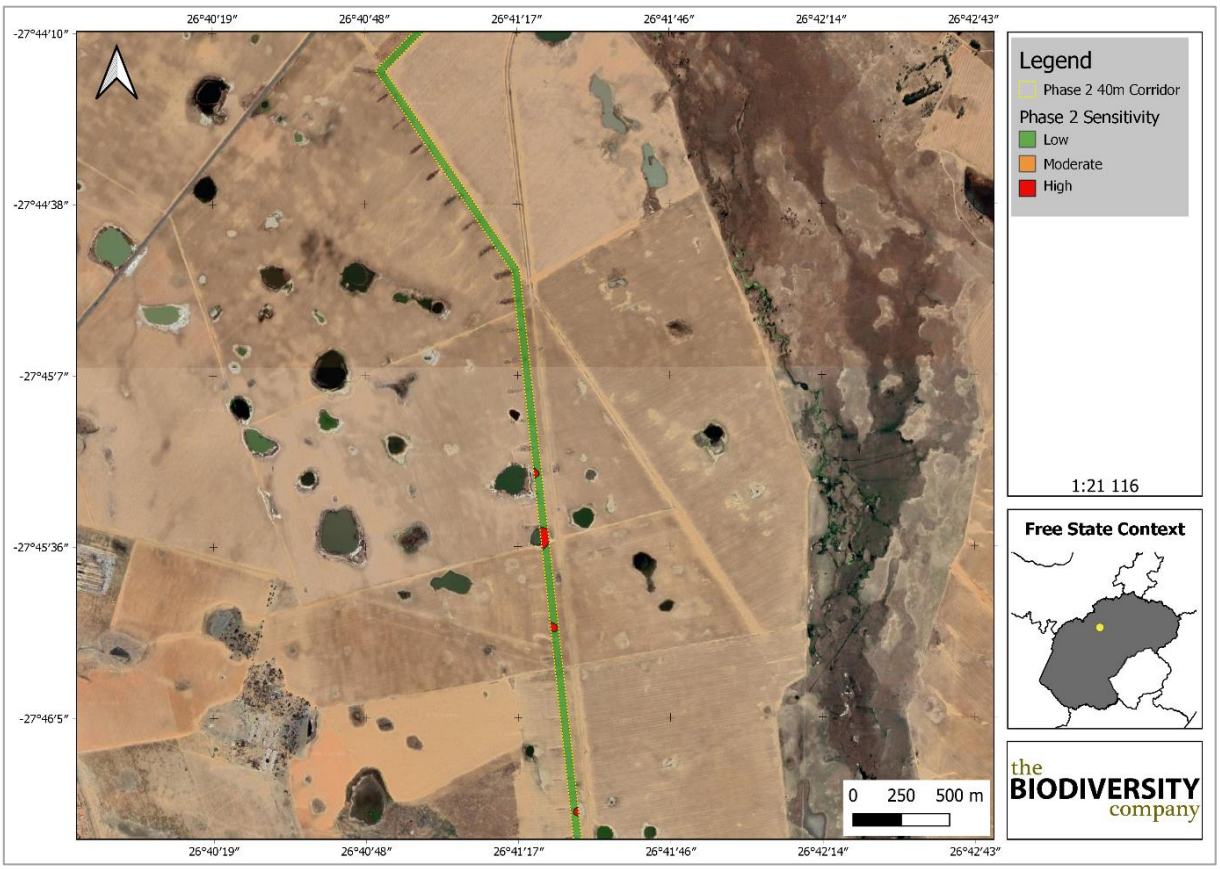


Figure 70: Terrestrial biodiversity sensitivity for Phase 2 – Map 5 (TBC, 2020b)

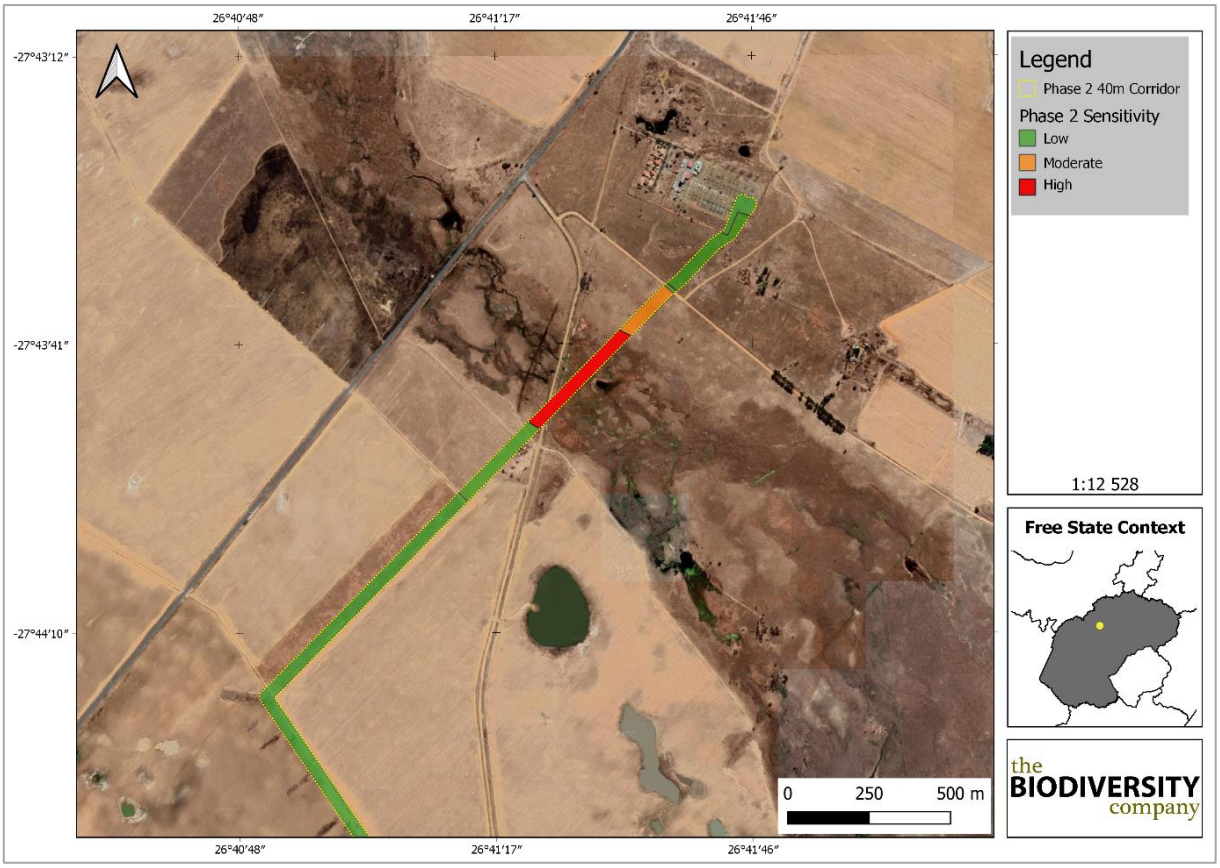


Figure 71: Terrestrial biodiversity sensitivity for Phase 2 – Map 6 (TBC, 2020b)

13.4.5 Impact Assessment

Refer to **Section 14.12** below for the results from the impact assessment from this study.

13.4.6 Conclusions

The Project area has been altered both currently and historically. However, the degraded grassland can be regarded as important, not only within the local landscape, but also regionally; as they are used for habitat, foraging and movement corridors for fauna within a fragmented landscape to more natural areas where they may reproduce. The degraded Grassland was rated with a moderate sensitivity.

The ecological integrity, importance and functioning of these terrestrial biodiversity areas provide a variety of ecological services considered beneficial, with one key service being the maintenance of biodiversity. The preservation of these systems is the most important aspect to consider for the proposed project. The wetland habitats are important due to their inherent environmental function and the Water Resource Assessment Report (TBC, 2020a) needs to be consulted in relation to that component.

Considering the above-mentioned information, no fatal flaws are evident for the proposed Project. It is the opinions of the specialists that the Project, may be favourably considered, should on condition all prescribed mitigation measures and supporting recommendations are implemented.

13.5 Avifaunal Assessment

A summary of the Avifaunal Assessment (TBC, 2020c) (contained in **Appendix G3**) follows.

13.5.1 Details of the Specialist

The details of the specialist that undertook the Avifaunal Assessment follow.

Organisation:	The Biodiversity Company
Name:	T. Clark
Qualifications:	MSc Zoological Science
Affiliation (if applicable):	SACNASP Professional Natural Scientist (Registration No.: 121338)

13.5.2 Objectives of the Study

The objectives of this study included the following:

- Undertake baseline survey and describe affected environment within the Project's footprint from an avifauna biodiversity perspective;
- Identify avifaunal SCC. Prepare an avifaunal sensitivity map with the use of GIS, based on the findings of the study; and
- Assess impacts to avifauna associated with the Project and recommend suitable mitigation measures.

13.5.3 Methodology

The assessment included the following tasks (amongst others):

- Incorporate existing data layers into GIS software to establish how the proposed Project might interact with any ecologically important entities as relevant to avifauna;
- Identify expected species likely to occur in the area, making use of the relevant datasets;
- Undertaken sampling, consisting of standardized point counts as well as random incidental surveys; and
- Analise and present sampling data.

13.5.4 Key Findings of the Study

A description of the avifauna in the Project area is contained in **Section 12.8.4.1** above. Key findings from the study follow.

13.5.4.1 Review of Renewable Energy Projects in proximity to the Site

According to the REEA Database (http://egis.environment.gov.za/), there are five (5) renewable energy applications in close vicinity to the Project area (see **Figure 72** below). This increases the overall impact on the avifauna in the area.

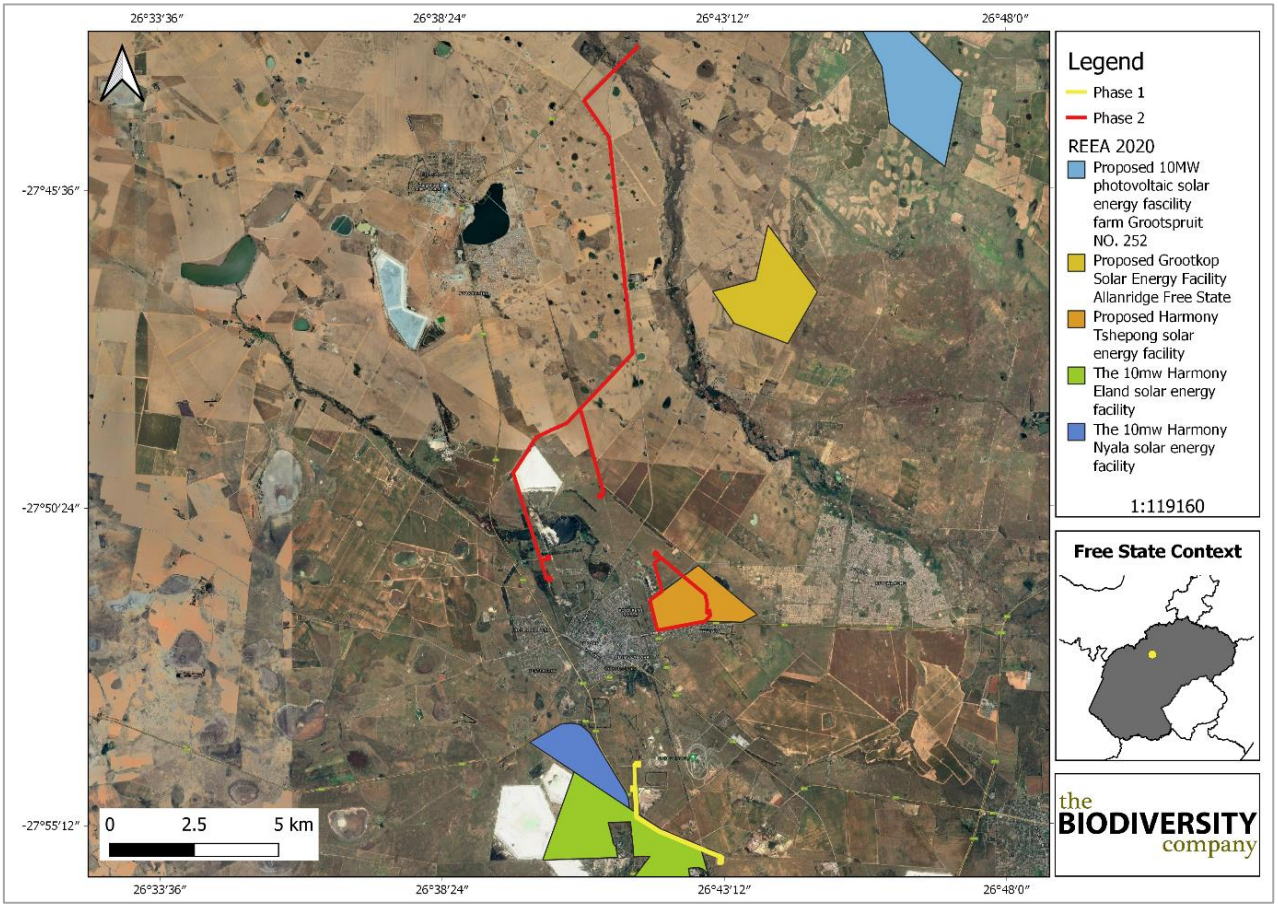


Figure 72: The Project Area in relation to nearby renewable energy projects (TBC, 2020c)

13.5.4.2 Site Diversity

A combined total of 71 bird species were recorded during both dry and wet season, point count surveys along the proposed Phase 1 and 2 Power Line routes. This represents a considerable proportion of the of the regional diversity as defined by the Area of Interest (AOI) considering the linear nature of the Project area and the limited structural complexity and diversity of habitats (mainly comprised of transformed grassland interspersed with shallow pans). A combination of SABAP 2 data (190 spp.) together with the 16 species collected during the combined baseline survey (140 spp. for both linear and non-linear studies) places the known regional diversity at 206 species.

Results indicate that species richness, abundance and overall diversity (as indicated by the Shannon diversity index) was considerably higher along the Phase 2 Power Line routes as compared to the Phase 1 routes. This is attributable to the higher habitat diversity along

the longer Phase 2 Power Line which also hosts wetlands, a habitat which is distinctly lacking from the Phase 1 route.

Comparisons in species richness between dry (36 spp.) and wet (61 spp.) season surveys revealed a strong seasonal bias. Although some of the heightened species richness recorded during the wet season is attributable to the arrival of migratory species, the majority is accounted for by the increased prevalence of cryptic grassland species.

Table 17 below provides a list of the top ten most abundant species (together with the frequency with which each species appeared in the point count samples) for each project phase. Together these species account for 87% and 70% of the total number of observed individuals along the Phase 1 and Phase 2 Power Line routes, respectively. This data reveals that common, adaptable and commensal species (e.g. White-browed Sparrow-Weaver and Laughing Dove) characterise the exclusively terrestrial (and degraded) habitat along the Phase 1 routes while waterbirds (e.g. Greater Flamingo and Red-billed Teal) are by far the most abundant birds along the Phase 2 routes which traverses an extensive section of panveld in mostly transformed (by crop cultivation) grassland.

Table 17: Top ten most abundant species found in the Project Areas (TBC, 2020c)

Common Name	Scientific Name	Relative Abundance	Frequency (%)
Phase 1			
White-browed Sparrow-Weaver	*Plocepasser mahali*	24.43	20.00
Laughing Dove	*Spilopelia senegalensis*	15.27	6.00
Red-billed Quelea	*Quelea quelea*	11.45	2.00
Cape Turtle (Ring-necked) Dove	*Streptopelia capicola*	9.16	12.00
Southern Masked Weaver	*Ploceus velatus*	6.11	8.00
African Pipit	*Anthus cinnamomeus*	6.11	12.00
African Quail-finch	*Ortygospiza atricollis*	4.58	2.00
Rufous-naped Lark	*Mirafra africana*	4.58	8.00
Barn Swallow	*Hirundo rustica*	3.05	2.00
Pied Crow	*Corvus albus*	3.05	4.00
Phase 2			
Greater Flamingo	*Phoenicopterus roseus*	15.27	2.45
Red-billed Teal	*Anas erythrorhyncha*	11.36	3.68
White-faced Whistling Duck	*Dendrocygna viduata*	8.76	1.23
Red-knobbed coot	*Fulica cristata*	8.17	2.45
Glossy Ibis	*Plegadis falcinellus*	6.63	1.84
Cape Shoveler	*Spatula smithii*	5.56	1.23
Red-billed Quelea	*Quelea quelea*	4.38	2.45
Cape Turtle (Ring-necked) Dove	*Streptopelia capicola*	3.79	7.36
Little Grebe	*Tachybaptus ruficollis*	3.67	4.29
Helmeted Guineafowl	*Numida meleagris*	2.49	2.45

13.5.4.3 Sampling Adequacy

Sampling effort along the power line routes is deemed adequate and the inventory considered largely representative of the bird community that inhabits these areas.

13.5.4.4 Habitat Diversity

Three broad avifaunal habitat types were identified within the Project area namely Wetlands (unchanneled valley-bottoms and semi-ephemeral pans), Grasslands and Transformed (grassland habitat degraded or destroyed through crop cultivation, alien plant encroachment or other anthropogenic land use practices). The planned route for the shorter Phase 1 Power Lines covers only terrestrial habitat comprised of Grassland and Transformed (infrastructure, alien bush clumps and croplands) habitats while the longer Phase 2 Power Lines cover Wetland and Transformed (mostly croplands) habitats.

Along the Phase 1 Power Line route, diversity was considerably higher in the Grassland habitat as compared to the Transformed habitat. The transformed habitats tended to be dominated by a smaller number of resilient “garden” species while the natural habitats supported a more diverse array grassland adapted species.

Along the Phase 2 Power Line route, diversity was slightly higher in the Wetlands habitat than it was in the Transformed habitat. Both habitat types in this area supported a high avian diversity which was is attributable to the abundance of both natural and artificially created / enhanced wetland habitat which provides ideal habitat for a wide diversity of waterbirds.

13.5.4.5 Habitat Uniqueness

The bird assemblages that characterise the natural habitats (Grassland for Phase 1 and Wetlands Phase 2) are largely distinct from those that occupy the Transformed habitats. This differentiation is most pronounced along the Phase 2 route where the distinction (in terms of habitat quality) between natural and transformed habitats is greatest as compared to the Phase 1 route where the integrity of natural grassland has been compromised and therefore supports several species common to both habitats.

13.5.4.6 Species of Conservation Concern

A total of 15 IUCN Red-listed species have the potential to occur within the AOI as defined by the six SABAP 2 pentads covering the greater Project area (listed in **Table 18** below). Of these, the majority (14 spp.) are likely to occur along the Phase 2 Power Line route while a lack of suitable habitat limits the SCC likely to occur along the Phase 1 route (4 spp.).

Except for Black Stork, the Phase 2 route traverses’ habitat capable of supporting all the regionally occurring SCC avifauna and all remaining natural areas between the croplands

(mostly associated with wetlands) should be considered to be of high avifaunal importance and sensitivity. The Phase 1 Power Line route, in contrast, is not considered sensitive or important from an avifaunal perspective as it is only likely to be visited by a small compliment of wider ranging and adaptable SCC such as Lanner Falcon, Falcon, Red-footed, Black-winged Pratincole and Abdim's Stork.

Table 18: List of present and potentially occurring red-listed avifauna (TBC, 2020c)
(Species in bold were observed on site)

Common Name	Scientific Name	Phase		SABAP 2	Status (Regional, Global)
		P 1	P 2		
African Marsh Harrier	*Circus ranivorus*	4	3	x	EN, LC
Yellow-billed Stork	*Mycteria ibis*	4	2	x	EN, LC
Secretarybird	*Sagittarius serpentarius*	4	3	x	VU, VU
Lanner Falcon	*Falco biarmicus*	3	2	x	VU, LC
Black Stork	*Ciconia nigra*	4	4	x	VU, LC
Caspian Tern	*Sterna caspia*	4	2		VU, LC
Maccoa Duck	***Oxyura maccoa***	**4**	**1**	**x**	**NT, VU**
Falcon, Red-footed	*Falco vespertinus*	3	3		NT, NT
Chestnut-banded Plover	*Charadrius pallidus*	4	2	x	NT, NT
Black-winged Pratincole	*Glareola nordmanni*	3	2	x	NT, NT
Lesser Flamingo	***Phoeniconaias minor***	**4**	**1**	**x**	**NT, NT**
Blue Korhaan	*Eupodotis caerulescens*	4	2	x	LC, NT
Curlew Sandpiper	*Calidris ferruginea*	4	2	x	LC, NT
Greater Flamingo	***Phoenicopterus roseus***	**4**	**1**	**x**	**NT, LC**
Abdim's Stork	*Ciconia abdimii*	2	2		NT, LC

13.5.4.7 Collision Prone Species

The proposed powerlines by their very nature are likely to pose a collision and electrocution risk to avifauna. Research suggests that some species are more prone to these risks than others. Those prone to collision and electrocution tend to be larger-bodied species whose low power to weight ratios during flight afford lower in-flight manouvarability. Other collision prone species include those that are distracted in flight (hunting or displaying); crepuscular species or those commuting during low light conditions. Additionally, birds which make regular short-distance commutes in large flocks such as ibises, ducks and other waterbirds are also more prone to collision as the birds flying in the rear will not be able to detect the powerlines.

Species particularly prone to electrocution typically involve species with large bodies and / or wingspans that are capable of touching conductors and ground/earth wires or earthed devices simultaneously. The chances of electrocution are increased when feathers are wet, during periods of high humidity or during defecation. Prevailing wind direction also influences the rate of electrocution casualties. Winds parallel or diagonal to cross-arms are the most detrimental, as they decrease manoeuvrability during landing or take-off.

For the purposes of this project a subset of collision prone species have been identified. Species considered particularly prone to collision based on count data, body size and flight patterns include (in order of risk) Greater Flamingo, Lesser Flamingo, Glossy Ibis, African Sacred Ibis, Spur-winged Goose, Egyptian Goose, Red-billed Teal, Cape Shoveler, Western Cattle Egret, Black-headed Heron Northern Black Korhaan and Helmeted Guineafowl.

13.5.4.8 Potential Collision and Electrocution Hotspots

Figure 73 and **Figure 74** below provide an indication of potential hotspots for collision and electrocution based on the data collected during the wet-season survey on the abundances of collision prone species.

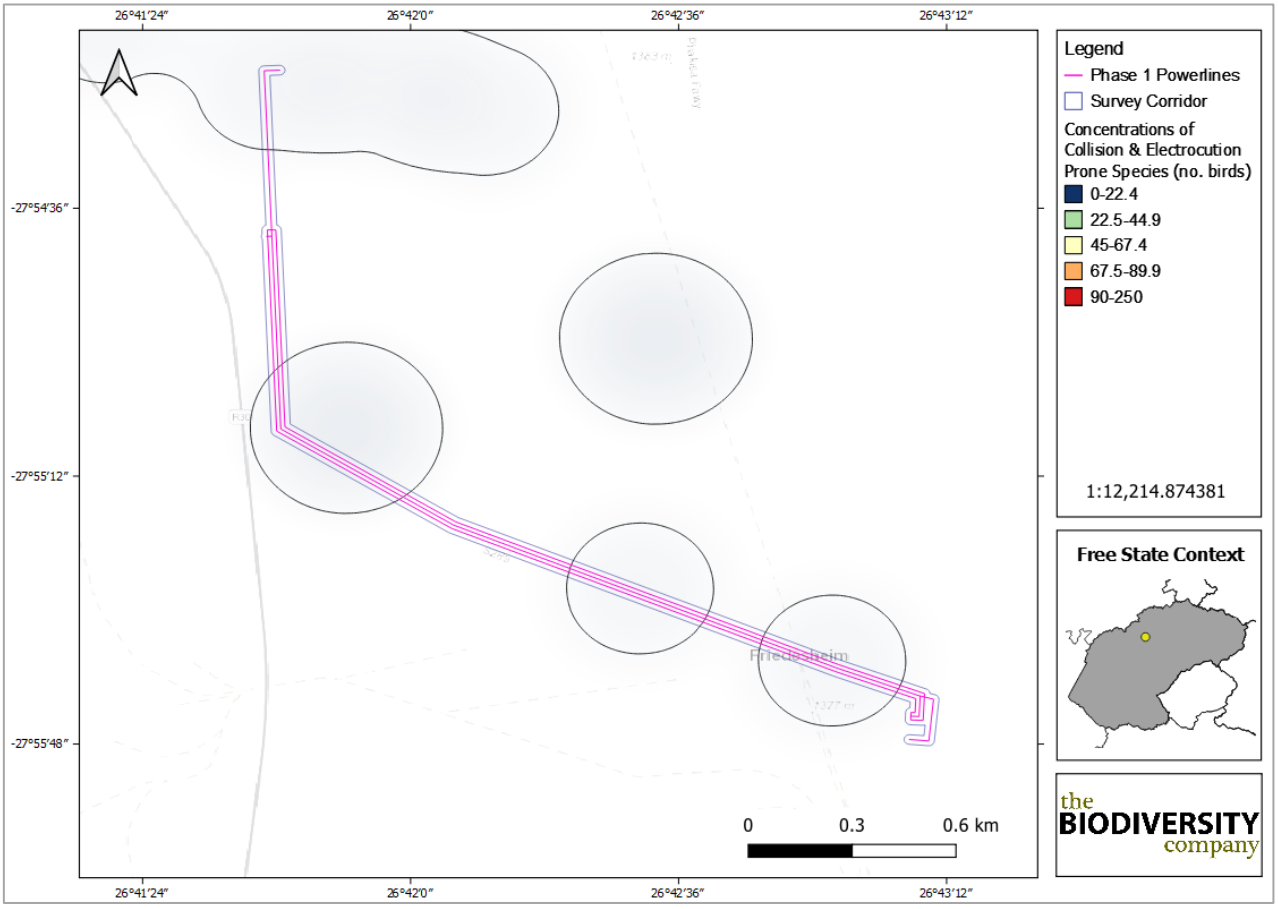


Figure 73: Concentrations of collision and electrocution prone species along Phase 1 (TBC, 2020c)

The modelling exercise revealed that the areas supporting the highest congregations of collision and electrocution prone species are situated in the northern parts of the Project area and are noticeably associated with large permanent to semi-ephemeral pans, dams and wetlands. With regards to linear power line features it is the Phase 2 routes that are of greatest significance. Collision risk is scattered in pockets along this route in line with the presence of pans but is particularly high at two locations situated at roughly the one

third and two thirds marks (indicated by bright red areas on the map). The southern Phase 1 Power Line route, in contrast, does not traverse wetland habitat, and does not support areas with significant concentrations of high-risk species. Although most of this power line is considered low-no risk two areas are considered to be of low-moderate risk and are situated at the northern terminus and the corner of the dog-leg heading off to the east (indicated by feint blue areas on the map).

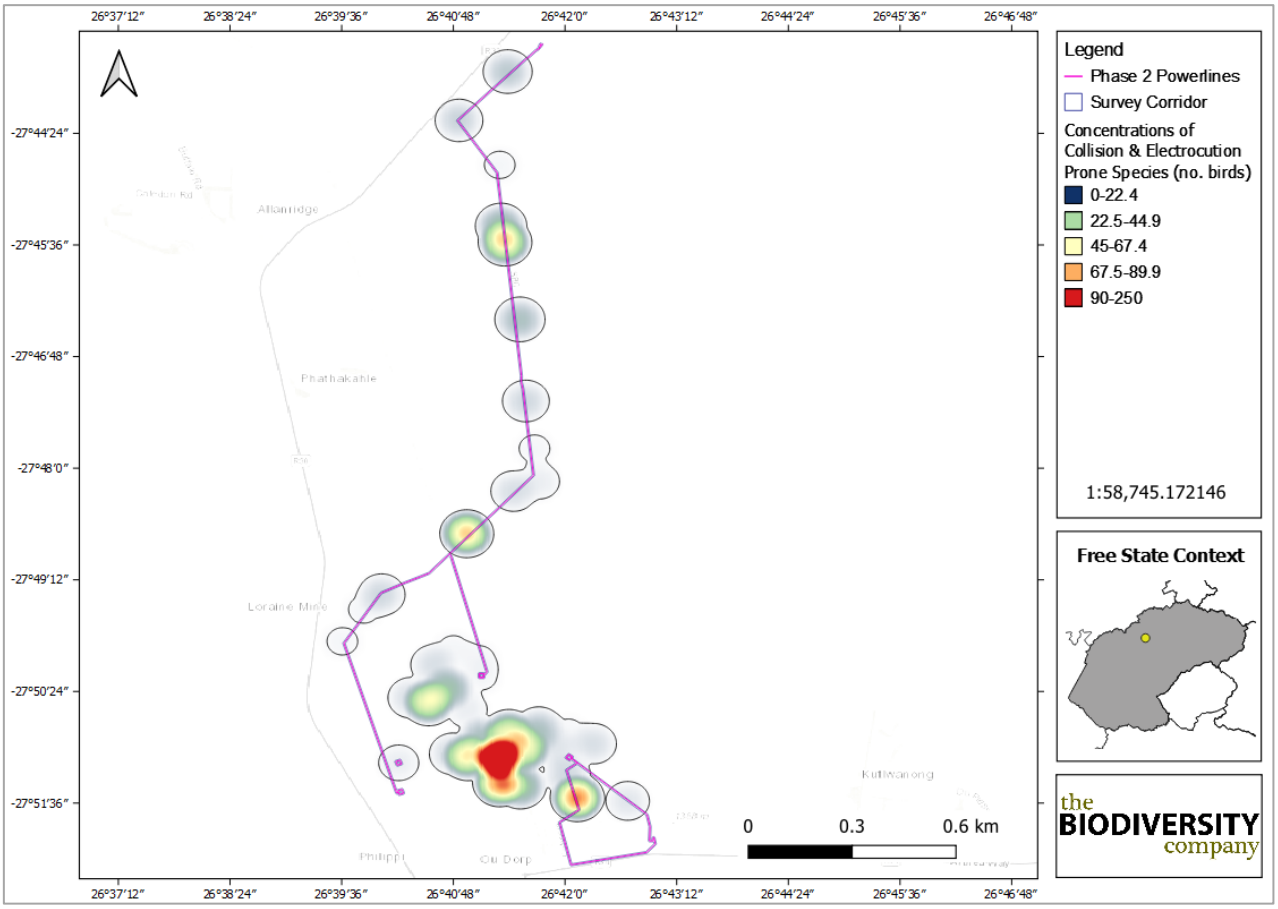


Figure 74: **Concentrations of collision and electrocution prone species at Phase 2 (TBC, 2020c)**

13.5.4.9 Sensitivity

Areas of avifaunal sensitivity for both Phase 1 and Phase 2 Power Line routes are shown in **Figure 75** and **Figure 76** below, respectively. These areas were based on a combination of wetland delineation data (TBC, 2020a) and abundance data on congregations of collision and electrocution prone species. All wetland areas within the 40m wide survey corridor were assigned a very high importance and sensitivity while their 15m buffer zones are afforded a moderate sensitivity. This is because wetland species account for 10 of the 15 regionally occurring SCC. Wetlands also support by far the highest species richness and abundance of avifauna within the entire project area. Some of the nearby pans and impoundments (e.g. Allenridge) provide traditionally frequented roost sites for globally significant populations of Near Threatened Greater and Lesser Flamingo. These birds disperse from these roost sites to forage in most of the pan and wetlands within the Project

area. Furthermore, a pair of Vulnerable Maccoa Duck were detected at a pan along the Phase 2 Power Line and are likely to make use of the other similar pans along this route.

In addition to wetlands areas identified as hotspots for collision prone species were included in the sensitivity assessment. This raster data was polygonised and split into three sensitivity classes namely high, moderate and moderate-low.

Within the Phase 1 route the sensitivity assessment identifies one area of very high sensitivity at the northern end of the power line route and then areas of moderate-low sensitivity at the elbow and again in a patch of habitat nearer the existing substation to the south.

Within the Phase 2 route the majority of sensitive habitat occurs in the northern two thirds. Very high areas are associated with the pans and wetlands in this area particularly further north. Additionally to areas supporting high concentrations of collision prone species occur at about the one thirds and two thirds mark going north (these are permanently inundated pans which support large flocks of waterfowl).

Figure 75: Avifaunal sensitivity for Phase 1 Power Lines (TBC, 2020c)

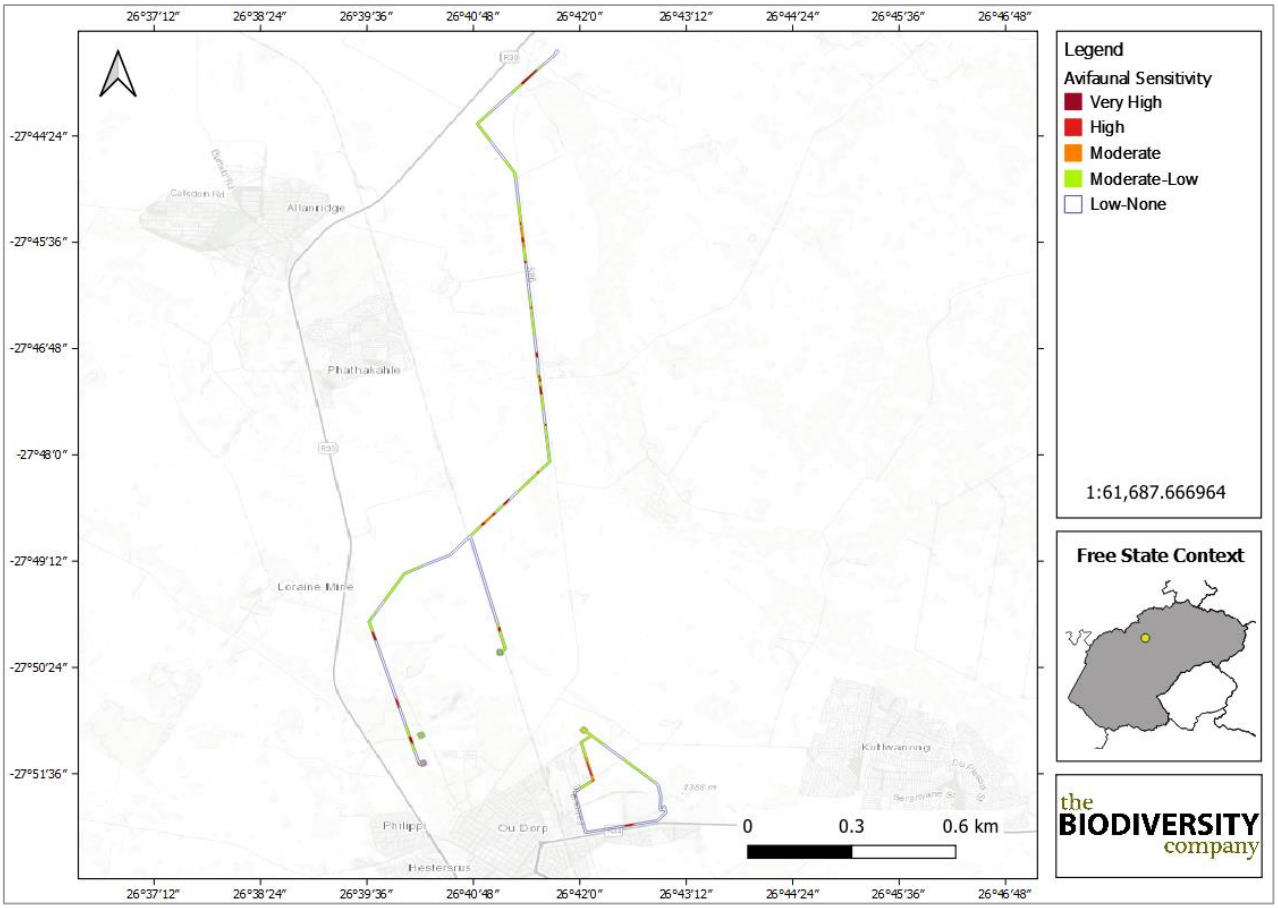


Figure 76: Avifaunal sensitivity for Phase 2 Power Lines (TBC, 2020c)

13.5.5 Impact Assessment

Refer to **Section 14.13** below for the results from the impact assessment from this study.

13.5.6 Conclusions

This study represents a comprehensive assessment of the avifaunal assemblage of the Phase 1 and Phase 2 Power Line routes. The assessment comprised both wet and dry season surveys. In total 965 birds were counted from 55 point count samples spanning the length of these lines.

The various impacts typically associated with both construction and operation of powerline developments on avifauna were considered. This included habitat loss, sensory disturbances (e.g. noise, dust, vibrations), collection of eggs and poaching, road kills, collisions with powerlines and electrocution by infrastructure and connections of the powerline. Overall, the impact assessment revealed that, with mitigation, all impacts associated with the Phase 1 Power Line are considered to have a residual impact significance of Low. This is due to the short distance of this route, the compromised habitat integrity, the existence of a major powerline servitude, the low overall avifaunal abundance and consequent low collision risk.

In contrast, the Phase 2 Power Line route has a higher avifaunal importance and collision risk. Consequently, residual impact significance ratings for habitat loss / degradation and collision / electrocution risk are assessed as Moderately High and Moderate respectively. It is important to consider that these power lines traverse directly over several large permanently to seasonally inundated pans in the central region and a large unchanneled valley-bottom wetland in the north. These habitats support large flocks of waterfowl, and represent important foraging habitats for the globally significant population of flamingos which roost at the nearby Allenridge pan. As such, these areas are hotspots for collision. Under normal circumstances these wetlands would be considered irreplaceable "no-go" areas and the construction of power lines across such habitat would represent a fatal flaw. However, this proposed Phase 2 Power Line route actually parallels a massive pre-existing power line servitude (comprised of 5 parallel powerlines) that services the Grootkop Substation. As such, although this pre-existing servitude was inappropriately positioned historically, the risks to avifauna associated with constructing an entirely new additional power line servitude for this Project (novel singular powerline route poses a high collision risk as it is less conspicuous and unknown to the local bird community) outweighs the risks associated with simply aligning it with the existing infrastructure. It is recommended that the potential impacts associated with the alignment of the Phase 2 Power Lines with the pre-existing, yet ecologically sub-optimal servitude, be offset by; (1) utilising a powerline design endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, (2) installing perch structures according to South African standards and (3) installing bird flappers at 10 m intervals at all wetland crossings, with smaller spacing intervals at the areas identified as collision hotspots.

13.6 Agricultural Impact Assessment

A summary of the Agricultural Impact Assessment (Index, 2020) (contained in **Appendix G4**) follows.

13.6.1 Details of the Specialist

The details of the specialist that undertook the Agricultural Impact Assessment follow.

Organisation:	Index
Name:	Dr A. Gouws
Qualifications:	PhD Integrated Land Use Modelling
Affiliation (if applicable):	▪ Council of Natural Sciences.No:400036/93, Category: Agricultural sciences. ▪ Member of the Soil Science Society of South Africa

13.6.2 Objectives of the Study

The key issues that were considered in the agricultural assessment include the following:

- ❖ Loss of high potential agricultural land and cultivated areas;
- ❖ Loss of grazing land;

- Loss of agricultural infrastructure;
- Impacts of the Project from an agricultural perspective; and
- Suitable mitigation measures to address the identified impacts.

13.6.3 Methodology

The present land uses were identified from various satellite images, dated from 2010 to 2020. A site visit took place on 22 October 2020 to confirm the land uses and to undertake a soil survey. Soils were classified according to the binomial soil classification system for South Africa. Land capability classification was then undertaken by using the classical eight class system of Montgomery. This is also the system used by the Department of Agriculture. A 40m wide corridor was assessed for the proposed power lines.

13.6.4 Key Findings of the Study

13.6.4.1 Agricultural Land Use

The land on which the power lines are planned has a variety of land uses. From historical satellite images it can be concluded that the land uses have been consistent over the past 10 years.

The main uses are as follows (refer to **Figure 77** below):

- Phase 1 –
  - The entire route is located on grazing land.
- Phase 2 –
  - The route from the substation in the south eastern portion to the site in Odendaalsrus is all under grazing and utilised by landless farmers. The veld is severely overgrazed. The portion north of the site is cultivated for large portions. There are some grazing land, pans and derelict land (land that is not suitable for farming purposes) along the route.

13.6.4.2 Agricultural Infrastructure

The line will mostly follow existing electricity infrastructure. No farming infrastructure will be permanently impacted on. Fences in some instances may have to be removed to gain access to the construction site – these will have to be replaced.

13.6.4.3 Land use capability

The land will only temporarily be disturbed and will revert to its previous land use once the power lines have been installed. The land use capability will, therefore not change. The capability was, therefore not assessed.

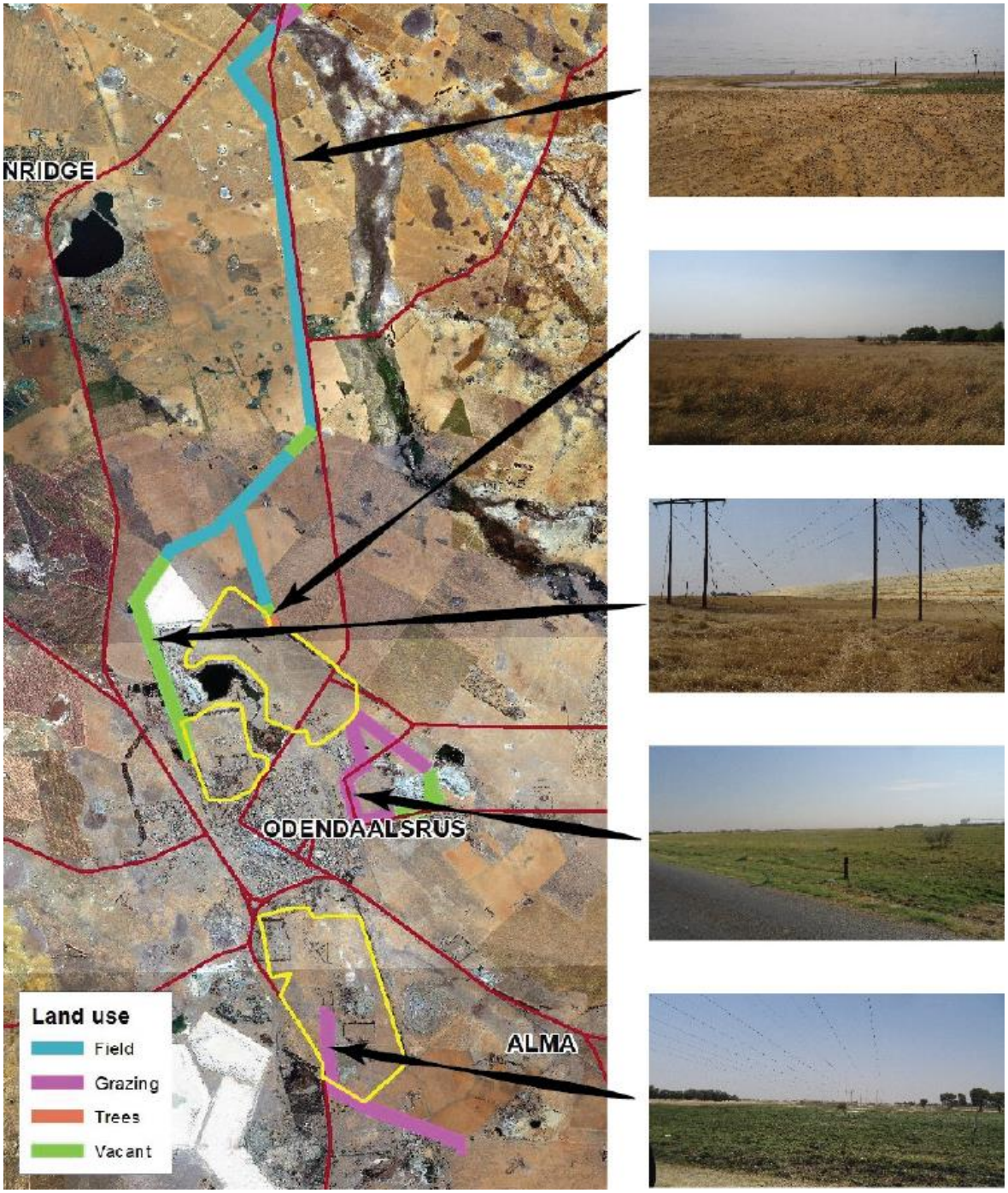


Figure 77: **Land uses (Index, 2020)**

13.6.4.4 Sensitivity Analysis

This application is for a linear activity (excluding the substation sites) for which impacts on the agricultural is only temporary. Only the footprint of the power line pylons will be lost due to construction. There will be very little or no permanent loss of agricultural land.

Figure 78 below shows the sensitivity of the Phase 1 and Phase 2 Power Line routes from an agricultural perspective, based on the National Web-based Environmental Screening Tool.

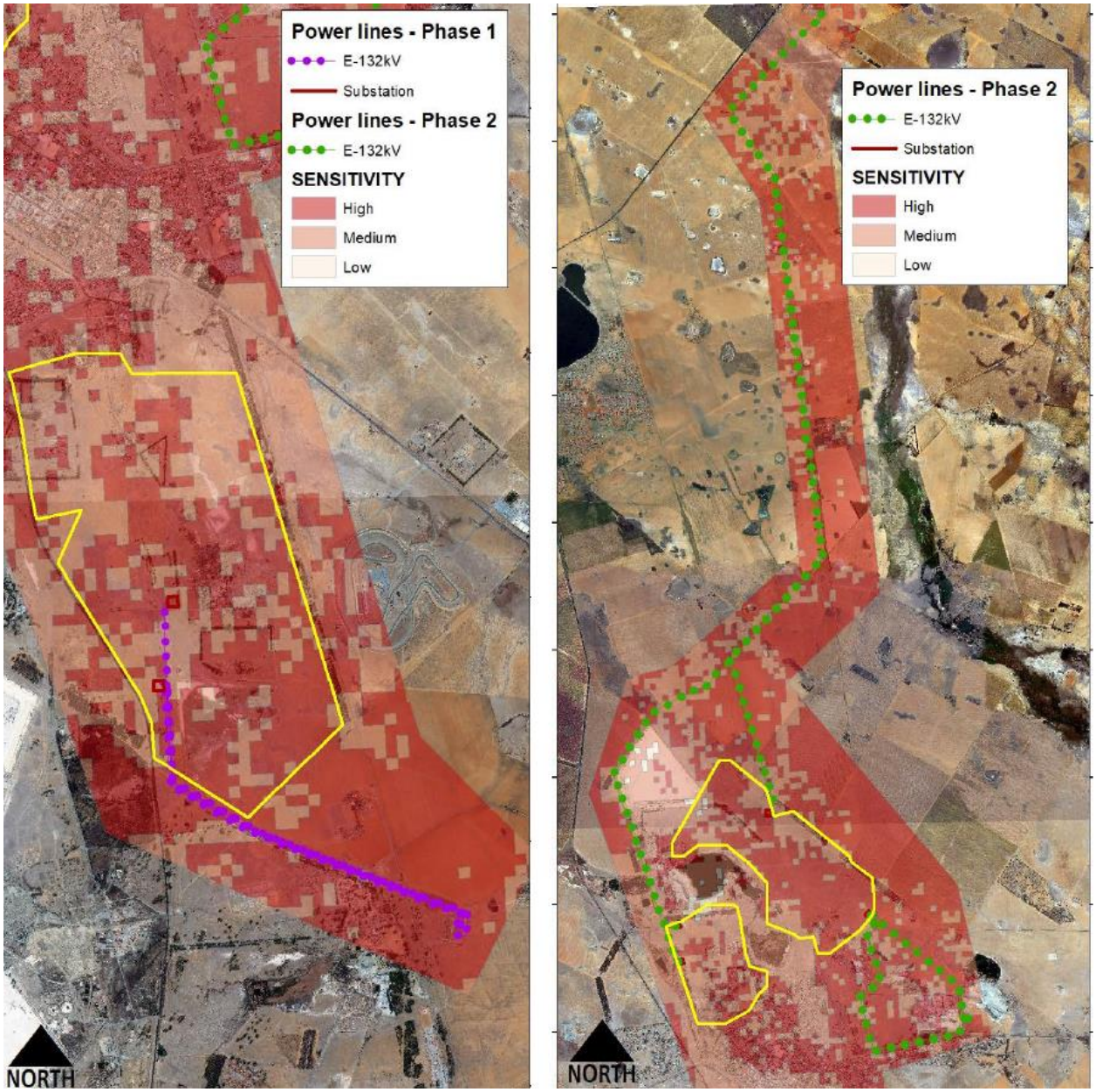


Figure 78: Agricultural sensitivity – Phase 1 (left) and Phase 2 (right) (Index, 2020)

The line traverses highly sensitive agricultural land that requires mitigation even though the soil will only be temporarily disturbed.

Table 19 below provides an interpretation of agricultural sensitivity according to the screening tool and the detailed assessment.

Table 19: Summary of sensitivity according to the screening tool (Index, 2020)

Sensitivity	Feature(s)	Comment
High	Land capability: Moderate-High	Soil will only be disturbed for the footprint of the pylon. Construction vehicles and staff will move below the lines and could impact on growing crops.

Sensitivity	Feature(s)	Comment
High	Annual Crop Cultivation / Pastures Land capability; Low-Moderate, low and very low	Soil will only be disturbed for the footprint of the pylon. Construction vehicles and staff will move below the lines and could impact on growing crops.
High	Old Fields Land capability: Moderate-high, moderate, low and very low	These are fallow lands with a sensitivity that ranges from moderately high to very low. However, they are not actively used for crop production at this stage. Only grazing opportunity will be lost, and that only for the duration of construction and the time it will take for the grass to recover from vehicle and construction staff movement.
Medium	Land capability: Low-Moderate/moderate	Soil will only be disturbed for the footprint of the pylon. Construction vehicles and staff will move below the lines and could impact on growing crops. Most of this land, however, is either vacant or under natural veld.
Low	Land capability: Very low/ low	-

13.6.5 Impact Assessment

Refer to **Section 14.14** below for the results from the impact assessment from this study.

13.7 Phase 1 Cultural Heritage Impact Assessment

A summary of the Phase 1 Cultural Heritage Impact Assessment (van Schalkwyk, 2020) (contained in **Appendix G5**) follows.

13.7.1 Details of the Specialist

The details of the specialist that undertook the Phase 1 Cultural Heritage Impact Assessment follow.

Name:	J. van Schalkwyk
Qualifications:	D Litt et Phil
Affiliation (if applicable):	Heritage Consultant: ASAPA Registration No.: 164 - Principal Investigator: Iron Age, Colonial Period, Industrial Heritage.

13.7.2 Objectives of the Study

The objectives of this study included the following:

- Identify possible archaeological, cultural and historic sites within the proposed development areas;
- Identify any potential 'fatal flaws' related to the proposed development;
- Evaluate the potential impacts of construction, operation and maintenance of the proposed development on archaeological, cultural and historical resources;
- Recommend mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural or historical importance; and

- Provide guideline measures to manage any impacts that might occur during the construction phase as well as the implementation phase.

13.7.3 Methodology

The methodology employed consisted of the following:

- A survey of the relevant literature was conducted with the aim of reviewing the previous research done and determining the potential of the area. In this regard, various anthropological, archaeological and historical sources were consulted.
- A survey was conducted of Heritage Impact Assessments that were undertaken for projects in the region by various heritage consultants, with the aim of determining the heritage potential of the area;
- The Heritage Atlas Database, various SAHRA databases, the Environmental Potential Atlas, the Chief Surveyor General and the National Archives of South Africa were consulted. Database surveys produced a number of sites located in the larger region of the proposed development.
- Aerial photographs and topocadastral and other maps were also studied.

13.7.4 Key Findings of the Study

13.7.4.1 Survey Results

During the physical survey, the following sites, features and objects of cultural significance were identified in the Project areas:

- Phase 1 Site –
  - No sites, features or objects of cultural significance dating to the Stone Age, Iron Age or historic period were identified in the Project area.
- Phase 2 Site –
  - No sites, features or objects of cultural significance dating to the Stone Age, Iron Age or historic period were identified in the Project area.

13.7.5 Impact Assessment

Refer to **Section 14.15** below for the results from the impact assessment from this study.

13.7.6 Conclusions

From a heritage point of view, it is recommended that the proposed development be allowed to continue on acceptance of the proposed mitigation measures are implemented.

13.8 Desktop Paleontological Assessment

A summary of the Desktop Paleontological Assessment (Banzai Environmental, 2020) (contained in **Appendix G6**) follows.

13.8.1 Details of the Specialist

The details of the specialist that undertook the Water Resources Impact Assessment follow.

Organisation:	Banzai Environmental
Name:	E. Butler
Qualifications:	MSc Zoology (specializing in Palaeontology)
Affiliation (if applicable):	Member of the Palaeontological Society of South Africa

13.8.2 Objectives of the Study

The general objectives of a Palaeontological Impact Assessment include the following:

- To identify the palaeontological status of the exposed as well as rock formations just below the surface in the development footprint;
- To estimate the palaeontological importance of the formations;
- To determine the impact on fossil heritage; and
- To recommend how the developer ought to protect or mitigate damage to fossil heritage.

13.8.3 Methodology

The following sources were reviewed as part of this study:

- Geological map 1:100 000, Geology of the Republic of South Africa (Visser, 1984);
- 1: 250 000 2724 Kroonstad Geological Map (Council of Geoscience);
- Spatial data of the proposed development.

13.8.4 Key Findings of the Study

The Phase 1 and Phase 2 Power Lines are primarily underlain by Caenozoic Superficial Sediments as well as a very small portion of the Bothaville Formation (Ventersdorp Supergroup, Ecca Group, Karoo Supergroup) in the north of Phase 2. According to the PalaeoMap of SAHRIS, the Palaeontological Sensitivity of the Late Cenozoic Superficial Sediments and Bothaville Formation is moderate.

Loss of fossil heritage will be a negative impact. Only the site will be affected by the proposed development. The expected duration of the impact is assessed as potentially permanent to long term. In the absence of mitigation procedures, the damage or destruction of any palaeontological materials will be permanent. Impacts on palaeontological heritage during the construction phase could potentially occur but are regarded as having a medium probability. The significance of the impact occurring will be medium.

13.9 Visual Impact Assessment

A summary of the Visual Impact Assessment (SAS, 2020) (contained in **Appendix G8**) follows.

13.9.1 Details of the Specialist

The details of the specialist that undertook the Visual Impact Assessment follow.

Organisation:	SAS Environmental Group of Companies
Name:	Stephen van Staden
Qualifications:	MSc Environmental Management
Affiliation (if applicable):	SACNASP

13.9.2 Objectives of the Study

The Visual Impact Assessment entails a process of data collection, spatial analysis, visualisation and interpretation to describe the quality of the landscape prior to development taking place and then identifying possible visual impacts after development. Mitigation measures are also recommended to manage visual impacts.

13.9.3 Methodology

The method of assessment was based on a spatial analysis of the proposed Project area and the surrounding areas, using Geographic Information Systems (GIS), digital satellite imagery, photographs, various databases and all available data on the planned infrastructure. The desktop assessment served to guide the field assessment through identifying preliminary areas of importance in terms of potential visual impacts.

The field assessment included a drive-around and on-foot survey of the Project area and in the immediate vicinity thereof and a drive-around of the surrounds, in order to determine the visual context within which the proposed project is to be developed. Focus was placed on assessing the potentially sensitive receptors identified within the visual assessment zone, these included settlements, which included schools, churches and prominent roads within the area. Points from where the proposed power line routes and associated substations were determined to be visible were recorded making use of Global Positioning Systems (GPS) to confirm these aesthetically sensitive viewpoints and potential sensitive visual receptors in relation to the proposed Project.

13.9.4 Key Findings of the Study

Based on the existing infrastructure in the area, the visual assessment zone encompasses a 2km radius of the proposed powerline route alternatives and associated substations. A Map indicating the location of potential visual receptors within a 2km radius of the Phase 1 and Phase 2 Power Lines is provided in **Figure 79** below.

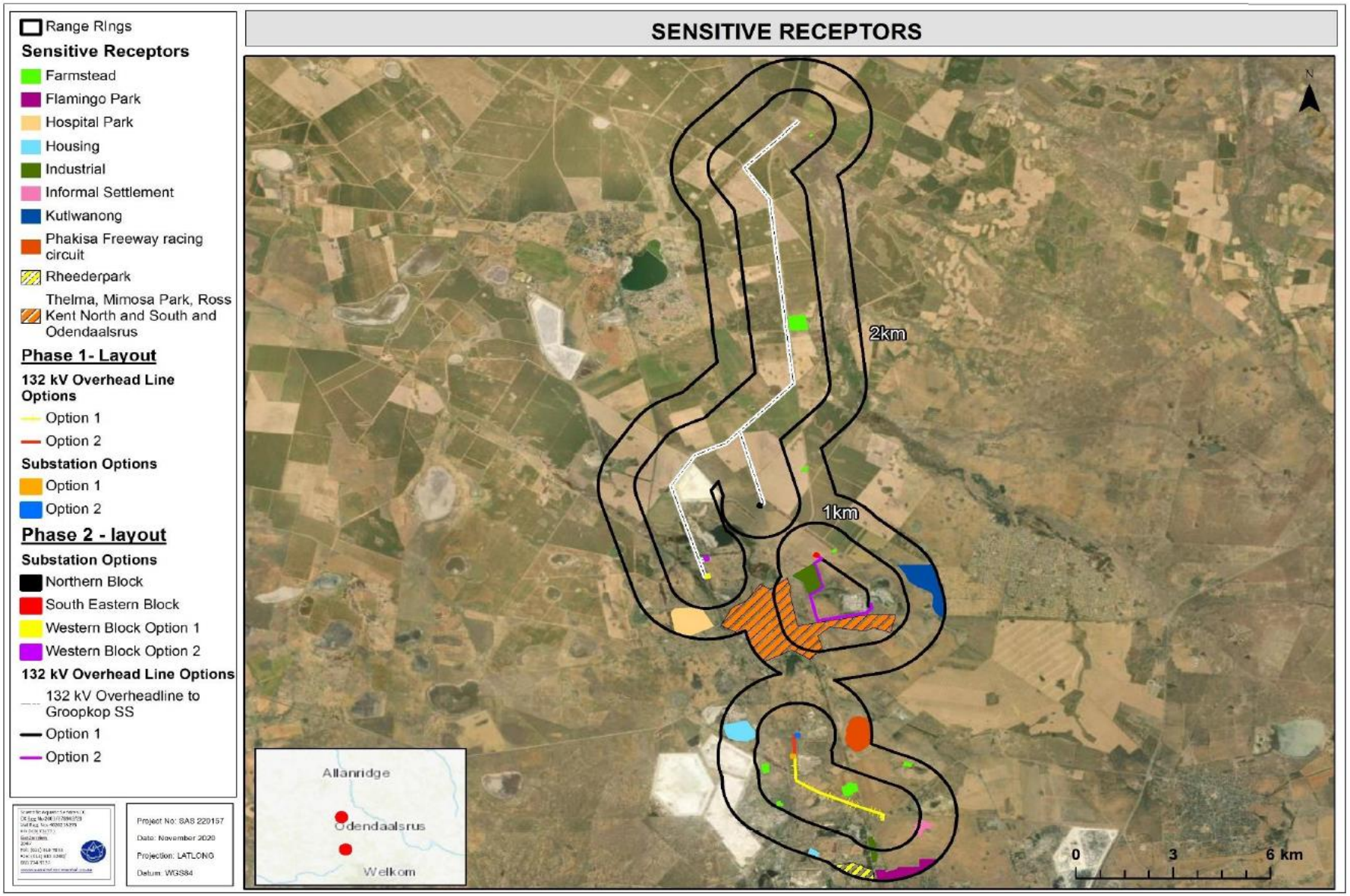


Figure 79: **Location of potential visual receptors within a 2km radius of the Phase 1 and Phase 2 Power Lines (SAS, 2020)**

Based on the findings from both the desktop and field assessments it is evident that there are several formal and informal settlements within a 5km radius of the proposed power line routes and associated substations. The proposed power line routes and associated substations are located within a semi-rural area interspersed with settlements, mining activities and various anthropogenic structures. The topography is relatively flat and dominated by grassland interspersed with tree clumps where cattle grazing and mining activities area taking place.

Even though the proposed Project area is situated within a semi-rural area, existing power lines and substations are present within the landscape, thus the landscape character has already been affected by industrial facilities. As such, the receptors within the surrounding area have grown accustomed to these structures, therefore the proposed power lines and substations are expected to have a low visual impact on the landscape character within the region.

The proposed Project area is located within a region of medium district brightness due to surrounding settlements. Overall, the impact significance of potential night-time lighting is expected to be low, of short duration and only occur during the construction phase and will be limited to a small area. The proposed power line options will, however, not be a source of light pollution during the operational phase. Security lights associated with the proposed substations may be a source of light pollution and may potentially contribute somewhat to the effects of skyglow and artificial lighting in the region.

Based on the impact assessment, it was evident that the proposed power lines and substations will have a moderately low visual impact during the development phases of the Project, prior to mitigation measures being implemented. This will mainly be attributed to the vegetation clearing during the construction phase, and introduction of power line structures in areas where no other structures are present, proposed footprints are not neat and well maintained. Additionally, the proposed lighting fixtures to be placed in such a manner that it contributes significantly to the effects of skyglow and night-time lighting pollution. However, with the implementation of mitigation measures, the visual impact on the receiving environment will be lowered to low visual impacts.

13.9.5 Impact Assessment

Refer to **Section 14.16** below for the results from the impact assessment from this study.

13.9.6 Conclusions

It is the opinion of the specialist that the project be considered acceptable from a visual resource management perspective, provided that the mitigatory measures are implemented and adhered to.

13.10 Socio-Economic Impact Assessment

A summary of the Socio-Economic Impact Assessment (Nemai Consulting, 2020) (contained in **Appendix G7**) follows.

13.10.1 Details of the Specialist

The details of the specialist that undertook the Socio-Economic Impact Assessment follow.

Organisation:	Nemai Consulting
Name:	C. Chidley
Qualifications:	BA (Economics); BSc Eng (Civil); MBA

13.10.2 Objectives of the Study

The key objectives of the Socio-Economic Impact Assessment included the following:

- Collecting baseline data on the current socio-economic environment.
- Assessing the socio-economic impacts (positive and negative) of the Project;
- Considering the outcomes of the public participation process to date;
- Suggesting suitable mitigation measures to address the identified impacts; and
- Making recommendations on preferred options from a socio-economic perspective (if relevant).

13.10.3 Methodology

The Socio-Economic Impact Assessment set out the socio-economic baseline of the study area, predicted social impacts on the Project and made recommendations for mitigating impacts. The socio-economic baseline level was based on both primary and secondary data. The primary data was collected directly from the community members, community leaders, and private farmers. Secondary data was accessed through South African Databases, available reports and articles, as well as internet searches.

The profile of the baseline conditions included describing the current status quo of the community, including information on a number of social and economic issues such as:

- Demographic factors;
- Socio-economic factors such as income and population data;
- Access to services;
- Institutional environment;
- Social Organisation (Institutional Context); and
- Statutory Regulatory Environment.

13.10.4 Key Findings of the Study

The following concerns were noted by the Councillors with regards to the proposed power lines and substations:

- Socio-economic benefits: The Councillors noted that the community members in the area are largely unemployed. The mining sector in the area employs some people from the surrounding communities. The Councillors were interested in the potential employment opportunities. It was pointed out that the Project should try to employ locally-based labour, possibly using the Expanded Public Works Programme model as well as using local companies (SMME's). As far as possible, importing labour from outside the affected areas should be avoided. In addition, skills development programmes and certifications to create long term skills within the community was noted as an expectation from the Project;
- Project Awareness: The Councillors expressed the need to know more about the Project;
- Duration of the Project: The Councillors enquired about the duration of employment contracts for the members of the community.

The following socio-economic implications of the Project were identified:

- High Risk Activities –
  - Land and Servitude Rights Acquisition (where necessary, having regard to existing structures located within the powerlines and substations corridor);
    - Structures located within the power lines' servitudes; and
  - Impacts of construction work on local communities.
- Lower Risk Activities –
  - Operation and maintenance of the Project's infrastructure; and
  - Maintenance of the roads.

13.10.5 Impact Assessment

Refer to **Section 14.24** below for the results from the impact assessment from this study.

13.10.6 Conclusions

The study assessed the social and economic impacts of the proposed Project. As expected, there were several positive and negative socio-economic impacts identified.

No socio-economic fatal flaws were identified. The proposed power lines mostly follow existing infrastructure in order to minimise negative socio-economic impacts. The negative impacts can be successfully mitigated, and the positive impacts will bring economic and social benefit to the area.

14 IMPACT ASSESSMENT

14.1 General

This section focuses on the pertinent environmental impacts that could potentially be caused during the pre-construction, construction and operational phases of the proposed Phase 1 and Phase 2 Power Lines and Substations.

Note that an 'impact' refers to the change to the environment resulting from an environmental aspect (or activity), whether desirable or undesirable. An impact may be the direct or indirect consequence of an activity.

Impacts were identified as follows:

- Impacts associated with listed activities contained in GN No. R. 983, R. 984 and R. 985 of 4 December 2014, as amended, for which Environmental Authorisation have been applied for;
- An appraisal of the Project's activities and components;
- An assessment of the receiving biophysical, social, economic and built environments;
- Findings from specialist studies;
- Issues highlighted by environmental authorities; and
- Comments received during public participation from IAPs.

14.2 Impacts associated with Listed Activities

As mentioned, the Project requires Environmental Authorisation for certain activities listed in the EIA Regulations of 2014 (as amended), which serve as triggers for the EIA. The potential impacts associated with the key listed activities are broadly stated in **Table 20** below.

Table 20: Potential Impacts associated with the key listed activities

Listed Activities	Potential Impact Overview
GN No. R. 983 of 4 December 2014 (as amended) (Listing Notice 1)	
GN No. R.983 – Activity no. 11(i): *The development of facilities or infrastructure for the transmission and distribution of electricity—* *(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or* *(ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more;* *excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is —* *(a) temporarily required to allow for maintenance of existing infrastructure;* *(b) 2 kilometres or shorter in length;* *(c) within an existing transmission line servitude; and*	• Impacts associated with the footprint of the physical infrastructure (proposed power lines). • Potential loss of sensitive environmental features (e.g. heritage resources, sensitive fauna and flora species) along the proposed power lines. • Visual impacts associated with the proposed power lines. • Impacts to land use. • Cumulative impacts associated with aligning the proposed power lines alongside existing power line corridors.

Listed Activities	Potential Impact Overview
(d) will be removed within 18 months of the commencement of development.	
GN No. R.983 – Activity no. 12(ii)(a - c): The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) 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; — excluding— (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; (ee) where such development occurs within existing roads, road reserves or railway line reserves; or (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.	• Impacts associated with the footprint of the physical infrastructure (power line towers) within 32 m of a watercourse. • Adverse effects to resource quality (i.e. flow, in-stream and riparian habitat, aquatic biota and water quality) associated with working in-stream and alongside watercourses. • Loss of riparian and instream vegetation within construction domain. • Destabilisation of affected watercourses. • Reduction in water quality of receiving watercourses due to improper management of storm water, hazardous material and sanitation. • Altering the drainage of the site.
GN No. R.983 – Activity no. 14: *The development 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.*	• Pollution of bio-physical environment and risks posed to flora and fauna, as well as human health, through poor practices associated with onsite storage of dangerous goods.
GN No. R.983 – Activity no. 19: *The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;* *but excluding where such infilling, depositing, dredging, excavation, removal or moving -* *(a) will occur behind a development setback;* *(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;* *(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;* *(d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or* *(e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.*	• Construction activities (including bulk earthworks) to be undertaken within watercourses for physical infrastructure. • Adverse effects to resource quality (i.e. flow, in-stream and riparian habitat, aquatic biota and water quality) associated with working in-stream and alongside the watercourse. • Destabilisation of affected watercourses.
GN No. R.983 – Activity no. 27:	• Clearance of areas consisting of indigenous vegetation associated with the construction footprint of the substations and laydown areas.

Listed Activities	Potential Impact Overview
The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for- *(i) the undertaking of a linear activity; or* *(ii) maintenance purposes undertaken in accordance with a maintenance management plan.*	• Potential loss of sensitive environmental features (e.g. sensitive fauna and flora species). • Visual impacts. • Soil destabilisation and subsequent erosion. • Proliferation of alien and invasive species.
GN No. R.983 – Activity no. 28(ii): Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.	• Clearance of large areas associated with the construction footprint of the power lines on land used for agricultural purposes, outside of an urban area. • Loss of agricultural land. • Socio-economic impacts associated with construction activities.
GN No. R.983 – Activity no. 48(i)(a - c): The expansion of— (i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or (ii) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more; where such expansion 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; excluding— (aa) the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such expansion activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such expansion occurs within an urban area; or (ee) where such expansion occurs within existing roads, road reserves or railway line reserves.	• Impacts associated with expanding existing access roads within 32m of watercourses. • Adverse effects to resource quality (i.e. flow, in-stream and riparian habitat, aquatic biota and water quality) associated with working in-stream and alongside watercourses. • Loss of riparian and instream vegetation within construction domain. • Destabilisation of affected watercourses. • Reduction in water quality of receiving watercourses due to improper management of storm water, hazardous material and sanitation.
GN No. R. 985 of 4 December 2014 (as amended) (Listing Notice 3)	
GN No. R.985 – Activity no. 10 - (b)(i): The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. b. Free State i. Outside urban areas:	Pollution of bio-physical environment and risks posed to flora and fauna, as well as human health, through poor practices associated with onsite storage of dangerous goods in sensitive areas (e.g. 100m from the edge of a watercourse or wetland).

Listed Activities	Potential Impact Overview
(hh) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.	
GN No. R.985 – Activity no. 12 - (b)(i), (ii) & (iv): The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. b. Free State i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans; iv. Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.	The clearance of large tracts of indigenous vegetation and potential loss of sensitive fauna and flora species within areas consisting of endangered ecosystems, CBAs and within 100 m from the edge of a watercourse or wetland.
GN No. R.985 – Activity no. 14(ii)(a) & (c) - (b)(i)(ff): The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or (ii) infrastructure or structures with a physical footprint of 10 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 has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. b. Free State i. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.	• Impacts to biodiversity as a result of the development of infrastructure (towers of power lines and access roads) within 32m from watercourses. • Effects to resource quality (i.e. flow, in-stream and riparian habitat, aquatic biota and water quality) associated with working in-stream and alongside the watercourses.

14.3 Issues raised by Environmental Authorities and IAPs

The issues raised by authorities (both regulatory and commenting) and IAPs to date, during the announcement phase of the public participation process, are captured and addressed in the Comments and Responses Report (refer to **Appendix K**).

The consolidated issues raised by authorities and IAPs have been succinctly grouped into the following main categories (*Note: please refer to the Comments and Response Report for a comprehensive and accurate representation of the issues raised*):

❖ Water use –

- Application in terms of the NWA for water uses.

❖ Existing infrastructure –

- Impacts to existing infrastructure (power lines, telephone lines, roads, pipelines, civil aviation, etc.).

❖ Cultural Heritage & Palaeontological Features –

- Impacts to cultural heritage and palaeontological features.

These issues received further attention during the investigations in the EIA phase, including the environmental and technical specialist studies.

14.4 Project Activities

In order to understand the impacts related to the Phase 1 and Phase 2 Power Lines and Substations it is necessary to unpack the activities associated with the project life-cycle, as done in the sub-sections to follow.

14.4.1 Project Phase: Pre-construction

Some of the main Project activities, as well as high-level environmental activities, to be undertaken in the pre-construction phase are listed in **Table 21** below.

Table 21: Simplified List of Activities associated with Pre-construction Phase

Project Phase: Pre-construction
Project Activities
• Negotiations and agreements with the affected landowners, Eskom (power line corridor), MLM (landowner at substations' sites), stakeholders and authorities (as relevant)
• Registration of power line servitude
• Completion of rehabilitation activities related to historical mining areas, including radiological sources, by Harmony Gold Mining Company Ltd *
• Undertake a follow-up survey once the tailings material has removed (based on Radiological Screening Survey) to verify that the activity concentrations in the respective areas are below 0.5 Bq/g *
• Detailed engineering design
• Detailed geotechnical investigations
• Survey and mark development
• Procurement process for Contractor
• Review Contractor's method statements (as relevant)
• Establish new access roads and undertake selective improvements to existing access roads to facilitate the delivery of construction plant and materials
• Arrangements for accommodation of construction workers (off site)
• The building of a site office and ablution facilities
• Confirmation of the location and condition of all structures and infrastructure
• Determining and documenting the conditions of the roads to be used during construction
• Fencing off substation sites
High Level Environmental Activities
• Diligent compliance monitoring of the EMPr, Environmental Authorisation and other relevant environmental legislation

Project Phase: Pre-construction
• Pre-construction environmental survey
• Develop Environmental Monitoring Programme (air quality, water quality, noise, social)
• Barricading of sensitive environmental features (e.g. wetlands)
• Obtain permits for impacts to SCC, if avoidance is not possible
• On-going consultation with IAPs
• Other activities as per EMPr

* *Refer to findings and recommendations of the Radiological Survey contained in the EIA Report for the PV Sites.*

14.4.2 Project Phase: Construction

Some of the main Project activities, as well as high-level environmental activities, to be undertaken in the construction phase are listed in **Table 22** below.

Table 22: Simplified List of Activities associated with Construction Phase

Project Phase: Construction
Project Activities
• Site establishment
• Prepare access roads
• Establish construction laydown areas
• Bulk fuel storage
• Delivery of construction material
• Transportation of equipment, materials and personnel
• Storage and handling of material
• Construction employment
• Site clearing (as necessary)
• Excavations for foundations and anchors of towers
• Concrete Works
• Erection of steel structures
• Construction of substation components
• Mechanical and Electrical Works
• Electrical supply
• Material delivery and offloading
• Stringing of transmission lines
• Stockpiling
• Waste and wastewater management
High Level Environmental Activities
• Diligent compliance monitoring of the EMPr, Environmental Authorisation and other relevant environmental legislation
• Implement Environmental Monitoring Programme (air quality, water quality, noise, traffic, social)
• Reinstatement and rehabilitation of construction domain
• On-going consultation with IAPs
• Other activities as per EMPr

14.4.3 Project Phase: Operation

Some of the main Project activities, as well as high-level environmental activities, to be undertaken in the operational phase are listed in **Table 23** below.

Table 23: Simplified List of Activities associated with Operational Phase

Project Phase: Operation
Project Activities
• Testing and commissioning the Project's components
• Servitude access arrangements and requirements
• Routine maintenance inspections of power lines and servitudes
• Controlling vegetation
• Managing stormwater and waste
• Conducting preventative and corrective maintenance
• On-going consultation with directly affected parties
High Level Environmental Activities
• On-going consultation with IAPs
• Other activities as per EMPr for Operational Phase

14.5 Environmental Aspects

Environmental aspects are regarded as those components of an organisation's activities, products and services that are likely to interact with the environment and cause an impact.

The environmental aspects that have been identified for the proposed Phase 1 and Phase 2 Power Lines and Substations, which are linked to the project activities, are provided in **Table 24** below. Note that only high level aspects are provided.

Table 24: Environmental Aspects associated with Project Life-Cycle

Project Phase: Pre-construction
Environmental Aspects
• Inadequate consultation with landowners, affected parties, stakeholders and authorities
• Inadequate rehabilitation of areas affected by historical mining
• Failure to prevent risks associated with radiological sources
• Inadequate environmental and compliance monitoring
• Poor construction site planning and layout
• Site-specific environmental issues not fully understood
• Land occupancy by temporary buildings, provisional on-site facilities and storage areas
• Inaccurate pre-construction environmental survey
• Absence of relevant permits (e.g. for protected trees, heritage resources - if encountered)
• Lack of barricading of sensitive environmental features
• Poor waste management
• Absence of ablution facilities

Project Phase: Construction
Environmental Aspects
• Inadequate consultation with landowner
• Inadequate environmental and compliance monitoring
• Lack of environmental awareness creation
• Indiscriminate site clearing
• Poor site establishment
• Poor management of access and use of access roads
• Disruptions to traffic
• Poor transportation practices
• Poor fencing arrangements
• Erosion
• Disruptions to existing services
• Disturbance of topsoil
• Poor management of excavations
• Inadequate storage and handling of material
• Inadequate storage and handling of hazardous material
• Poor maintenance of equipment and plant
• Poor management of labour force
• Pollution from ablution facilities
• Inadequate management of construction camp
• Poor waste management practices – hazardous and general solid, liquid
• Wastage of water
• Disturbance to occupiers of land
• Disturbance to mining infrastructure to remain on the site
• Poor management of pollution generation potential
• Damage to significant flora (if encountered)
• Damage to significant fauna (if encountered)
• Environmental damage where watercourses are crossed
• Inadequate stormwater management
• Environmental damage of sensitive areas
• Damage to cultural heritage and palaeontological features (if encountered)
• Poor reinstatement and rehabilitation

Project Phase: Operation
Environmental Aspects
• Inadequate environmental and compliance monitoring
• Inadequate management of access, routine maintenance and maintenance works
• Inadequate management of vegetation
• Inadequate stormwater management
• Pollution caused by dangerous good (e.g. transformer oils) associated with substations
• Inadequate management of light pollution at substations
• Failure to comply with health, safety and environmental specifications

14.6 Potentially Significant Environmental Impacts

Environmental impacts are the change to the environment resulting from an environmental aspect, whether desirable or undesirable.

Note that it is not the intention of the impact assessment to evaluate all potential environmental impacts associated by the Project's environmental aspects, but rather to focus on the potentially **significant** direct and indirect impacts.

The potentially significant environmental impacts associated with the Phase 1 and Phase 2 Power Lines and Substations, as listed in **Table 25** below, were identified through an appraisal of the following:

- Project-related components and infrastructure (see **Section 5**);
- Operation of the power lines and substations;
- Activities associated with the project life-cycle (i.e. pre-construction, construction and operation);
- Nature and profile of the receiving environment and potential sensitive environmental features and attributes (see **Section 12**);
- Findings from specialist studies (see **Section 13**);
- Understanding of direct and indirect effects of the Project as a whole (see **Section 14**);
- Comments received during public participation from authorities and IAPs; and
- Legal and policy context (see **Section 7**).

Table 25: Potentially Significant Environmental Issues for prioritisation during the EIA Phase

Environmental Factor	Construction Phase Potential Issues / Impacts	Operational Phase Potential Issues / Impacts
Land Use	▪ Permanent change in land use at substations ▪ Loss of land used for agriculture ▪ Sterilisation of land ▪ Servitude restrictions ▪ Risks posed by previous mining activities	▪ Sterilisation of land for future mining or agricultural land uses ▪ Servitude restrictions
Geology	▪ Suitability of geological conditions to support the substations and towers	▪ Suitability of geological conditions to support the substations and towers
Geohydrology	▪ Groundwater pollution due to spillages and poor construction practices ▪ Groundwater use ▪ Influence to groundwater flow	▪ Groundwater pollution due to poor operation and maintenance practices
Topography	▪ Visual impacts ▪ Crossing topographic features (watercourses)	▪ Visual impacts ▪ Crossing topographic features (watercourses)
Soil	▪ Encountering historically contaminated soil ▪ Soil erosion due to clearance and inadequate stormwater management ▪ Soil compaction	▪ Soil erosion due to inadequate stormwater management ▪ Soil contamination due to poor operation and maintenance practices

Environmental Factor	Construction Phase Potential Issues / Impacts	Operational Phase Potential Issues / Impacts
	▪ Soil contamination due to spillages and poor construction practices ▪ Loss of topsoil	
Surface Water	▪ Alteration of drainage over substation sites ▪ Surface water pollution due to spillages and poor construction practices ▪ Encroachment of construction activities into riparian zones / wetlands ▪ Impacts where access roads and power lines cross watercourses (e.g. sedimentation, loss of vegetation, destabilisation of watercourse structure)	▪ Sedimentation through silt-laden runoff, caused by inadequate stormwater management ▪ Damage to the substations and towers from major flood events ▪ Water resources could be contaminated through inadequate storage and handling of dangerous goods at the substations (e.g. transformer oils) and poor management of waste and wastewater ▪ Water use requirements of the Project need to be satisfied
Flora & Fauna	▪ Habitat loss ▪ Potential loss, disturbance or displacement of protected fauna and flora species ▪ Human - animal conflicts ▪ Noise and vibration impacts to fauna ▪ Nights lights may affect nocturnal faunal species ▪ Illegal harvesting and poaching of faunal and floral species by construction workers ▪ Pollution of the biophysical environment from poor construction practices ▪ Proliferation of invasive alien species in disturbed areas	▪ Risk to birds from collision with infrastructure and from electrocution ▪ Electrical faulting from birds ▪ Chemical pollution associated with dangerous goods at the substations ▪ Proliferation of invasive alien species in disturbed areas
Socio-economic Environment	▪ Informal use of land to be stopped ▪ People residing on the sites to be relocated ▪ Influx of people seeking employment and associated impacts (e.g. foreign workforce, cultural conflicts, squatting, demographic changes) ▪ Safety and security ▪ Use of local road network ▪ Nuisance from dust and noise ▪ Consideration of local labourers and suppliers in area – stimulation of local economy (positive impact) ▪ Transfer of skills (positive impact)	▪ Threats to human and animal health from electromagnetic fields ▪ Direct and indirect economic opportunities as a result of the Project
Air Quality	▪ Dust from the use of dirt roads by construction vehicles ▪ Dust from bare areas that have been cleared for construction purposes ▪ Emissions from construction equipment and machinery ▪ Tailpipe emissions from construction vehicles	▪ Impacts to air quality caused by the operation and maintenance of the facility include dust from the use of dirt roads and tailpipe emissions from vehicles
Noise	▪ Localised increases in noise may be caused by construction activities	N/A
Agriculture	▪ Loss of fertile soil through land clearance ▪ Soil erosion ▪ Loss of topsoil	▪ Loss of possible future agricultural land use due to direct occupation by the development footprint ▪ Soil erosion due to inadequate stormwater management

Environmental Factor	Construction Phase Potential Issues / Impacts	Operational Phase Potential Issues / Impacts
	▪ Risk of harm to livestock (associated with informal grazing) from construction activities	
Historical and Cultural Features	▪ Possible direct impacts on below-ground archaeological deposits and fossils as a result of ground disturbance ▪ Possible impacts to the cultural landscape as a result of the introduction of incompatible structures and infrastructure to the rural landscape	N/A
Existing Structures & Infrastructure	▪ Rehabilitation measures need to be implemented with regards to the previous mining activities on the sites ▪ Restrictions regarding servitudes of existing infrastructure	▪ Restrictions regarding servitudes of existing infrastructure ▪ Disturbances to infrastructure traversed by power lines during maintenance activities
Transportation	▪ Increase in traffic on the local road network ▪ Transportation of materials and construction personnel to site ▪ Impacts to road conditions ▪ Speeding and reckless driving by construction personnel ▪ Construction vehicles accessing and leaving the sites via provincial roads ▪ Use of oversized vehicles/abnormal loads, as required ▪ Risks to other road users	▪ Transportation of maintenance materials, as well as operational and maintenance personnel, to site
Aesthetics	▪ Landscape transformation ▪ Visual impacts associated with construction activities	▪ Landscape transformation ▪ Light pollution
Health	▪ Hazards related to previous mining activities ▪ Hazards related to construction work ▪ Increased levels of dust and particulate matter ▪ Increased levels of noise ▪ Water (surface and ground) contamination. ▪ Poor water and sanitation ▪ Communicable diseases ▪ Psychosocial disorder (e.g. social disruptions) ▪ Safety and security ▪ Lack of suitable health services	▪ Hazards related to operation and maintenance work

The findings of the specialists are of particular importance in terms of understanding the impacts of the Phase 1 and Phase 2 Power Lines and Substations and managing these during the project life-cycle, as these studies focused on the significant environmental issues. As can be seen from the various impact assessments performed by the specialists, there are a cross-cutting impacts that are addressed in a number of these studies, with particular reference to the land use, terrestrial ecology and socio-economic effects of the Project. The mitigation measures proposed by the specialists for these similar types of impacts are regarded as complementary and they are aligned with best practices and principles.

14.7 Impact Assessment Methodology

The impacts and the proposed management thereof are first discussed in **Section 14.9** to **Section 14.24** below on a qualitative level and thereafter quantitatively assessed by evaluating the nature, extent, magnitude, duration, probability and ultimately the significance of the impacts (refer to methodology provided in **Table 26** below). Where applicable, the impact assessments and significance ratings provided by the respective specialists are included.

In the case of the specialist studies, some of the impact assessment methodologies deviated from the approach shown in **Table 26** below. However, the quantitative basis for these specialist evaluations of the impacts to specific environmental features still satisfied the intention of the EIA.

The assessment considers impacts before and after mitigation, where in the latter instance the residual impact following the application of the mitigation measures is evaluated.

Table 26: Quantitative Impact Assessment Methodology

Nature (/Status)	The project could have the following impacts to the environment: • Positive; • Negative; or • Neutral.
Extent	• Local - extend to the site and its immediate surroundings. • Regional - impact on the region but within the province. • National - impact on an interprovincial scale. • International - impact outside of South Africa.
Magnitude	Degree to which impact may cause irreplaceable loss of resources. • Low - natural and social functions and processes are not affected or minimally affected. • Medium - affected environment is notably altered; natural and social functions and processes continue albeit in a modified way. • High - natural or social functions or processes could be substantially affected or altered to the extent that they could temporarily or permanently cease.
Duration	• Short term - 0-5 years. • Medium term - 5-11 years. • Long term - impact ceases after the operational life cycle of the activity either because of natural processes or by human intervention. • Permanent - mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.
Probability	• Almost certain - the event is expected to occur in most circumstances. • Likely - the event will probably occur in most circumstances. • Moderate - the event should occur at some time. • Unlikely - the event could occur at some time. • Rare/Remote - the event may occur only in exceptional circumstances.
Significance	Provides an overall impression of an impact's importance, and the degree to which it can be mitigated. The range for significance ratings is as follows- 0 - Impact will not affect the environment. No mitigation necessary. 1 - No impact after mitigation. 2 - Residual impact after mitigation / some loss of populations and habitats of non-threatened species. 3 - Impact cannot be mitigated / exceeds legal or regulatory standard / increases level of risk to public health / extinction of biological species, loss of genetic diversity, rare or endangered species, critical habitat.

14.8 Impact Mitigation

14.8.1 Mitigation Hierarchy

Impacts are to be managed by assigning suitable mitigation measures. According to DEAT (2006), the objectives of mitigation are to:

- Find more environmentally sound ways of executing an activity;
- Enhance the environmental benefits of a proposed activity;
- Avoid, minimise or remedy negative impacts; and
- Ensure that residual negative impacts are within acceptable levels.

Mitigation should strive to abide by the following hierarchy – (1) prevent; (2) reduce; (3) rehabilitate (or remediate); and/or (4) compensate for the environmental impacts.

The proposed mitigation of the impacts associated with the Project includes specific measures identified by the technical team (including engineering solutions) and environmental specialists, stipulations of environmental authorities and environmental best practices.

Note that the mitigation measures in the subsequent sections are not intended to be exhaustive, but rather focus on the potentially significant impacts identified.

The EMPr (contained in **Appendix L**) provides a comprehensive list of mitigation measures for specific elements of the Project and the receiving environment, which extends beyond the impacts evaluated in the body of the EIA Report.

14.8.2 EMPr Framework

An EMPr represents a detailed plan of action prepared to ensure that recommendations for enhancing positive impacts and/or limiting or preventing negative environmental impacts are implemented during the life-cycle of a project.

The content of an EMPr must either contain the information set out in Appendix 4 of GN No. R. 982 of 4 December 2014, as amended, or must be a generic EMPr relevant to an application as identified and gazetted by the Minister in a Government Notice. Once the Minister has identified, through a Government Notice, that a generic EMPr is relevant to an application for Environmental Authorisation, that generic EMPr must be applied by all parties involved in the EA process, including, but not limited to, the Applicant and the Competent Authority. In this regard, the Minister of Environmental Affairs published the generic EMPr relevant to an application for Environmental Authorisation for substation and overhead electricity transmission and distribution infrastructure in GN No. 435 of 22 March 2019. These EMPr's were used for the Project: Power Lines.

All liability for the implementation of the EMPr (as well as the EIA findings and Environmental Authorisation, if granted) lies with the Project Proponent.

14.9 Land Use

14.9.1 Impact Description

Certain informal uses of the sites earmarked for the PV Plants (including the substations and sections of the power lines) are taking place, including the grazing of livestock, informal settling and people residing within the old mine houses. The MLM, as the landowner, is responsible for the removal of informal dwellings and illegal dumping areas on the sites, as well as for relocating the people residing in the old mine houses.

The previous mining company (i.e. Harmony Gold Mining Company Ltd) is responsible for all the surface disturbances on the mining areas which includes, all historical mining and prospecting activities. The Radiological Survey found that radioactive tailings are still present on the PV Sites. These sites will not be released from NNR regulatory control until these tailings have been removed or used in an approved manner (SciRAD Consulting, 2020).

14.9.2 Impact Assessment

Environmental Feature	**Land Use**
Relevant Alternatives & Activities	**All physical infrastructure and ancillary structures that form part of the Project**
Project life-cycle	**Construction & operational phases**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Impacts on current informal use of land • Impacts of old mining activities, structures and infrastructure on the development of the substations	• Scheduling and implementation of rehabilitation activities in accordance with the Tripartite and Rehabilitation Agreement between the Mining Company, MLM and the Applicant. • Exclude tailings storage facilities to the south of the Phase 1 Site and the north of the Phase 2 Site from the development. • Implement recommendations from the Radiological Survey (SciRAD Consulting, 2020) in terms of the tailings material. Undertake a follow-up survey to verify that the activity concentrations in the respective areas are below 0.5 Bq/g. • Receive approval from the NNR for the development of the sites.

	+/- Impacts	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	-	local	medium-high	short-term	almost certain	3
After Mitigation	-	local	low	short-term	moderate	1

14.10 Soils

14.10.1 Impact Description

According to Index (2020), soils that are highly prone to wind erosion are encountered in the Project area. During the construction phase areas will be cleared of vegetation, which may lead to soil erosion. Erosion could also take place in the absence of suitable stormwater management. The EMPr includes storm water management measures to prevent the occurrence of erosion.

Considering the previous mining activities that took place on the overall PV Sites, there is a likelihood of encountering historically contaminated soil. Soil may also be polluted by poor storage or handling of material, spillages and inadequate housekeeping practices. Mitigation measures are contained in the EMPr related to the safe management of materials and hazardous substances on site, in order to minimise the impact of these materials on the biophysical environment.

14.10.2 Impact Assessment

Environmental Feature	**Soils**
Relevant Alternatives & Activities	**Construction and operational activities**
Project life-cycle	**Construction & operational phases**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Soil erosion • Soil compaction	• Consider findings from geotechnical investigations during Project design phase and incorporate mitigation measures (as relevant). • Take representative soil samples to determine existing levels of soil contamination. Manage soil and spoil material accordingly. • Stabilisation of cleared areas and watercourse crossings to prevent and control erosion. • Manage drainage from sites to minimise erosion. • Reinstate and rehabilitate disturbed areas to prevent future erosion. • See mitigation measures regarding hazardous substances & waste • Rehabilitation of construction footprint.

	+/- Impacts	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	-	local	medium-high	short-term	likely	3
After Mitigation	-	local	low	short-term	unlikely	1

14.11 Surface Water

14.11.1 Hydrology (Flood Management)

14.11.1.1 Impact Description

Key hydrological features associated with the PV Sites include the following:

- The Mahemspruit (south-west of Phase 1), Sandspruit (north-east of Phase 2) and a non-perennial river (west of Phase 2) are the most prominent rivers in the area; and
- Based on a combination of desktop and in-field delineations, a total of 4 and 18 individual natural wetland HGM units were identified and delineated within the 40m survey corridor for Phase 1 and Phase 2 Power Lines, respectively.

Potential impacts from a hydrological perspective, include the following:

- The development may alter drainage on the PV Sites, with resulting increase in runoff;
- Impacts where access roads and ancillary infrastructure cross watercourses;
- Impacts caused by inadequate stormwater management at the substations; and
- Damage to the development from major flood events.

14.11.1.2 Impact Assessment

Environmental Feature	Hydrology
Relevant Alternatives & Activities	**Construction and operational activities**
Project life-cycle	**Construction & operational phases**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Alteration of drainage over sites • Watercourse crossings • Inadequate stormwater management • Damage caused by floods	• Substations and towers are to be developed outside of the 1:100 year floodline of any watercourse. • Design and implement a suitable stormwater drainage system at the substations. Make provision for separation of clean and dirty water. • Identify appropriate protection measures during the design stage, taking into consideration foundation stability, access road stability, and electrical connections (amongst others). • Erosion protection measures to be installed where there are possibilities of surface water sheet flow causing erosion. • The construction camp shall not be situated within 100 meters or within the 1:100 year flood line of any watercourse. • Stabilisation of watercourses at access road crossings.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	local	medium-high	long-term	likely	2
After Mitigation	-	local	low	long-term	unlikely	1

14.11.2 Wetlands

The findings from the Water Resources Impact Assessment (contained in **Appendix G1**) follow.

14.11.2.1 Impact Description

No substations will be positioned in a wetland or an associated buffer area. The proposed locations of the towers are unknown, but where the route aligns with existing power line routes it was assumed that towers will be placed adjacent to existing towers. It is likely that some of the towers will encroach into the recommended buffer areas of wetlands.

During construction, site clearing and storage of equipment may lead to the disturbance and degradation of wetland vegetation (non-cultivated areas), increased bare surfaces, runoff and potential for erosion. Additionally, the excavation, levelling and installation of towers may lead to increased sediment loads and contamination of wetlands with hydrocarbons (leaks and spillages) as well as contamination with human sewerage and litter. It is also assumed that most wetland and buffers can be avoided.

Once constructed the routine operation and maintenance of the power lines will invariably result in the clearing of vegetation within the servitude. Existing power line servitudes together with any residual disturbances from construction may facilitate proliferation of alien and invasive species, if not managed appropriately.

14.11.2.2 Impact Assessment

Table 27: DWS Risk Impact Matrix for the proposed Project (Andrew Husted Pr Sci Nat 400213/11) (TBC, 2020a)

Activity	Aspect	Impact	Mitigation Scenario	Severity					Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Control Measures
				Flow Regime	Water Quality	Habitat	Biota	Severity											
Construction																			
Clearing and preparation of powerline route including storage of equipment	Wetland vegetation deterioration and soil exposure.	Disturbance and degradation of wetland vegetation	Without	1	1	3	3	2	1	3	6	2	2	5	1	10	60	**M**	• Restrict the disturbance and clearance footprint to within 15 m on either side of the proposed power line route (40 m disturbance corridor). • The current substation layout is optimally situated from a wetland perspective. • The placement of towers is somewhat restricted by the location of existing towers. Limited risks are expected for Phase 1, with risks more likely for Phase 2. Try avoid wetlands and buffers where feasible. Implement a rehabilitation plan. Cleared areas must be rehabilitated and stabilised to avoid impacts to adjacent wetland and buffer areas. In cultivated fields, an interception berm is preferred to avoid sedimentation of the adjacent water resources. • Although the prescribed post-mitigation buffer as per the national buffer determination tool is 15 m attempt wherever possible to maintain a 30 m buffer on the delineated wetlands to lower the potential for bird collisions which are highest near water resources. • Reduce the disturbance footprint and the unnecessary clearing of vegetation when traversing the identified drainage lines. • Make use of existing access routes as much as possible, before new routes are considered. Any selected “new” route must not encroach into the wetland areas.
			With	1	1	1	1	1	1	3	5	2	1	5	1	9	45	**L**	

Activity	Aspect	Impact	Mitigation Scenario	Severity					Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Control Measures
				Flow Regime	Water Quality	Habitat	Biota	Severity											
		Increased bare surfaces, runoff and potential for erosion	Without	2	2	2	2	2	2	2	6	3	3	1	1	8	48	L	• Keep tower hole excavation and soil heaps neat and tidy. • Limit construction activities to the dry season when storms are least likely to wash concrete and sand into wetlands. This is only where towers are within wetlands and buffer areas. • Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash. • Mixing of concrete must under no circumstances take place in any wetland or their buffers. Scrape the area where mixing and storage of sand and concrete occurred to clean once finished. • Limit the placement of towers within wetlands and buffer areas where feasible. • Do not situate any of the construction material laydown areas within any wetland or buffer area. Try adhere to a 30 m buffer in these instances. • No machinery should be allowed to parked in any wetlands or buffer areas.
			With	1	1	1	1	1	2	2	5	3	1	1	1	6	30	L	
		Introduction and spread of alien and invasive vegetation	Without	1	1	3	3	2	1	2	5	3	3	5	1	12	60	M	• Promptly remove all alien and invasive plant species that may emerge during construction (i.e. weedy annuals and other alien forbs). • Limit soil disturbance • The use of herbicides is not recommended in or near wetlands (opt for mechanical removal). • Appropriately stockpile topsoil cleared from the transmission line footprint. • Clearly demarcate transmission line construction footprint, and limit all activities to within this area. • Minimize unnecessary clearing of vegetation beyond the tower footprints and transmission line corridors. • Lightly till any disturbed soil around the tower footprint to avoid compaction.
			With	1	1	2	1	1.25	1	2	4.25	3	1	1	1	6	26	L	
Excavation, levelling and installation of transmission towers.	Soil disturbance, sedimentation	Increased sediment loads to downstream reaches	Without	2	2	2	2	2	2	2	6	3	3	1	1	8	48	L	• See mitigation for increased bare surfaces, runoff and potential for erosion • Re-instate topsoil and lightly till transmission tower disturbance footprint.
			With	1	1	1	1	1	1	2	4	3	1	1	1	6	24	L	

Activity	Aspect	Impact	Mitigation Scenario	Severity					Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Control Measures
				Flow Regime	Water Quality	Habitat	Biota	Severity											
		Contamination of wetlands with hydrocarbons due to leaks and spillages from machinery, equipment & vehicles as well as Contamination and eutrophication of wetland systems with human sewerage and litter.	Without	2	3	2	2	2.25	2	2	6.25	3	3	1	1	8	50	L	• Make sure all excess consumables and building materials / rubble is removed from site and deposited at an appropriate waste facility. • Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) or construction materials on site (e.g. concrete) in such a way as to prevent them leaking and entering wetland or buffer areas. • Mixing of concrete must under no circumstances take place within the wetland or buffer areas. • Check for oil leaks, keep a tidy operation, and promptly clean up any spills or litter. • Provide appropriate sanitation facilities for workers during construction and service them regularly. • The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected must be disposed of at a licensed disposal facility; • The Contractor must be in possession of an emergency spill kit that must be complete and available at all times on site; • Any possible contamination of topsoil by hydrocarbons must be avoided. Any contaminated soil must be treated in situ or be placed in containers and removed from the site for disposal in a licensed facility;
			With	1	3	1	1	1.5	2	2	5.5	3	1	1	1	6	33	L	
Operation																			
Routine operation and maintenance of powerline route	Clearing of wetland vegetation beneath powerline	Degradation of wetland vegetation wetland vegetation.	Without	1	1	1	3	1.5	2	1	4.5	3	1	5	1	10	45	L	• Clear vegetation in line with the 2010 Eskom Environmental Procedure Document entitled "Procedure for vegetation clearance and maintenance within overhead powerline servitudes". • Avoid the use of herbicides and diesel to treat stumps within the wetland areas. • Make use of existing access routes as much as possible, before new routes are considered. Any
			With	1	1	1	23	6.5	2	1	9.5	3	1	5	1	10	95	L	

Activity	Aspect	Impact	Mitigation Scenario	Severity					Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Control Measures
				Flow Regime	Water Quality	Habitat	Biota	Severity											
																			selected “new” route must not encroach into the wetland areas.
	Alien and Invasive species	Proliferation of alien and invasive species	Without	1	1	3	4	2.25	2	2	6.25	3	1	5	1	10	63	M	• In line with the 2010 Eskom Environmental Procedure Document entitled "*Procedure for vegetation clearance and maintenance within overhead powerline servitudes*" all alien vegetation along the transmission servitude should be managed in terms of the Regulation GNR.1048 of 25 May 1984 (as amended) issued in terms of the Conservation of Agricultural Resources Act, Act 43 of 1983. By this Eskom is obliged to control category 1, 2 and 3 plants to the extent necessary to prevent or to contain the occurrence, establishment, growth, multiplication, propagation, regeneration and spreading such plants within servitude areas.
			With	1	1	1	4	1.75	2	1	4.75	3	1	5	1	10	48	L	
Decommissioning																			
Removal of transmission towers and lines	Vehicle access	Degradation of wetland vegetation and proliferation of alien and invasive species	Without	2	2	2	3	2.25	1	2	5.25	3	1	5	1	10	53	L	• See mitigation for the impacts on direct loss, disturbance and degradation of wetlands and spread of alien and invasive plants. • Control should continue for a minimum of three years following decommissioning.
			With	1	1	2	3	1.75	1	2	4.75	3	1	5	1	10	48	L	
	Re-excavation of Transmission Towers	Increased bare surfaces, runoff and potential for erosion	Without	2	2	2	2	2	2	2	6	3	3	1	1	8	48	L	• See mitigation for increased bare surfaces, runoff and potential for erosion and increased sediment loads during construction
			With	1	1	1	1	1	2	2	5	3	1	1	1	6	30	L	

14.12 Terrestrial Ecology

The findings from the Terrestrial Ecological Impact Assessment (contained in **Appendix G2**) follow.

14.12.1 Impact Description

Phase 1 does not overlap with a CBA area and it is also not expected to be crucial habitat. The Phase 2 Project area, however, impacts on a CBA habitat and EN ecosystem type, and a number of pans are also encountered in and around the area within which SCC flora species can be found. The destruction of these wetland habitats will result in the irreplaceable loss of resources for these threatened species.

The main anticipated impacts during the construction phase include the following:

- Destruction, fragmentation and degradation of habitats and ecosystems;
- Spread and/or establishment of alien and/or invasive species;
- Displacement of faunal community (including several SCC) due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, vibration);
- Mortalities and displacements of fauna and flora SCCs; and
- Chemical pollution associated with dust suppressants.

The main anticipated impacts during the operational phase include the following:

- Continued fragmentation and degradation of habitats, ecosystems and CBA2 areas;
- Spread of alien and/or invasive species;
- Displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with BESS and substation, noise, light, dust, vibration); and
- Reduced dispersal/migration of fauna.

14.12.2 Impact Assessment

Table 28: Assessment of significance of potential impacts on terrestrial ecology associated with the construction phase of Phase 1 (TBC, 2020b)

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	**Spatial Scope**	**Severity of Impact**	**Sensitivity of Receiving Environment**	**Probability of Impact**	**Significance**	**Duration of Impact**	**Spatial Scope**	**Severity of Impact**	**Sensitivity of Receiving Environment**	**Probability of Impact**	**Significance**
Destruction, fragmentation and degradation of habitats, and ecosystems	5	3	4	3	5		4	2	3	3	4	
	Permanent	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Definite	**Moderately High**	Life of operation or less than 20 years: Long Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**
Spread and/or establishment of alien and/or invasive species	4	3	3	4	4		3	2	2	2	3	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology highly sensitive /important	Highly likely	**Moderately High**	One year to five years: Medium Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**
Displacement of faunal community (Including several SCC) due to habitat loss, direct mortalities	3	3	3	3	4		2	2	2	2	3	
	One year to five years: Medium Term	Local area/ within 1 km of the site boundary / <	Significant / ecosystem structure and function	Ecology moderately sensitive/ /important	Highly likely	**Moderate**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted /	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	**Spatial Scope**	**Severity of Impact**	**Sensitivity of Receiving Environment**	**Probability of Impact**	**Significance**	**Duration of Impact**	**Spatial Scope**	**Severity of Impact**	**Sensitivity of Receiving Environment**	**Probability of Impact**	**Significance**
and disturbance (road collisions, noise, light, dust, vibration);		5000ha impacted / Linear features affected < 1000m	moderately altered					Linear features affected < 100m				
Mortalities and displacements of fauna and flora SCCs.	3	3	3	4	4		2	2	2	4	3	
	One year to five years: Medium Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology highly sensitive /important	Highly likely	**Moderate**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology highly sensitive /important	Likely	**Low**
Chemical pollution associated with dust suppressants	3	4	4	3	4		2	2	2	2	1	
	One year to five years: Medium Term	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Highly likely	**Moderately High**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Highly unlikely	**Absent**

Table 29: Assessment of significance of potential impacts on terrestrial ecology associated with the construction phase of Phase 2 (TBC, 2020b)

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Destruction, fragmentation and degradation of habitats and ecosystems	5	3	4	3	5		4	2	3	3	4	
	Permanent	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Definite	**Moderately High**	Life of operation or less than 20 years: Long Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**
Spread and/or establishment of alien and/or invasive species	4	3	3	3	4		3	2	2	2	3	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**	One year to five years: Medium Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**
Displacement of faunal community (Including several SCC) due to habitat loss, direct mortalities and disturbance (road collisions, noise, light,	3	3	3	3	4		2	2	2	2	3	
	One year to five years: Medium Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
dust, vibration);		affected < 1000m										
Mortalities and displacements of fauna and flora SCCs.	3	3	3	3	4		2	2	2	2	3	
	One year to five years: Medium Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**
Chemical pollution associated with dust suppressants	3	4	4	3	4		2	2	2	2	3	
	One year to five years: Medium Term	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Highly likely	**Moderately High**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**

Table 30: Assessment of significance of potential impacts on terrestrial ecology associated with the operational phase of Phase 1 (TBC, 2020b)

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Continued fragmentation and degradation of habitats and ecosystems	5	3	4	3	4		4	3	3	3	3	
	Permanent	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Definite	**Moderately High**	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**
Spread and/or establishment of alien and/or invasive species	4	3	3	4	3		2	2	2	2	3	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology highly sensitive /important	Likely	**Moderate**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**
Displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with substation,	4	3	3	4	3		3	2	2	2	2	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features	Significant / ecosystem structure and function moderately altered	Ecology highly sensitive /important	Likely	**Moderate**	One year to five years: Medium Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Possible	**Low**

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
noise, light, dust, vibration)		affected < 1000m										
	4	3	3	4	3		2	2	2	2	3	
Reduced dispersal of fauna	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology highly sensitive /important	Likely	**Moderate**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**

Table 31: Assessment of significance of potential impacts on terrestrial ecology associated with the operational phase of Phase 2 (TBC, 2020b)

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
	5	3	4	3	4		4	3	3	3	3	
Continued fragmentation and degradation of habitats and ecosystems	Permanent	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Highly likely	**Moderately High**	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Spread and/or establishment of alien and/or invasive species	4	3	3	3	3		2	2	2	2	3	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**
Displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with substation, noise, light, dust, vibration)	4	4	3	4	3		3	2	2	2	2	
	Life of operation or less than 20 years: Long Term	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	Significant / ecosystem structure and function moderately altered	Ecology highly sensitive /important	Likely	**Moderately High**	One year to five years: Medium Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Possible	**Low**
Reduced dispersal of fauna	4	3	4	3	3		2	2	2	2	3	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Likely	**Moderate**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
		affected < 1000m										

Table 32: Mitigation Measures – Terrestrial Ecology (TBC, 2020b)

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Management outcome: Vegetation and Habitats				
Areas rated as High sensitivity in proximity to the development areas, should be declared as 'no-go' areas during the construction phase and operational phase, and all efforts must be made to prevent access to this area from construction workers, machinery .The infrastructure should be realigned to prioritise development within low/moderate sensitivity areas. This excludes High sensitivity areas which are authorised for development.	Life of operation	Project manager, Environmental Officer	Development footprint	Ongoing
Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible.	Life of operation	Project manager, Environmental Officer	Areas of indigenous vegetation	Ongoing
Where possible, existing access routes and walking paths must be made use of.	Construction/Operational Phase	Environmental Officer & Design Engineer	Roads and paths used	Ongoing
All laydown, chemical toilets etc. should be restricted to low sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction/closure phase has been concluded. No storage of vehicles or equipment will be allowed outside of the designated project areas.	Construction/Operational Phase	Environmental Officer & Design Engineer	Laydown areas	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood and wind events. This will also reduce the likelihood of encroachment by alien invasive plant species.	Operational phase	Environmental Officer & Contractor	Assess the state of rehabilitation and encroachment of alien vegetation	Quarterly for up to two years after the closure
Any woody material removed can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion.	Operational and Decommissioning phase	Environmental Officer & Contractor	Woody material under powerline and in SS footprint	During Phase

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
A spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment on site unless necessary. All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them leaking and entering the environment.	Life of operation	Environmental Officer & Contractor	Spill events, Vehicles dripping.	Ongoing
Storm Water run-off & Discharge Water Quality	Life of operation	Environmental Officer & Design Engineer	Water Quality and presence of erosion	Ongoing
It should be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.	Life of operation	Project manager, Environmental Officer	Any instances	Ongoing
A fire management plan needs to be complied and implemented to restrict the impact fire might have on the surrounding areas.	Life of operation	Environmental Officer & Contractor	Fire Management	During Phase
Rocks removed in the construction phased may not be dumped, but can be used in areas where erosion control needs to be performed	Operational phase	Environmental Officer & Contractor	Rock piles	During Phase
Any individual of the nationally protected trees or protected plants that was observed needs a relocation or destruction permit in order for any individual that may be removed or destroyed due to the development. Preferably, the trees/plants can be relocated within the property without a permit or otherwise left unharmed. Hi visibility flags must be placed near any protected plants in order to avoid any damage or destruction of the species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program.	Life of operation	Project manager, Environmental Officer Lodge Manager	Protected Tree/Plant species	Ongoing
The substation surfaces may not have reflective surfaces which can lead to veld fires	Operational phase	Environmental Officer & Contractor	Fire Management	During Phase
Management outcome: Fauna				
The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments, • Signs must be put up to enforce this	Construction/Operational Phase	Project manager, Environmental Officer	Infringement into these areas	Ongoing

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to amphibian species and nocturnal mammals	Construction/Operational Phase	Environmental Officer	Noise levels	Ongoing
No trapping, killing, or poisoning of any wildlife is to be allowed • Signs must be put up to enforce this;	Life of operation	Environmental Officer	Evidence of trapping etc	Ongoing
Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided and sodium vapor (green/red) lights should be used wherever possible.	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Light pollution and period of light.	Ongoing
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited.	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing
Schedule activities and operations during least sensitive periods, to avoid migration, nesting and breeding seasons.	Life of operation	Project manager, Environmental Officer & Design Engineer	Activities should take place during the day in the case.	Ongoing
Heat generated from the substations must be monitored to ensure it does not negatively affect the local fauna	Life of operation	Environmental Officer & Contractor	Heat generated by substations	Ongoing
All areas to be developed must be walked through prior to any activity to ensure no nests or fauna species are found in the area. Should any Species of Conservation Concern not move out of the area or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken.	Construction and Operational phase	Project manager, Environmental Officer	Presence of Nests and faunal species	Planning, Construction and Decommissioning
The holes for the powerline poles must be dug and planted in a progressive manner • Should the holes over night they must be covered temporarily to ensure no small fauna species fall in.	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of trapped animals and open holes	Ongoing
Ensure that cables and connections are insulated successfully to reduce electrocution risk.	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted fauna	Ongoing
Management outcome: Alien species				
The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprint of the roads must be kept to prescribed widths.	Construction/Operational Phase	Project manager, Environmental Officer & Contractor	Footprint Area	Life of operation
An alien management plan must be implemented quarterly for 2 years after phase	Construction phase and Decommissioning phase	Project manager, Environmental Officer & Contractor	Assess presence and encroachment of alien vegetation	Quarterly for 2 years after phase

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Management outcome: Dust				
Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes wetting of exposed soft soil surfaces. • No non environmentally friendly suppressants may be used as this could result in pollution of water sources	Life of operation	Contractor	Dustfall	Dust monitoring program.
Management outcome: Waste management				
Waste management must be a priority and all waste must be collected and stored effectively.	Life of operation	Environmental Officer & Contractor	Waste Removal	Weekly
Litter, spills, fuels, chemicals and human waste in and around the project area.	Construction/Closure Phase	Environmental Officer & Health and Safety Officer	Presence of Waste	Daily
A minimum of one toilet must be provided per 10 persons. Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area.	Life of operation	Environmental Officer & Health and Safety Officer	Number of toilets per staff member. Waste levels	Daily
The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility	Life of operation	Environmental Officer & Health and Safety Officer	Availability of bins and the collection of the waste.	Ongoing
Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regard to waste management. Under no circumstances may domestic waste be burned on site	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Collection/handling of the waste.	Ongoing
Refuse bins will be emptied and secured Temporary storage of domestic waste shall be in covered waste skips. Maximum domestic waste storage period will be 10 days.	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Management of bins and collection of waste	Ongoing, every 10 days
Management outcome: Environmental awareness training				
All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area to inform contractors and site staff of the presence of Red / Orange List species, their identification, conservation status and importance, biology, habitat requirements and management requirements the Environmental Authorisation and within the EMPr. The avoidance and protection of the wetland areas must be included into a site induction. Contractors and employees must all undergo the induction and made aware of the “no-go” to be avoided.	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing
Management outcome: Erosion				

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Speed limits must be put in place to reduce erosion. • Reducing the dust generated by the listed activities above, especially the earth moving machinery, through wetting the soil surface and putting up signs to enforce speed limit as well as speed bumps built to force slow speeds; • Signs must be put up to enforce this.	Life of operation	Project manager, Environmental Officer	Water Runoff from road surfaces	Ongoing
Where possible, existing access routes and walking paths must be made use of.	Life of operation	Project manager, Environmental Officer	Routes used within the area	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events and strong winds.	Life of operation	Project manager, Environmental Officer	Re-establishment of indigenous vegetation	Progressively
A stormwater management plan must be compiled and implemented.	Life of operation	Project manager, Environmental Officer	Management plan	Before construction phase: Ongoing

14.13 Avifauna

A separate Avifauna Assessment (contained in **Appendix G3**) was undertaken and the findings from this study follow.

14.13.1 Impact Description

Phase 1 does not overlap with a CBA area and it is also not expected to be crucial habitat for avifaunal SCCs. The Phase 2 Project area, however, was a CBA habitat and EN vegetation type, it also possessed a number of pans in which Greater and Lesser Flamingos were observed. The destruction of these wetland habitats will result in the irreplaceable loss of resources for these threatened species.

The main anticipated impacts during the construction phase include the following:

- Habitat loss (destroy, fragment and degrade habitat, ultimately displacing avifauna);
- Sensory disturbances (e.g. noise, dust, vibrations);
- Collection of eggs and poaching;
- Roadkill; and
- Chemical pollution associated with dust suppressants.

The main anticipated impacts during the operational phase include the following:

- Habitat loss (destroy, fragment and degrade habitat, ultimately displacing avifauna);
- Sensory disturbances (e.g. noise, dust, vibrations);
- Collection of eggs and poaching;
- Roadkill;
- Collisions with power lines;
- Electrocution by infrastructure and connections of the power lines.

14.13.2 Impact Assessment

Table 33: Assessment of significance of potential impacts on avifauna associated with the construction phase of Phase 1 (TBC, 2020c)

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Habitat Loss (Destroy, fragment and degrade habitat, ultimately displacing avifauna)	5	3	4	3	5		4	2	2	2	3	
	Permanent	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Great / harmful/ ecosystem structure and function largely altered	Ecology highly sensitive /important	Definite	**High**	Life of operation or less than 20 years: Long Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	likely	**Low**
Sensory disturbances (e.g. noise, dust, vibrations)	4	3	3	3	4		3	2	2	2	3	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**	One year to five years: Medium Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**
Collection of eggs and poaching	3	3	3	3	4		2	2	2	2	3	
	One year to five years: Medium Term	Local area/ within 1 km of the site boundary / <	Significant / ecosystem structure and function	Ecology moderately sensitive/ /important	Highly likely	**Moderate**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted /	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	**Spatial Scope**	**Severity of Impact**	**Sensitivity of Receiving Environment**	**Probability of Impact**	**Significance**	**Duration of Impact**	**Spatial Scope**	**Severity of Impact**	**Sensitivity of Receiving Environment**	**Probability of Impact**	**Significance**
		5000ha impacted / Linear features affected < 1000m	moderately altered					Linear features affected < 100m				
Roadkill	3	3	3	3	4		2	2	2	2	3	
	One year to five years: Medium Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**
Chemical pollution associated with dust suppressants	3	4	4	3	4		2	2	2	2	3	
	One year to five years: Medium Term	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Highly likely	**Moderately High**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**

Table 34: Assessment of significance of potential impacts on avifauna associated with the construction phase of Phase 2 (TBC, 2020c)

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Habitat Loss (Destroy, fragment and degrade habitat, ultimately displacing avifauna)	5	4	4	4	5		4	4	4	3	4	
	Permanent	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	Great / harmful/ ecosystem structure and function largely altered	Ecology highly sensitive /important	Definite	**High**	Life of operation or less than 20 years: Long Term	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Highly likely	**Moderately High**
Sensory disturbances (e.g. noise, dust, vibrations)	4	3	3	3	3		3	2	2	2	2	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**	One year to five years: Medium Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Possible	**Low**
Collection of eggs and poaching	3	3	4	4	4		2	2	2	2	3	
	One year to five years: Medium Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features	Great / harmful/ ecosystem structure and function largely altered	Ecology highly sensitive /important	Highly likely	**Moderately High**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
		affected < 1000m										
Roadkill	3	3	3	3	4		2	2	2	2	3	
	One year to five years: Medium Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**
Chemical pollution associated with dust suppressants	3	4	4	3	4		2	2	2	2	3	
	One year to five years: Medium Term	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Highly likely	**Moderately High**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**

Table 35: Assessment of significance of potential impacts on avifauna associated with the operational phase of Phase 1 (TBC, 2020c)

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Habitat Loss (Destroy, fragment and degrade habitat, ultimately displacing avifauna)	5	4	4	4	4		4	2	2	2	3	
	Permanent	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	Great / harmful/ ecosystem structure and function largely altered	Ecology highly sensitive /important	Highly likely	**High**	Life of operation or less than 20 years: Long Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**
Sensory disturbances (e.g. noise, dust, vibrations)	4	3	3	3	3		2	2	2	2	3	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**
Collection of eggs and poaching	4	4	3	4	3		3	2	2	2	2	
	Life of operation or less than 20 years: Long Term	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features	Significant / ecosystem structure and function moderately altered	Ecology highly sensitive /important	Likely	**Moderately High**	One year to five years: Medium Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Possible	**Low**

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
		affected < 3000m										
Roadkill	4	3	4	4	4		2	2	2	2	3	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Great / harmful/ ecosystem structure and function largely altered	Ecology highly sensitive /important	Highly likely	**Moderately High**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**
Collisions with powerlines	5	4	4	4	4		4	3	3	4	3	
	Permanent	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	Great / harmful/ ecosystem structure and function largely altered	Ecology highly sensitive /important	Highly likely	**High**	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology highly sensitive /important	Likely	**Low**
Electrocution by infrastructure and connections of the powerlines	5	4	4	4	4		4	3	3	4	1	
	Permanent	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features	Great / harmful/ ecosystem structure and function largely altered	Ecology highly sensitive /important	Highly likely	**High**	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology highly sensitive /important	Highly unlikely	**Low**

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
		affected < 3000m										

Table 36: Assessment of significance of potential impacts on avifauna associated with the operational phase of Phase 2 (TBC, 2020c)

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Habitat Loss (Destroy, fragment and degrade habitat, ultimately displacing avifauna)	5	4	4	4	5		4	3	3	3	3	
	Permanent	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	Great / harmful/ ecosystem structure and function largely altered	Ecology highly sensitive /important	Definite	**High**	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**
Sensory disturbances (e.g. noise, dust, vibrations)	4	3	3	3	3		2	2	2	2	3	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Collection of eggs and poaching	4	4	3	4	3		3	2	2	2	3	
	Life of operation or less than 20 years: Long Term	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	Significant / ecosystem structure and function moderately altered	Ecology highly sensitive /important	Likely	**Moderately High**	One year to five years: Medium Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**
Roadkill	4	3	4	4	4		2	2	2	2	3	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Great / harmful/ ecosystem structure and function largely altered	Ecology highly sensitive /important	Highly likely	**Moderately High**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**
Collision with powerlines	5	4	4	4	5		4	3	3	4	3	
	Permanent	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	Great / harmful/ ecosystem structure and function largely altered	Ecology highly sensitive /important	Definite	**High**	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology highly sensitive /important	Likely	**Moderate**
	5	4	4	4	4		4	3	3	4	3	

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Electrocution by infrastructure and connections of the powerlines	Permanent	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	Great / harmful/ ecosystem structure and function largely altered	Ecology highly sensitive /important	Highly likely	**High**	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology highly sensitive /important	Likely	**Moderate**

The mitigation measures to manage impacts to avifauna are captured in **Table 37** below.

Table 37: Summary of management outcomes pertaining to impacts to avifauna and their habitats (TBC, 2020c)

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Management outcome: Habitats				
Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible.	Life of operation	Project manager, Environmental Officer	Areas of indigenous vegetation	Ongoing
Where possible, existing access routes and walking paths must be made use of.	Construction/Operational Phase	Environmental Officer & Design Engineer	Roads and paths used	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood and wind events. This will also reduce the likelihood of encroachment by alien invasive plant species.	Closure Phase/Rehabilitation phase	Environmental Officer & Contractor	Assess the state of rehabilitation and encroachment of alien vegetation	Quarterly for up to two years after the closure
Rehabilitation of the disturbed areas existing in the project area must be made a priority. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are endemic to this vegetation type.	Operational/Closure Phase/ Post Closure Phase	Environmental Officer & Contractor	Road edges and BESS footprint	Ongoing
Any woody material removed can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion.	Closure Phase/ Post Closure Phase	Environmental Officer & Contractor	Road edges and BESS footprint	During Phase
Erosion control and alien invasive management plan	Life of operation	Environmental Officer & Contractor	Erosion and alien invasive species	Ongoing
A fire management plan needs to be complied and implemented to restrict the impact fire might have on the surrounding areas.	Life of operation	Environmental Officer & Contractor	Fire Management	During Phase
Management outcome: Avifauna				
The areas to be developed must be specifically demarcated to prevent movement of staff or any	Construction/Operational Phase	Project manager, Environmental Officer	Infringement into these areas	Ongoing

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
individual into the surrounding environments. Signs must be put up to enforce this				
All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting or hunting terrestrial species (e.g. ducks, francolin), and owls, which are often persecuted out of superstition. Signs must be put up to enforce this.	Life of operation	Environmental Officer	Evidence of trapping etc	Ongoing
The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on avifauna	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Construction/Closure Phase	Ongoing
Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided and sodium vapor (red/green) lights should be used wherever possible.	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Light pollution and period of light.	Ongoing
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limit (40km/h), to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited.	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing
Schedule activities and operations during least sensitive periods, to avoid migration, nesting and breeding seasons (July-September).	Life of operation	Project manager, Environmental Officer & Design Engineer	Activities should take place during the day in the case.	Ongoing
All areas to be developed must be walked through prior to any activity to ensure no nests or avifauna species are found in the area. Should any Species of Conservation Concern not move out of the area or their nest be found in the area a suitably qualified specialist must be	Planning, Construction and Decommissioning	Project manager, Environmental Officer	Presence of Nests and faunal species	Planning, Construction and Decommissioning

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
consulted to advise on the correct actions to be taken.				
The design of the proposed powerline must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds or bird strikes	Ongoing
Use environmentally friendly cleaning and dust suppressant products	Construction and operation	Environmental Officer & Contractor, Engineer	Presence of chemicals in and around the project area	Ongoing
Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used. This would involve using existing/approved pylons and associated infrastructure for different lines.	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds	Ongoing
Any exposed parts must be covered (insulated) to reduce electrocution risk.	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds	Ongoing
Perch structures must be installed. South African standards state 270cm above the cross arm (Prinsen *et al.,* 2012).	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds	Ongoing
Ensure that the phase cables are spaced far enough apart to reduce the risk of large birds touching both simultaneously (2 m for large raptors) (Prinsen *et al.,* 2012). If such separation (isolation) cannot be provided, exposed parts must be covered (insulated) to reduce electrocution risk. Cables must be monitored over i.e. to ensure they do not get exposed.	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds and presence of exposed cables	Ongoing
Bird flappers must be installed on the lines at 10 m intervals. This must be done for the portions that overlap with wetland and riparian habitats. The interval must be increased in areas identified to support higher concentrations of collision and electrocution prone species.	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of dead birds in the project area	Ongoing

14.14 Agricultural

The findings from the Agricultural Impact Assessment (contained in **Appendix G4**) follow.

14.14.1 Impact Description

The following impacts were identified and assessed from an agricultural perspective:

- Loss of high potential land –
  - The impact of installing the power line will only have a local impact with a low significance. Mitigation can be affected by doing the construction then the land is free, which is after crops are harvested but before cultivation commences for the next season.
- Loss of grazing land –
  - The impact will be local. The power lines' construction corridors and may be disturbed. Only the footprint of the pylons, however, will be lost as grazing.
  - Fences may be damaged during construction and should afterwards be replaced or repaired.
  - Cattle grazing on veld and stover should be moved elsewhere to accommodate construction.
- Loss of farming infrastructure – there will be no permanent loss of farming infrastructure.
- Other – the number of employed in farming will not be influenced.

14.14.2 Impact Assessment

Table 38: Assessment of agricultural impacts (Index, 2020)

POTENTIAL ENVIRONMENTAL IMPACT / NATURE OF IMPACT	Extent	Probability	Reversibility	Irreplaceable	Duration	Magnitude	TOTAL (SP)	Significance	Extent	Probability	Reversibility	Irreplaceable	Duration	Magnitude	TOTAL (SP)	Significance
LOSS OF HIGH POTENTIAL LAND																
Direct occupation /loss of land	1	1	2	2	5	1	**11**	**L**	1	1	2	2	5	1	**11**	**L**
Loss of agricultural production	1	1	1	2	1	1	**6**	**L**	1	1	1	1	1	1	**5**	**L**
LOSS OF GRAZING LAND																
Direct occupation /loss of land	1	1	1	1	1	1	**5**	**L**	1	1	1	1	1	1	**5**	**L**
Loss of agricultural production	1	1	1	1	1	1	**5**	**L**	1	1	1	1	1	1	**5**	**L**
LOSS OF AGRICULTURAL PRODUCTION																
Loss of crop production	1	1	4	4	4	2	**28**	**M**	1	1	4	4	4	2	**28**	**M**
Loss of grazing	2	4	4	4	4	2	**54**	**H**	2	2	4	2	2	2	24	**M**
LOSS OF AGRICULTURAL INFRASTRUCTURE																
Direct occupation /loss of land	1	1	1	1	1	1	**5**	**L**	1	1	1	1	1	1	**5**	**L**
Loss of agricultural production	1	1	1	1	1	1	**5**	**L**	1	1	1	1	1	1	**5**	**L**

The mitigation measures identified as part of the Agricultural Impact Assessment are captured in **Table 39** below.

Table 39: Mitigation measures for agricultural impacts (Index, 2020)

Impact	Mitigation
Loss of high potential and cultivated land	▪ The footprint of the pylon will be lost. This is small and other than moving the position, it cannot be mitigated. ▪ Do construction when no farming activities take place.
Loss of grazing land	▪ The footprint of the pylon will be lost. This is small and other than moving the position, it cannot be mitigated. ▪ Unless the grazing capacity of the farm is bleached, the significance of the impact is negligible.
Loss of farming infrastructure	▪ Fences may be damaged during construction. They should be replaced or repaired. ▪ Cattle grazing on veld and stover should be moved elsewhere to during the construction period. ▪ There will be no permanent loss of farming infrastructure is foreseen.

14.15 Phase 1 Cultural Heritage Impact Assessment

The findings from the Phase 1 Cultural Heritage Impact Assessment (contained in **Appendix G5**) follow.

14.15.1 Impact Description

As no sites, features or objects of cultural significance were identified in the Project area, no mitigation measures were proposed. Provision is made in the EMPr to manage chance finds.

14.15.2 Impact Assessment

Table 40: Assessment of cultural heritage impacts (van Schalkwyk, 2020)

Matjhabeng Phase 1 Power Lines and Substations		
Impact assessment: As no sites, features or objects of cultural heritage significance were identified on the project area, there would be no impact as a result of the proposed development		
	Without mitigation	With mitigation
Extent	Site (1)	Site (1)
Duration	Permanent (5)	Permanent (5)
Intensity	Minor (2)	Minor (2)
Probability	Very improbable (1)	Very improbable (1)
Significance	Low (8)	Low (1)
Status (positive or negative)	Negative	Neutral
Reversibility	n/a	n/a
Irreplaceable loss of resources?	No	No
Can impacts be mitigated: n/a		
Mitigation: n/a		
Cumulative impact: None		

Matjhabeng Phase 2 Power Lines and Substations		
Impact assessment: As no sites, features or objects of cultural heritage significance were identified on the project area, there would be no impact as a result of the proposed development		
	Without mitigation	With mitigation
Extent	Site (1)	Site (1)
Duration	Permanent (5)	Permanent (5)
Intensity	Minor (2)	Minor (2)
Probability	Very improbable (1)	Very improbable (1)
Significance	Low (8)	Low (1)
Status (positive or negative)	Negative	Neutral
Reversibility	n/a	n/a
Irreplaceable loss of resources?	No	No
Can impacts be mitigated: n/a		
Mitigation: n/a		
Cumulative impact: None		

14.16 Visual Impact Assessment

The findings from the Visual Impact Assessment (contained in **Appendix G8**) follow.

14.16.1 Impact Description

The following visual impacts were identified:

- Impact 1: Impact on Landscape Character and Sense of Place –
  - The proposed Project may impact on the existing landscape and visual character of the region and Sense of Place associated with the proposed power line route alternatives and associated substations and its immediate surroundings. The character of the landscape in the region of the proposed powerline route alternatives and associated substations are currently dominated by relatively flat grassland terrain, interspersed with cultivated fields, alien tree stands and semi-rural settlements and mining activities. There are currently various power lines within the proposed route corridor. The overall character of the landscape is therefore at low risk to be altered by the proposed activities.
- Impact 2: Visual Intrusion and Visual Absorption Capacity (VAC) impacts –
  - Power lines and associated structures are generally experienced as having a negative impact on landscape aesthetics as it will introduce an industrial aspect to a landscape. This area does, however, have numerous overhead power lines present. Hence, the visual intrusion of the proposed power lines and associated substations will be low. The altered visual environment during the construction phase, may lead to moderate levels of visual intrusion and lead to increased visual contrast, this will however be a temporary visual intrusion and contrast. This in turn will negatively impact on the existing medium VAC (the ability of an area to visually absorb development).
- Impact 3: Visual Exposure and Visibility Impacts –

- The proposed power lines and associated substations may impact on visual exposure and visibility, which relates directly to the perception of sensitive visual receptors towards the project. Sensitive visual receptors have been determined to primarily comprise residents, including farmers and farm workers, living within km as well as local roads users. Direct visual exposure will take place as a result of the proposed power lines and associated substations being visible to road users and farmers in the immediate vicinity thereof, as well as indirectly through fugitive dust generated by construction related activities. In addition to physical infrastructure, impacts from clearing of vegetation, potential erosion as a result of bare soils, maintenance activities and the alteration of local topography will also create contrast in the landscape and may be visible to receptors. It is however important to note, that although the long term, operational visual impact of the Project is unlikely to be highly significant due to power lines being common features of South African landscapes.

❖ Impact 4: Impacts due to night time lighting –

- The proposed power line routes and associated substations areas are located within an area where there are numerous sources of night-time lighting, such as the towns of Odendaalsrus, Allanridge, Nyakallong, farm steads and the Harmony Gold Mining operations and street lights. The lighting environment of the region is therefore considered Suburban with medium district brightness. Development of the proposed power lines and associated substations may potentially be a source of light pollution during the construction phase, should security lighting be utilised during the night. Overall, the impact significance of potential night-time lighting is expected to be low, of short duration and only occur during the construction phase and will be limited to a small area. The proposed power lines will, however, not be a source of light pollution during the operational phase. Security lights associated with the proposed substations may however be a source of light pollution, and may potentially contribute somewhat to the effects of skyglow and artificial lighting in the region. This can be easily mitigated by installing security lighting no higher than 5 meters above the ground and through appropriate planning of illumination direction.

14.16.2 Impact Assessment

Table 41: Assessment of visual impacts (SAS, 2020)

Impact	Unmanaged	Managed
Construction phase		
1: Impact on landscape character and sense of place	Medium Low	Low
2: Visual intrusion and VAC impacts	Medium Low	Low
3: Visual exposure and visibility impacts	Medium Low	Low
4: Impacts due to nighttime lighting	Low	Low
Operational phase		
1: Impact on landscape character and sense of place	Medium Low	Low
2: Visual intrusion and VAC impacts	Medium Low	Low
3: Visual exposure and visibility impacts	Medium Low	Low
4: Impacts due to nighttime lighting	Low	Low

Table 42: Mitigation measures for visual impacts (SAS, 2020)

Impact	Mitigation
General housekeeping	▪ All construction areas must be kept in a neat and orderly condition at all times; ▪ Any areas for material storage and other potentially intrusive activities must be screened from view as far as possible; ▪ An efficient removal system of waste and rubble must be ensured during the construction phase; ▪ All operational infrastructure should be actively maintained to avoid degradation.
Development footprint	▪ The duration of the construction phase should be reduced as far as possible through careful planning; ▪ The development footprint and disturbed areas associated with the construction phase of the project should be kept as small as possible, with as little indigenous vegetation being cleared as possible with specific mention tall trees which provides increased screening ability; ▪ Construction boundaries should be clearly demarcated to minimise areas of surface disturbance; ▪ Direct loss of or damage to valuable natural visual resources such as the various pans in the area should be actively avoided; ▪ As far as possible, existing roads are to be utilised for construction and maintenance purpose, to limit cumulative impacts from roads and traffic, as well as to limit the extent of the vegetation cleared for the purpose of the project; ▪ The height of any temporary structures such as soil stockpiles should be kept as low as possible.
Infrastructure placement	▪ Where infrastructure is located within view of visually sensitive receptors within close proximity to the Project, it must be placed as far away as possible and as close as possible to the existing power line structures. Where full screening of infrastructure components is not possible, siting should take advantage of partial screening opportunities; ▪ As far as possible and where feasible, infrastructure should be placed in areas that have already been disturbed.
Infrastructure appearance	▪ Although the use of lattice towers is also deemed acceptable, monopole structures are generally preferred for the proposed power line due to these structures having a smaller development footprint and subsequent lower visual impact than lattice towers, however, structural considerations may force the use of one or the other (monopole vs lattice tower), especially at bends along the line; ▪ The use of highly reflective material for tower structures and substations should be avoided; ▪ Painting or coating infrastructure components to match darker colours in the natural surroundings may reduce the distance required for effective screening but is not deemed necessary in this instance ; ▪ The use of permanent signage and project construction signs should be minimised and visually unobtrusive.
Screening	▪ It must be ensured that existing vegetation is retained as far as possible during the construction and operational phases of the project to act as visual screens with particular reference to existing tall trees; ▪ As far as possible and where the proposed powerline does not follow existing alignments, towers and monopoles are to be positioned in such a way as to maximise the screening effect of existing topography and existing mand-made structures and where possible placement of towers where it will be exposed against the skyline should be avoided; ▪ It must be ensured, wherever possible, that existing natural vegetation is incorporated into the concurrent site rehabilitation especially in line of sight from sensitive receptors.
Erosion	▪ Erosion, which may lead to high levels of visual contrast and further detract from the visual environment, must be prevented throughout the lifetime of the project by means of putting soil stabilisation measures in place where required and through concurrent rehabilitation.

Impact	Mitigation
Dust	▪ During the construction phase all dirt and access roads, as well as other areas cleared of vegetation for construction purposes will require effective dust suppression such as regular watering; ▪ Access roads must be suitably maintained to limit erosion and dust pollution; ▪ Vehicle speed on unpaved roads must be reduced to limit dust creation.
Lighting	▪ As far as possible, construction activities should be restricted to daylight hours, in order to limit the need to bright floodlighting and the potential for skyglow and to avoid the use of additional night-time lighting for security purposes; o Night lighting of construction sites and camps should be minimised as far as possible, taking into consideration that due to safety requirements a certain level of lighting may be necessary; o Where security lighting is used during the construction phase and operational phase at the substations, the following management measures should be implemented: o Making use of motion detectors on security lighting, at the substations, ensures that the site will remain in relative darkness, until lighting is required for security and maintenance purposes; o Placement of lights should consider the location of surrounding receptors and as far as possible be screened from view; o The use of high light masts and high pole top security lighting should be avoided. Any high lighting masts should be covered to reduce glow; o Up-lighting of structures must be avoided, with lighting installed at downward angles that provide precisely directed illumination beyond the immediate surroundings of the infrastructure, thereby minimising the light spill and trespass; o Care should be taken when selecting luminaries to ensure that appropriate units are chosen and that their location will reduce spill light and glare to a minimum; o Minimum wattage light fixtures should be used, with the minimum intensity necessary to accomplish the light's purpose; o The use of low-pressure sodium lamps, yellow LED lighting, or an equivalent should be considered to reduce skyglow.
Rehabilitation	▪ Concurrent/ progressive rehabilitation of temporary cleared areas, including reshaping and revegetation, must be implemented as soon as possible; ▪ Upon completion of construction, the Project area should be left in a condition that protects the soil surface against erosion and instability; ▪ Indigenous and locally occurring plant species selected for use in re-vegetation should be selected taking quick growth rates into consideration in order to cover bare areas and prevent soil erosion; ▪ Upon decommissioning, it is important that vegetation be reinstated to blend with the natural environment.

14.17 Air Quality

14.17.1 Impact Description

Sensitive receptors to dust and other air quality impacts in the study area include people residing in the surrounding urban and rural areas, ecological features (fauna and flora) and crops.

The overall Project proposes the use of a renewable resource (solar), which is a cleaner form of energy generation than using fossil fuels, with environmental benefits.

Sources of air quality impacts associated with the Project may include:

❖ Construction phase –

- Dust from the use of dirt roads by construction vehicles;
- Dust from bare areas that have been cleared for construction purposes; and
- Emissions from construction equipment and machinery.

❖ Operational phase –

- Impacts to air quality caused by the operation and maintenance of the facility include dust from the use of dirt roads and tailpipe emissions from vehicles.

Mitigation measures are included in the EMPr to ensure that the air quality impacts during the construction phase are suitably managed.

14.17.2 Impact Assessment

Environmental Feature	**Air Quality**
Relevant Alternatives & Activities	**Construction domain of development footprint**
Project life-cycle	**Construction phase**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Excessive dust levels as a result of construction activities • Emissions from construction equipment and machinery	• Appropriate dust suppression measures or temporary stabilising mechanisms to be used when dust generation is unavoidable (e.g. dampening with water, chemical soil binders, straw, brush packs, chipping), particularly during prolonged periods of dry weather. Dust suppression to be undertaken for all bare areas, including construction area and access roads. Note that all dust suppression requirements should be based on the results from the dust monitoring and the proximity of sensitive receptors. • Speed limits to be strictly adhered to. • Air quality to be monitored (baseline and during construction) for dust fallout and particulate matter. Sampling locations to consider major sources of dust and sensitive receptors. • All vehicles and machinery used at the site are to be in good working condition and fitted with appropriate emission controls • Plant to be operated efficiently and turned off when not in use.

	+/- Impacts	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	-	local	medium	short-term	likely	3
After Mitigation	-	local	low	short-term	unlikely	1

14.18 Noise

14.18.1 Impact Description

Sensitive receptors to noise impacts in the study area include people residing in the surrounding urban and rural areas, as well as ecological receptors (fauna).

During construction, localised increases in noise will be caused by earthworks, establishment and operating of site construction laydown area, construction of proposed infrastructure, transportation

of construction workers and material, activities at the construction camp, and general construction noise.

During the operational phase, power lines produce an audible sound or buzz because they are producing something called a corona discharge that is interacting with the surrounding air. The corona discharge is a side-effect of the electric field the power line generates by carrying electricity. The discharge can be greater, and the buzzing louder if there is increased moisture or pollutants in the air. Under normal conditions, corona-generated noise is not audible. The noise may be audible under certain wet conditions. Conductors are selected based on factors such as audible noise, corona, and electromagnetic field mitigation. In addition, corona rings can be fitted if deemed necessary. Corona is not associated with any adverse health effects in humans or livestock.

Project personnel working on the construction site will experience the greatest potential exposure to the highest levels of noise and vibration. Workplace noise and vibration issues will be managed as part of the Occupational Health and Safety Management System to be employed on site, which will include specific measures aimed at preventing hearing loss and other deleterious health impacts.

14.18.2 Impact Assessment

Environmental Feature	**Noise**
Relevant Alternatives & Activities	**Construction domain of development footprint**
Project life-cycle	**Construction phase**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Noise as a result of construction activities	• The provisions of SANS 10103:2008 will apply to all areas within audible distance of residents. • Working hours to be agreed upon with Project Manager, so as to minimise disturbance to community members. • Construction activities generating output levels of 85 dB or more will be confined to normal working hours. • Noise preventative measures (e.g. screening, muffling, timing, pre-notification of affected parties) to be employed.

	+/- Impacts	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	-	local	medium	short-term	likely	2
After Mitigation	-	local	low	short-term	unlikely	1

14.19 Hazardous Substances & Waste

14.19.1 Impact Description

Improper management of hazardous substances and waste may pollute the biophysical environment (air, water and soil), and pose risks to humans, flora and fauna. It may also cause visual impacts.

Hazardous substances to be stored and used during the construction and operational phases of the Project include oil, fuel, solvents and pesticides (amongst others).

General construction waste will comprise of surplus or off-specification materials (e.g. concrete, wooden pallets, packaging paper or plastic, wood, metals, etc.) and construction debris. Domestic waste will include food waste, plastic, glass, aluminum cans and waste paper. A small proportion of the waste generated during construction phase will be hazardous and may include used oil, hydraulic fluids, waste fuel, grease and waste oil containing rags. Wastewater, including water adversely affected in quality through construction-related activities and human influence, will include sewage, water used for washing purposes (e.g. equipment, staff) and drainage over contaminated areas (e.g. workshop, equipment storage areas).

Waste types likely to be generated during routine operation and maintenance activities include dielectric fluids, clearing agents, oils, solvents, wastewater, defunct / damaged substation components and domestic waste.

Provision is made in the EMPr to manage impacts associated with hazardous substances and waste,

14.19.2 Impact Assessment

Environmental Feature	**Hazardous Substances & Waste**
Relevant Alternatives & Activities	**Storage and use of hazardous substances & generation of waste**
Project life-cycle	**Construction & operational phases**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Environmental pollution caused by improper management of hazardous substances and waste	• Hazardous substances shall be stored and handled in accordance with the appropriate legislation and standards, which include the Hazardous Substances Act (Act No. 15 of 1973), Occupational Health and Safety Act (No. 85 of 1993), relevant associated Regulations and applicable SANS and international standards. • Prevent environmental contamination from insulating oils used in the substations' transformers. • Storage and use of hazardous materials will be strictly controlled to prevent environmental contamination and will adhere to the requirements stipulated on the Material Safety Data Sheets. • In the event of spillages of hazardous substances the appropriate clean up and disposal measures shall be implemented. • Waste to be disposed of at a licenced waste disposal facility. • Wastewater to be properly disposed of. Contaminated water will not be discharged to the environment.

	+/- Impacts	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	-	local	medium-high	long-term	likely	3
After Mitigation	-	local	low	long-term	unlikely	1

14.20 Traffic

14.20.1 Impact Description

During the construction period, there will be an increase in traffic on the local road networks due to the delivery of plant and material, transportation of staff and normal construction-related traffic. Haul roads and access roads will also be created on site, within the construction domain.

As part of the construction phase, measures will be implemented for the selective upgrade of the roads (if necessary) and to render these roads safe for other users (amongst others). After the construction phase, the local roads will only need to be used for operation and maintenance purposes.

All the appropriate traffic safety measures and control must be implemented to minimise any potential impacts associated with the construction of the power lines and substations.

14.20.2 Impact Assessment

Environmental Feature	**Traffic and Access**
Relevant Alternatives & Activities	**All construction activities that may affect existing road networks**
Project life-cycle	**Construction**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Disruptions to existing road users. • Safety risks. • Crossing of main roads during construction. • Increase in dust levels. • Use of road network by construction vehicles.	• Clearly demarcate all construction access roads. • Proper access control is to be maintained to prevent livestock / game from accessing construction areas, as well as for any other unauthorised access. • Strict adherence to speed limits by construction vehicles on public roads and access roads. Appropriate speed limits need to be posted on all access roads according to the geometric design and limitations of heavy vehicles. • Ensure adequate maintenance of construction vehicles. • When construction vehicles are required to cross provincial and district roads (as relevant) appropriate safety and traffic calming measures need to be in place. This will include flag men, speed reductions and warning signage. • Limit internal service roads to a minimum. • Implement measures to manage dust caused by site traffic.

	+/- Impacts	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	-	local	medium-high	short-term	almost certain	3
After Mitigation	-	local	low	short-term	moderate	1

14.21 Civil Aviation

14.21.1 Impact Description

Towers and transmission lines can disrupt airplane flight paths in and near airports and endanger low-flying airplanes, especially those used in agricultural management activities. It is noted that the Welkom Airport is located approximately 9 km to the south-west of the Phase 1 PV Site, and that the proposed power lines follow existing transmission line corridors.

According to the National Web-based Environmental Screening Tool (refer to report appended to the Application Form), the sensitivity in terms of civil aviation is as follows:

- Phase 1 Power Lines - medium (see **Figure 80** below);
- Phase 2 Power Lines to Grootkop Substation - low (see **Figure 81** below); and
- Phase 2 Power Lines to Geduld Substation - low (see **Figure 82** below).

It is noted that the Phase 1 Power Lines and Phase 2 Power Lines to Grootkop Substation follow existing power line corridors. It is further noted that the Phase 2 Power Lines to Geduld Substation were discarded in the preferred alternative (refer to **Section 15.3** below).

The South African Civil Aviation Authority (SACAA) was engaged with as part of the EIA and the Proponent is undertaking the Application Process.

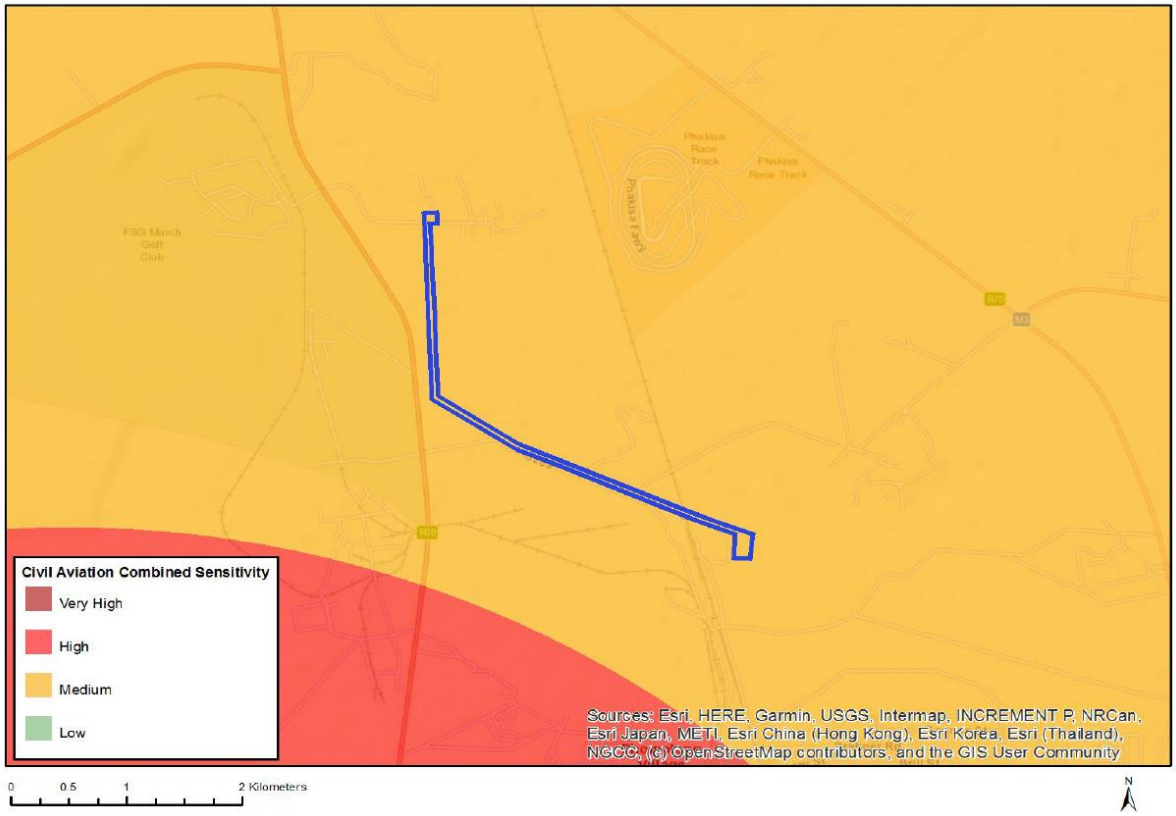


Figure 80: Relative civil aviation theme sensitivity for Phase 1 Power Lines (National Web-based Environmental Screening Tool)

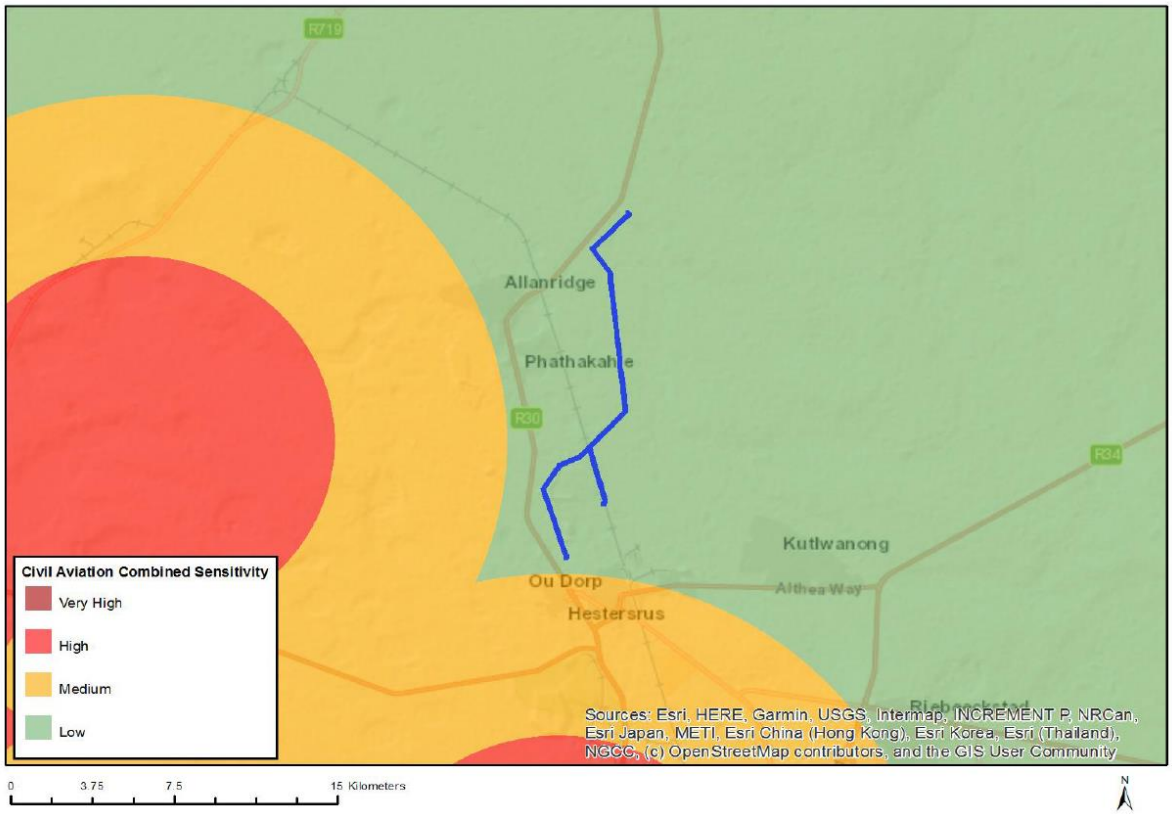


Figure 81: **Relative civil aviation theme sensitivity for Phase 2 Power Lines to Grootkop Substation (National Web-based Environmental Screening Tool)**

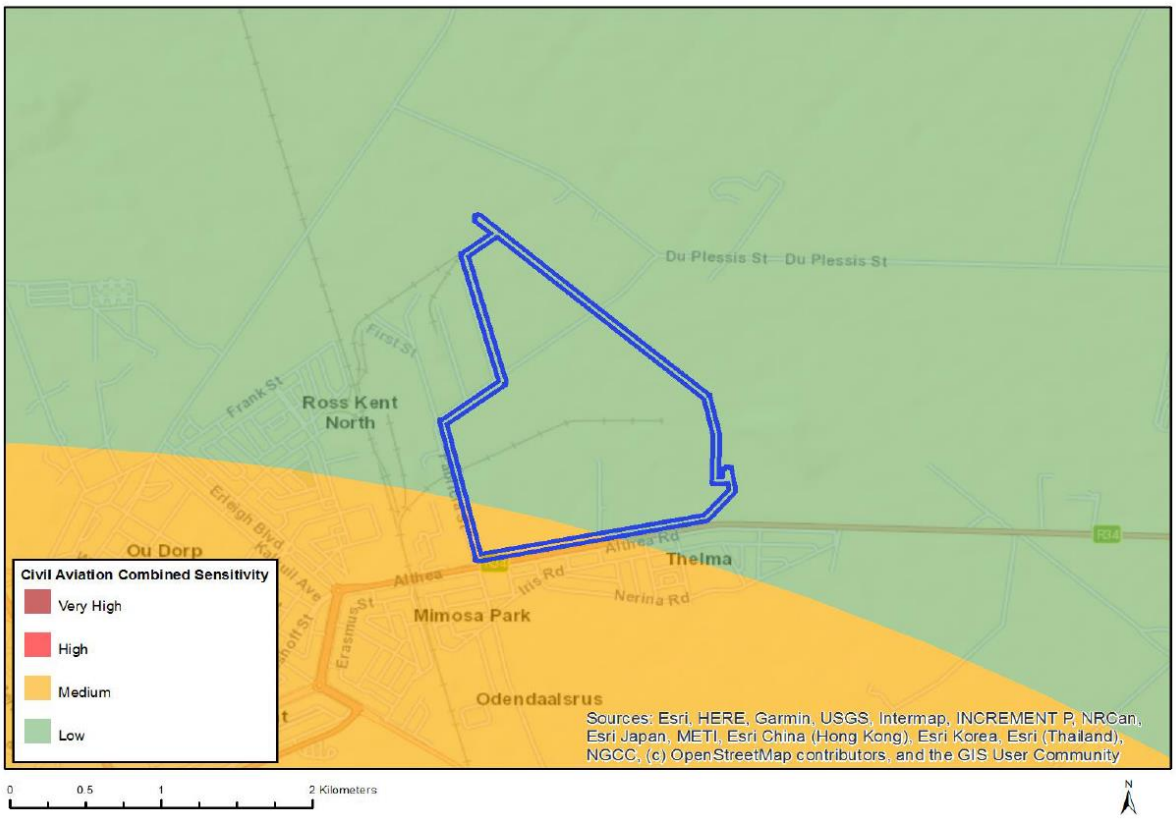


Figure 82: **Relative civil aviation theme sensitivity for Phase 2 Power Lines to Geduld Substation (National Web-based Environmental Screening Tool)**

14.22 Existing Structures and Infrastructure

14.22.1 Impact Description

Potential impacts of the Project to existing structures and infrastructure include:

- Disruptions to services or damage caused as a result of construction activities;
- Disruptions to traffic on roads to be used by construction vehicles (see **Section 14.20** above); and
- Construction-related disturbances (e.g. noise, dust).

A detailed survey will be conducted to identify all physical features that are located within the final project footprint. Optimisation of the layout during the design phase will seek to avoid existing structures and infrastructure, where possible. Where avoidance is not possible, suitable compensation measures need to be established, as necessary.

14.22.2 Impact Assessment

Environmental Feature	**Existing Structures and Infrastructure**
Relevant Alternatives & Activities	**All activities that affect existing structures and infrastructure**
Project life-cycle	**Construction & operational phases**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Disruption of existing services • Damage to existing structures and infrastructure	• Identify and record existing services and infrastructure. • Conform to requirements of relevant service providers and infrastructure custodians (e.g. Eskom. Transnet, Telkom, SANRAL, DPRT, etc.). • Ensure access to infrastructure is available to service providers at all times. • Immediately notify service providers of disturbance to services. Rectify disturbance to services, in consultation with service providers. Maintain a record of all disturbances and remedial actions on site. • Adequate reinstatement and rehabilitation of affected environment.

	+/- Impacts	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	-	local	medium-high	short-term to permanent	likely	3
After Mitigation	-	local	low	short-term	unlikely	1

14.23 Health and Safety

14.23.1 Impact Description

14.23.1.1 Construction Phase

Health and safety related risks associated with the Project during the construction phase include the following:

- ❖ Hazards related to construction work;
- ❖ Increased levels of dust and particulate matter, as well as noise;
- ❖ Water (surface and ground) contamination;
- ❖ Poor water and sanitation services to construction workers;
- ❖ Communicable diseases;
- ❖ Psychosocial disorder (e.g. social disruptions);
- ❖ Safety and security to the local community; and
- ❖ Lack of suitable health services.

These risks are addressed through mitigation measures identified under other environmental features, such as socio-economic environment, surface water, air quality, noise, as well as best practices included in the EMPr. Additional management requirements will be included in the Project's Occupational Health and Safety system.

14.23.2 Impact Assessment

Environmental Feature	**Health and Safety**
Relevant Alternatives & Activities	**Construction activities**
Project life-cycle	**Construction phase**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Health and safety risks during construction	• Dedicated Occupational Health and Safety system to be implemented by the Contractor. • Undertake a hazard identification and risk assessment and identify preventive and protective measures. • Conduct basic safety awareness training with construction workers. • Provide all workers with the necessary Personal Protective Equipment (PPE). • Prevent environmental contamination. • Provide potable water and sanitation services to workers. • All workers shall be clearly identifiable and to remain within construction domain during working hours. • Prepare an Emergency Response Plan. • Ensure adequate control of communicable diseases. • Maintain access control to construction domain.

	+/- Impacts	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	-	local	high	short-term to permanent	likely	3
After Mitigation	-	local	low	short-term	unlikely	1

14.23.2.1 Operational phase –

Electromagnetic fields consist of electric and magnetic fields and are produced whenever electricity is used. For a transmission line, the strength of the electric field varies generally with the operating voltage of the line (measured in volts) while the magnetic field strength is related to the current flowing in the line (measured in amps) (Parsons Brinckerhoff,

2013). EMF strengths dependent on *inter alia* the height of the electrical wires above the ground and their geometric arrangements, which are supported by the transmission structures.

Even though the EMF inside a substation is high (but less than occupational limits), the fields outside the substation decrease with distance, as is the case with power lines (Wolhuter & Holtzhausen, 2015). It is documented in literature that EMF levels reduce rapidly with distance from the source. The proposed substations, which contains high voltage transformers, will be enclosed by security fencing to prevent unauthorised access and the exposure to high voltage electricity. This will also provide safe distance between electrical equipment and the general public.

Other health and safety related associated with the Project during the operational phase include the following:

- Injuries to workers from operation and maintenance activities (vehicle accidents, replacement of components/parts, etc.) and;
- Emergency fire hazards; and
- Electrocution of workers;

Environmental Feature	**Health and Safety**
Relevant Alternatives & Activities	**Operation and maintenance activities**
Project life-cycle	**Operational phase**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Health and safety risks posed by operation and maintenance activities	• Dedicated Occupational Health and Safety system to be implemented by the Operator of the PV Plant. • Conduct basic safety awareness training with all operational staff. • Temporary Contractors to adhere to Occupational Health and Safety requirements. • Provide potable water and sanitation services to operational staff. • Prepare an Emergency Response Plan. • Maintain servitude. • Ensure EMF remain less that occupational limits within substations. • Control access to the substations.

	+/- Impacts	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	-	local	high	long-term	likely	3
After Mitigation	-	local	low	long-term	unlikely	1

14.24 Socio-Economic Environment

14.24.1 Impact Description

The potentially significant socio-economic impacts associated with the Project, as identified as part of the Socio-Economic Impact Assessment (contained in **Appendix G75**), are summarised in **Table 43** below.

Table 43: Summary of potentially significant socio-economic impacts (Nemai Consulting, 2020)

Activity	Aspect	Potential Impact
Land Acquisition and Servitude Rights Acquisition	Land Acquisition	▪ Partial loss of livelihood by affected landowners ▪ Reduced access to parts of their farms in Thelma
	Servitude Rights	▪ Reduced access to land / structures / infrastructure located in the servitude.
Scheme Operations	Enabling development through the network expansion of electricity.	▪ Economic growth and induced impacts
	Supply of goods and services to the scheme	▪ Opportunity for local business
	Administration and Technical Input	▪ Employment of local people
		▪ Skills development
Construction Phase	Access onto properties	▪ Damage to property or equipment
		▪ Damage or wear to access roads
		▪ Improvement of access in the Project area
		▪ Security concerns
	Erection of towers and stringing of conductors	▪ Proximity to construction work and associated inconvenience and dangers
		▪ Employment of local people and SMME's
		▪ Sourcing of equipment, machinery and services locally
	Earthworks and roadworks	▪ Noise
		▪ Dust
	Concrete and civil works	▪ Noise
		▪ Influx of workers
		▪ Employment of local labour and SMME's
		▪ Sourcing of equipment, machinery and services locally
		▪ Temporary road closures
		▪ Increased traffic
		▪ Temporary closures to affected properties
	Transport of goods to site and employment of staff	▪ Increased traffic
		▪ Security concerns
		▪ Improved access to amenities
		▪ Noise

Activity	Aspect	Potential Impact
	Mechanical and Electrical works	▪ Employment of local people
		▪ Sourcing of equipment, machinery and services locally

14.24.2 Impact Assessment

Environmental Feature	Impacts created by providing a secure, sufficient power supply
Project life-cycle	Operational phase
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Economic	• Increased productivity. • More flexible economy.
Social Benefits	• Convenient and less time-consuming daily tasks. • Facilitation of education. • Facilitation of mass transport. • Improved productivity of health care.

	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Positive	Regional	High	Long Term	Likely	3
After Mitigation	Positive	Regional	High	Long Term	Likely	3
Significance of Impact and Preferred Alternatives	Mitigation is not necessary for this positive impact.					

Environmental Feature	Impact owing to Land and Rights Acquisition
Relevant Alternatives & Activities	Acquisition of land
Project life-cycle	Pre-construction
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Loss of income from the acquisition of land	• Where-ever possible, the final routing of the project infrastructure should be adjusted to avoid impacts. If the power line servitude is such that it allows power line alignment to the extent that an impact on a dwelling can be avoided, this should be done. • Where impacts cannot be avoided, all negotiations and payments relating to compensating affected landowners should be conducted and concluded before construction begins. • Those landowners who will be required to sell portions of their properties to the Applicant must be compensated for any business that is operating on the premises. • All landowners whose businesses will be affected by the proposed Project should be compensated to the full value of their immovable assets and any loss of income. • Negotiations should take place between the landowner and the Applicant for any compensation of potential income denied as a result of the servitude agreements.
Relocation of Households	• In the event that household relocation will be necessary, the process to be followed is as follows: o A Resettlement Action Plan to be drawn up providing detail on the impacted households, households needs and how these will be catered for during and after the relocation,

	provides detail on the area to which they are to be relocated and the timeframes associated with the relocation. ○ The Relocation Action Plan is to be discussed with every impacted household and agreed to in writing. ○ The Relocation Action Plan is to be discussed with every impacted landowner (if this is not the same as the impacted household) and agreed to in writing. ○ Relocation is to take place in strict accordance with the Relocation Action Plan. ○ An independent audit, carried out by a suitably qualified relocation expert, is to be conducted after every relocation to determine the relocation's effectiveness and to identify shortfalls in adhering to the relocation action plan. ○ Shortfalls are to be addressed by the Proponent within the duration of the construction period of the Project.
Construction Period and time frame	• Careful planning should be adopted to reduce the impact of land acquisition on the overall programme for the works.

	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Regional	High	Long term	likely	3
After Mitigation	Negative	Local	Low	Medium term	Likely	1
Significance of Impact and Preferred Alternatives	The final routing of the powerline and the selection of the proposed substations are the primary mitigation measure that should be adopted. The final routing and site selection should be amended to avoid impacts on existing structures / infrastructure as far as possible.					

Environmental Feature	Economic opportunities arising from the construction phase
Project life-cycle	Construction phase
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
SMME Creation	• Local SMMEs should be given an opportunity to participate in the construction of the project through the supply of services, material or equipment.
Job Creation and Skills Development	• The main contractor should employ non-core labour from the Main/Sub places as far as possible during the construction phase. • The principles of Expanded Public Works Programme can be used for guiding the construction.
Indirect Employment Impacts	• Spaza/informal trader shops may open next to the site as a consequence of construction. These should be controlled by the Contractor to limit their footprint and to ensure that the MLM's Informal Trading By-laws are complied with.

	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Positive	Local	Medium	Short Term	Likely	1
After Mitigation	Positive	Local	Low	Short Term	Likely	3
Significance of Impact and Preferred Alternatives	Individuals who will benefit during the construction are limited to those who actively participate in the construction activity through employment, sub-contracting or other economic opportunities. Active participation should be encouraged. The benefits will take place irrespective of which routing alternative is preferred.					

Environmental Feature	Disturbance arising from the construction phase
Project life-cycle	Construction phase
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Traffic	• Ensure that the necessary signage and traffic measures are implemented for safe and convenient access to the site. • Additional creation of routes and access roads must be implemented to reduce heavy traffic flow. • The EMPr must include restrictions on the Contractor and its sub-contractors related to minimising impacts on the safety of road users. Restrictions should include appropriate speed limitations, restricting travel times to daylight hours, communication measures and the establishment of haul routes. • Measures must be put in place to prevent construction vehicles from entraining dirt onto public roads. • Traffic control personnel must be assigned where deemed necessary. This will be to control the movement of construction vehicles in relation to local vehicles to ensure maximum safety and coherence.
Local Road Condition	• A continuous condition survey of the local roads to be used during the construction phase should be made prior to construction. • Delivery routes should be defined and adhered to during the construction phase. • Maintenance of local roads should take place during the construction phase, ensuring that the local roads used by the contractor are left in the same or better condition than they were prior to the start of construction.
Increase in Dust	• Dust and disturbance can be mitigated through the use of appropriate dust suppression mechanisms. • Adherence to road signage can be added as an advantage and a measure to manage the increase in dust levels.
Influx of workers	• All employment of locally sourced labour should be controlled on a contractual basis. If possible, and if the relevant Ward Councillors deem it necessary, the employment process should include the affected Ward Councillors. • People in search of work may move into the area, however, the Project will create a limited number of job opportunities. Locally based people should be given opportunities and preferences over others. • No staff accommodation should be allowed on site. • Influx of workers could may lead to increased diseases and HIV/AIDSs & STI as well as STD infections, therefore awareness programmes should be implemented through the local educational institutions and for the workers as well.
Worker Health and Safety	• The provisions of the OHS Act 85 of 1993 and the Construction Regulations of 2014 should be implemented on all sites. • Account should be taken of the safety impacts on the local community when carrying out the longitudinal aspects of the project, such as the power lines. • Contractors should establish HIV/AIDs awareness programmes at their site camps.
Security	• The sites of the substations should be fenced for the duration of construction. • All contractors' staff should be easily identifiable through their respective uniforms. • A security policy should be developed which amongst others requires that permission be obtained prior to entering any property and provisions controlling trespassing by contractor staff.

	• Security staff should only be allowed to reside at contractor camps and no other employees. • Contractors should establish crime awareness programmes at their site camps.
Noise impacts	• Working hours to be agreed upon with Project Manager, so as to minimise disturbance to community members. • Should overtime work be required, that will generate noise, consultation with the affected community or landowner should take place.
Damage to property	• If a risk exists of damage taking place to a property as a result of construction, a condition survey should be undertaken prior to construction. • The Contractor is to make good and acknowledge any damage that occurs on any property as a result of construction work. • Where crops and agricultural machinery are damaged, compensation is to be paid to the farmer. • The farmer should be compensated for any loss of income experienced due to construction work.

	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Short Term	Likely	2
After Mitigation	Negative	Local	Low	Short Term	Moderate	1
Significance of Impact and Preferred Alternatives	Disturbances and irritation during construction is to be expected. These can then be successfully mitigated through Contractor specifications that are issued at a tender stage and through the continuous monitoring during construction phase. Negative impacts owing to the construction will unfortunately be experienced irrespective of the site and routing alternative.					

14.25 "No-Go" Impacts

The "no-go option" is the alternative of not implementing the activity. The "no-go option" also provides the baseline against which the impacts of other alternatives are compared.

The "no go option" needs to be considered in light of the motivation (see **Section 3** above) as well as the need and desirability of the overall Project (see **Section 6** above), as proposed Solar PV Plant needs to be integrated and connected to the Eskom national grid through the Phase 1 and Phase 2 Power Lines and Substations. Some key considerations in this regard include:

- South Africa has identified the need to supply a diversified power generation that includes renewable energy technologies, such as proposed by the Project. This is in light of the country's endeavour and commitment to reduce the carbon footprint created by the current heavy reliance on coal to produce electricity;
- The Project will be developed to serve the MLM's energy requirements and will generate power for delivery to the local/national grid. The Project holds various benefits for MLM, including refinancing the current Eskom debt for immediate relief, potential to attract foreign investments, additional revenue stream, financial investment into the municipality and local economic benefits (e.g. job creation, skills development and SMME development);

- The Proponent has secured a long term lease with the MLM for the duration of the PPA. The MLM's Council has formally classified this Project as an EEPP; and
- Surplus power will be taken up by other C&I off-takers via additional PPA's.
- A Network Integration Study was undertaken to investigate the integration of the proposed Solar PV Plant into the Eskom electrical network. The results showed that the Eskom grid has sufficient spare capacity to absorb the phases of the Project.

In contrast, should the proposed Project not go ahead, any potentially significant environmental issues associated with the Project (refer to **Section 14.9** to **Section 14.24** above) would be irrelevant and the status quo of the local receiving environment would not be affected by the Project-related activities. Following the rehabilitation of the sites by Harmony Gold Mining Company Ltd., in terms of historical mining activities, the prerogative will lie with the MLM as the landowner to determine an alternative future desired use of the land (if any). The objectives of this Project would, however, not be met. This will *inter alia* mean that the Project's intended benefits to MLM will not be realised. The "no go option" is thus not preferred.

14.26 Cumulative Impacts

14.26.1 Introduction

A cumulative impact, in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

14.26.2 Other Renewable Energy Projects in Proximity to the Proposed PV Sites

Cumulative impacts can be identified by combining the potential environmental implications of the Project with the impacts of projects and activities that have occurred in the past, are currently occurring, or are proposed in the future within the Project area. According to the REEA Database, renewable energy applications have been made for the properties to the immediate south and west of the Phase 1 Site and to the south-east of the Phase 2 Site.

One of these renewable energy projects (reference number 14/12/16/3/3/1/1471/AM1), which is located to the south of the Phase 1 Site, proposed the establishment of the Eland PV facility located within the boundary of properties owned by the Harmony Gold Mining Company Ltd near Odendaalsrus. The purpose of this project is to generate electricity for exclusive use by the mining company (Savannah Environmental, 2015).

Information pertaining to the other renewable energy project in the area could not be found.

From a desktop scan it can be seen that these other renewable energy project sites have also been affected by mining and other anthropogenic activities. Nonetheless, cumulative impacts may be

caused by these various developments, including loss of biodiversity and habitat fragmentation, visual and landscape character impacts, noise, reduction in air quality, traffic disruptions, as well as pressures on local facilities, goods and services. The aforementioned impacts in relation to the Project have been assessed individually in **Section 14.9** to **Section 14.24** above and mitigation measures have been developed for each of the impact areas.

14.26.3 The Proposed Project's contribution towards Cumulative Impacts

The following is noted in terms of the Project's contribution towards cumulative impacts:

- The sensitivity of the Project area from an avifaunal perspective is discussed in **Section 12.8.4.1** and **Section 13.5** above, and these sensitivities were taken into consideration in the revised layouts (see **Section 15.3** below). There is an opportunity to implement a combined avifauna monitoring programme for the various renewable energy projects. Such a programme will need to comply with the Birds and Solar Energy Best Practice Guidelines (Jenkins *et al*., 2017).
- The construction period may cause traffic-related impacts in terms of the local road network, which will be associated with heavy vehicle construction traffic for the delivery of material, transportation of construction workers and general construction-related traffic. This may compound traffic impacts if other large scale projects are planned during the same period. The EMPr includes mitigation measures to manage traffic-related impacts.
- The clearance of vegetative cover for the Project's development footprint will exacerbate erosion, which is already encountered in the greater area as a result of other land use disturbances. Mitigation measures to control erosion are included in the EMPr.
- There will be an increase in the dust levels during the construction phase, as a result of earthworks, use of haul roads and other gravel roads, stockpiles, material crushing, etc. Measures to manage dust are included in the EMPr.
- Any developments that may be enabled by the proposed Project may place a strain on the infrastructure of Odendaalsrus. The future growth of the town and interventions to ensure that the infrastructure can cater for this growth forms part of municipal planning, which includes the IDP and SDF.
- Changes in demographics in the region due to the influx of employment seekers may cause problems such as crime, STDs, conflicts with local communities, etc. This was assessed as part of the Socio-economic Impact Assessment and mitigation measures are included in the EMPr.
- Cumulative effects in terms of the electromagnetic fields may occur as a result of aligning the proposed Phase 1 and Phase 2 Power Lines alongside existing high-voltage power lines. Although it is anticipated that the electromagnetic fields are mainly associated with localised influences within the servitude width, the cumulative impact is not quantified within this report.
- There is a potential for positive cumulative economic effects from the construction of multiple developments in the area. The increased creation of jobs and economic input into local businesses would provide a benefit to local communities.

15 ANALYSIS OF ALTERNATIVES

15.1 General

Alternatives are the different ways in which a project can be executed to ultimately achieve its objectives. Examples could include carrying out a different type of action, choosing an alternative location or adopting a different technology or design for the project.

By conducting the comparative analysis, the BPEO can be selected with technical and environmental justification. Münster (2005) defines the BPEO as the alternative that "*provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term*".

15.2 "No-Go" Option

The implications of the "no-go" option are discussed in **Section 14.25** above.

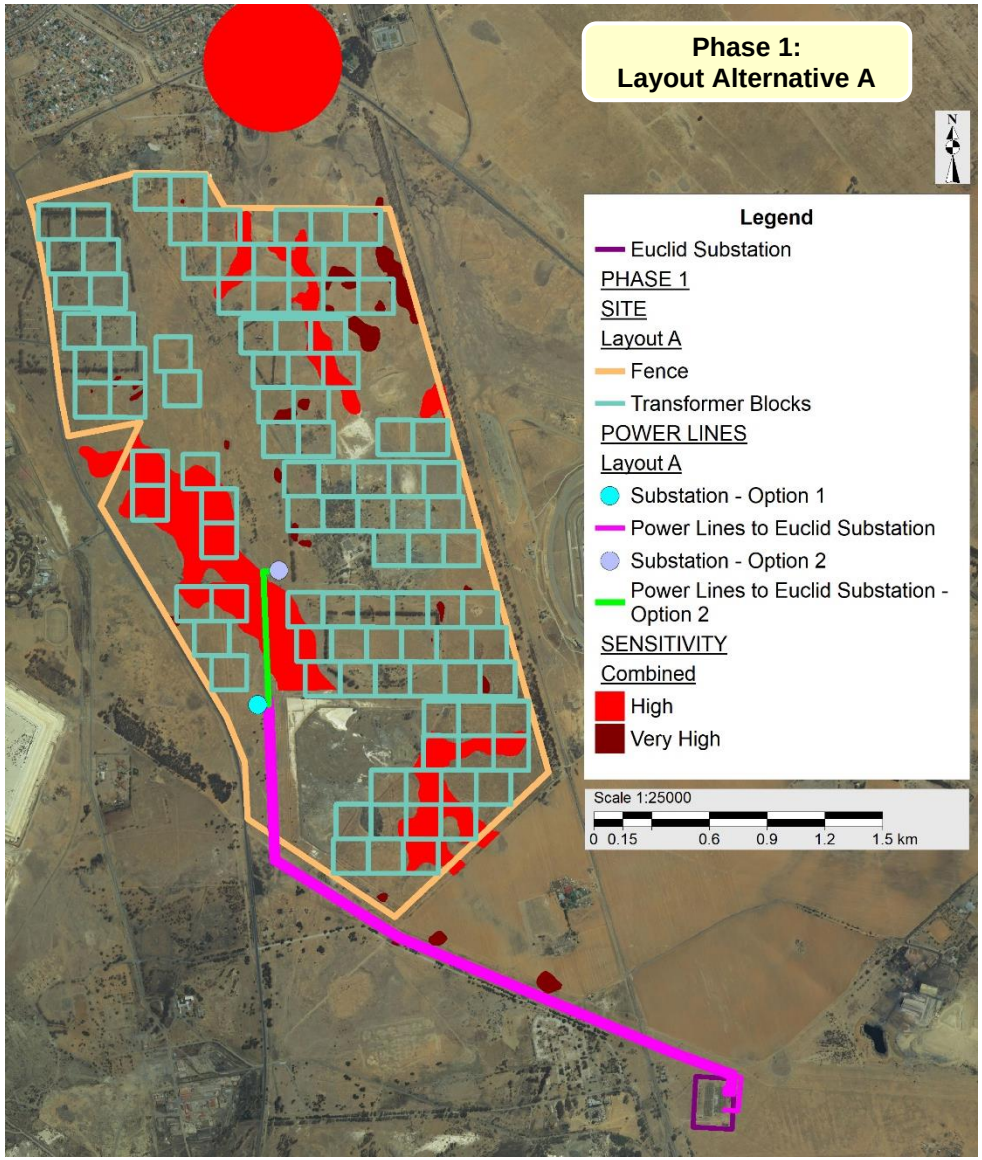
The "no go option" is not preferred, as the objectives of the Project will not be met, and the associated benefits will not materialise. Although not proceeding with the Project would avoid the adverse environmental impacts, these impacts are considered to be manageable through the provisions contained in the BAR and EMPr.

15.3 Layout Alternatives

The original Project layout, referred to as Layout Alternative A, was assessed by the specialists (**Section 13.3** to **Section 13.10**). This layout included the following options to the proposed Phase 1 and Phase 2 Power Lines and Substations (shown in **Figure 3** above and **Figure 83** below):

- Two options were considered for both the Phase 1 and Phase 2 Substation Positions, with associated power line routes (refer to **Section 5.3.2** above); and
- For Phase 2, two options were identified for the power line route to connect to the Geduld Substation.

Based on the findings of the specialist studies, in particular the Water Resources Impact Assessment, Terrestrial Ecology Assessment, Avifaunal Assessment and Traffic Impact Assessment, the layouts for the Phase 1 and Phase 2 PV Sites were revised to cater for the environmental sensitivity, with associated changes to the power lines and substations. The key changes made to the layouts entailed the reconfiguration of the transformer blocks and ancillary infrastructure to avoid areas of "very high" sensitivity, as well as avoiding the realignment of the A48 / S86. This new layout is referred to as Layout Alternative B. **Figure 83** and **Figure 84** below show the layout alternatives for Phase 1 and Phase 2, respectively.



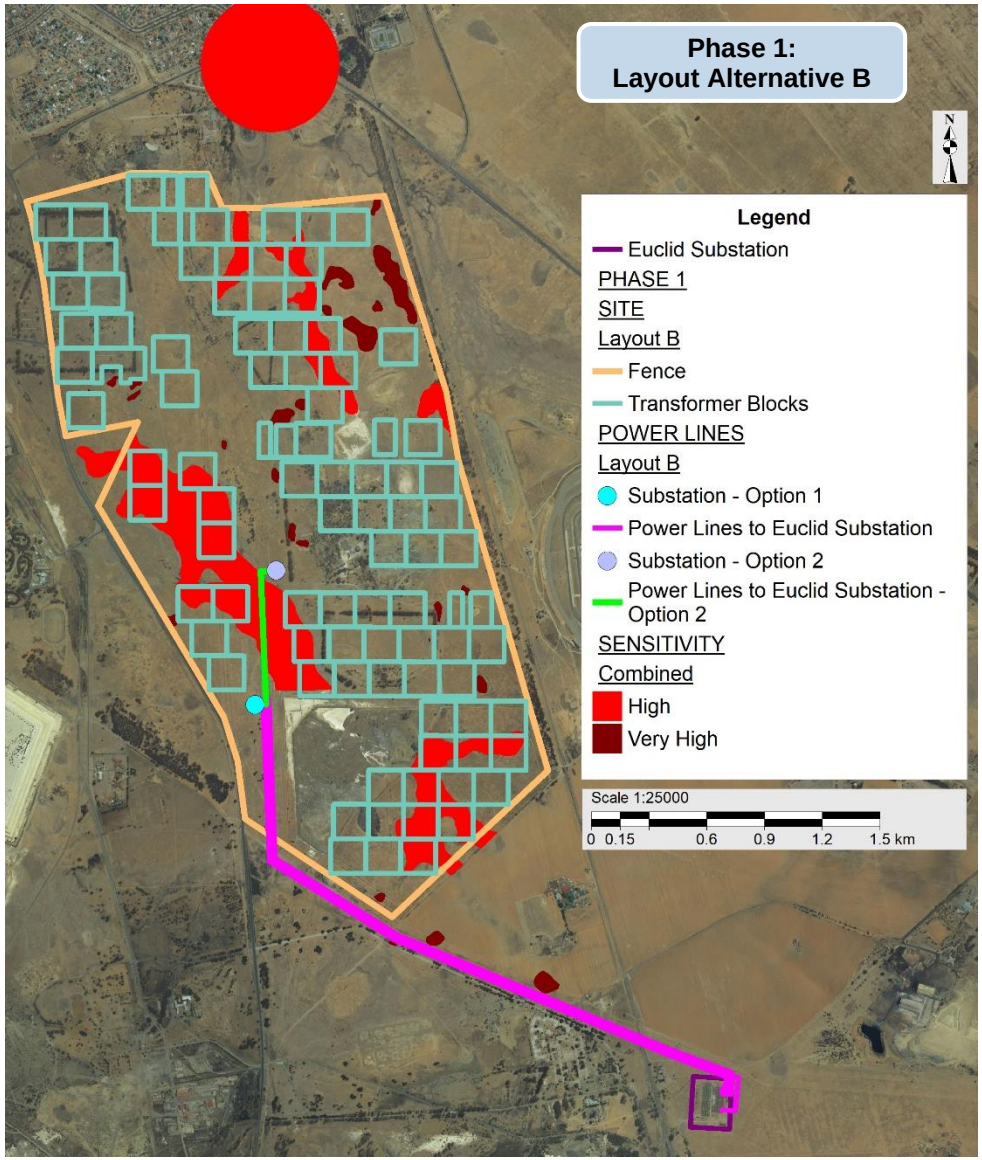


Figure 83: **Comparison of alternative layouts for Phase 1 Power Lines and Substations (based on sensitivity at PV Sites)**
(Note: not all components of the Phase 1 PV Facility are shown)

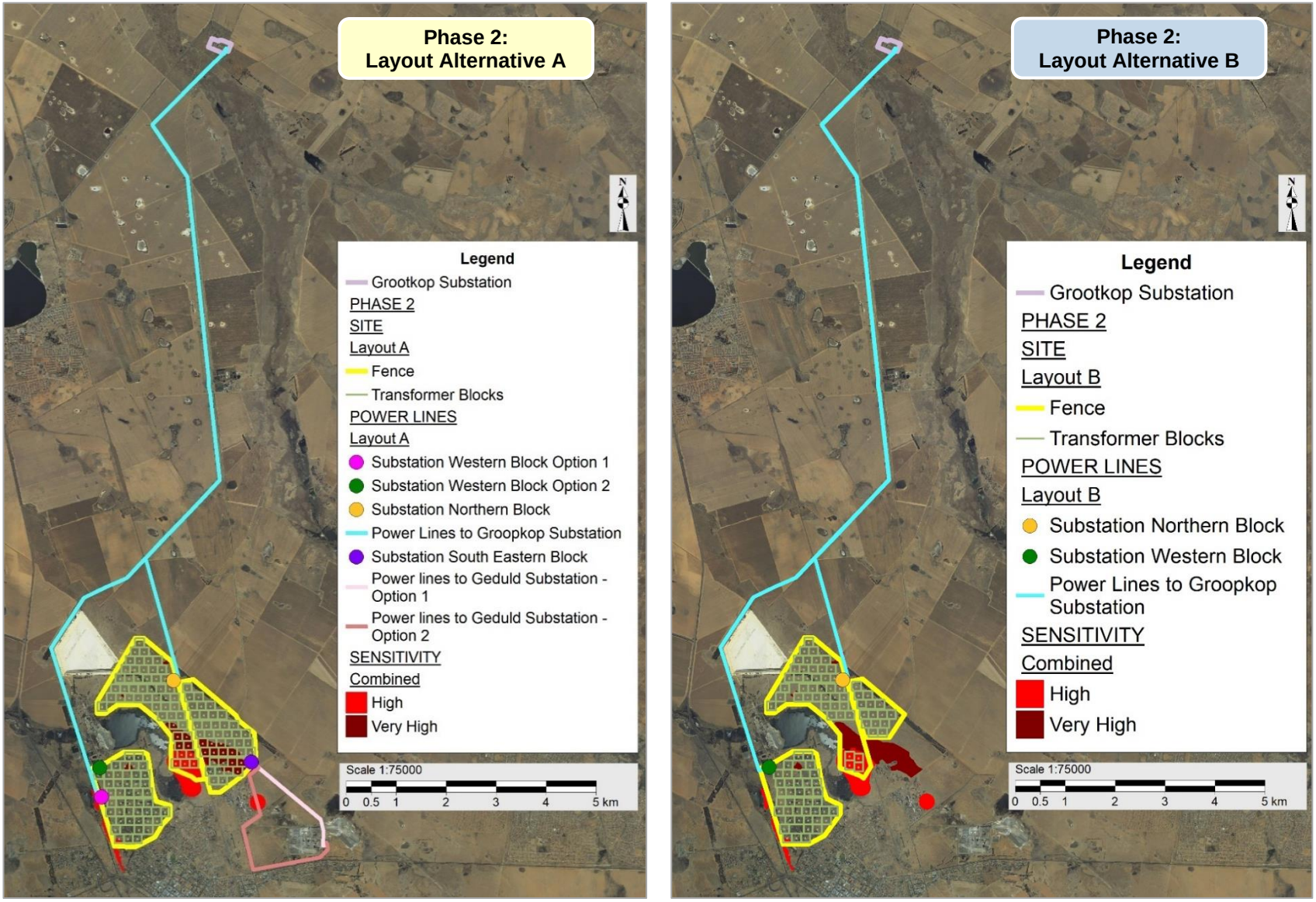


Figure 84: **Comparison of alternative layouts for Phase 2 Power Lines and Substations (based on sensitivity at PV Sites)**
(Note: not all components of the Phase 2 PV Facility are shown)

The following is noted in terms of the influence of Layout Alternative B to the proposed power lines and substations:

- Phase 1 –
  - The options for the substations and their associated power lines routes remained the same.
- Phase 2 (refer to **Figure 85** below) –
  - The substation at the South Eastern Block and the associated power line route options to the Geduld Substation, were discarded; and
  - The Substation Option 1 at the Western Block and the associated section of power line route option that links up to the route to the Grootkop Substation were discarded.

There were thus two alternatives that were ultimately assessed to identify the BPEO, namely Layout Alternatives A and B (with changes to Phase 2 Power Lines and Substations), as well as the Phase 1 Substation Options 1 and 2 and associated power line route options to the Euclid Substation.

15.4 Preferences Expressed by Specialists & Technical Team

15.4.1 Layout Alternatives A and B

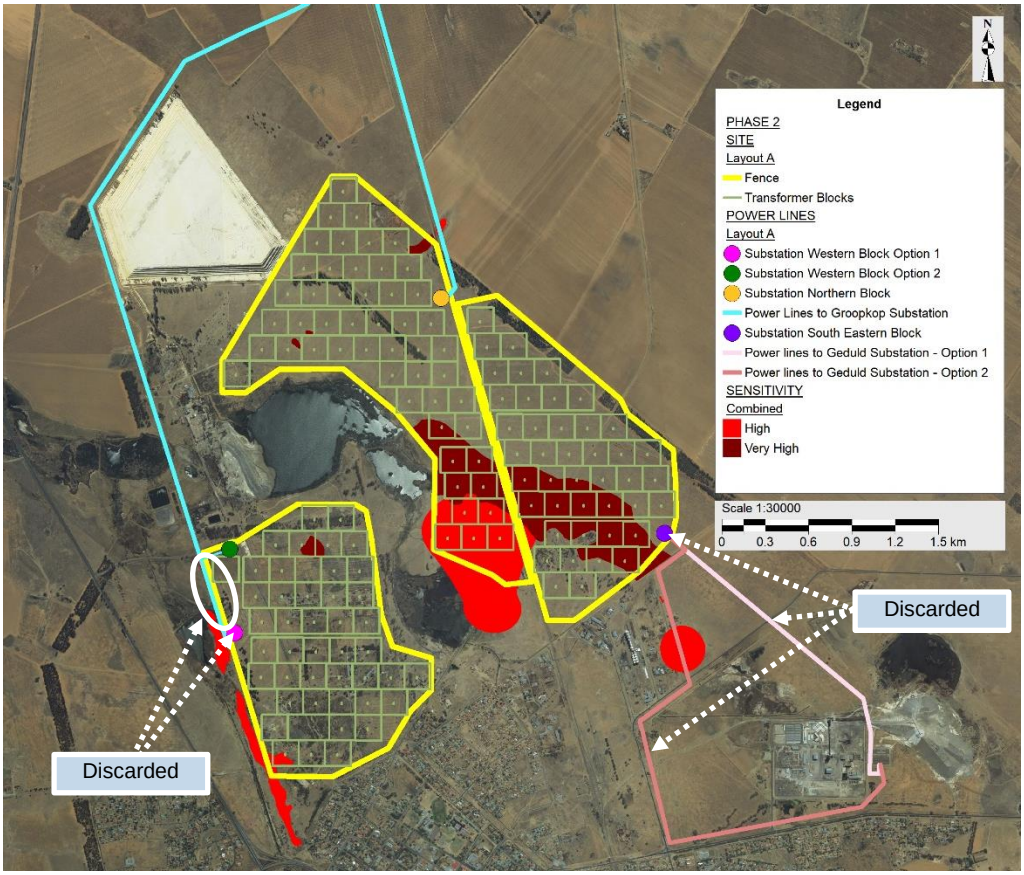
As mentioned in **Section 15.3** above, Layout Alternative B was compiled based on the findings of the Water Resources Impact Assessment, Terrestrial Ecology Assessment, Avifaunal Assessment and Traffic Impact Assessment. The findings of the other specialist studies did not necessitate any changes to the original layout (Layout Alternative A).

15.4.2 Phase 1 Substation Options 1 and 2 and Associated Power Line Routes

The preferences expressed by the specialists and technical team in terms of the Phase 1 Substation Options 1 and 2 and associated power line route options to the Euclid Substation, are provided in **Table 44** below.

Table 44: Summary of Options preferred by specialists and technical team
(✓ = preferred; grey fil & - = no preference expressed)

Project Phase	Alternatives	Terrestrial Ecology	Aquatic	Avifauna	Agriculture	Heritage	Palaeontology	Socio-Economic	Visual	Technical
Phase 1	Substation Option 1 & Power Line Route		-		-	-	-	-	-	✓
	Substation Option 2 & Power Line Route	✓		✓						



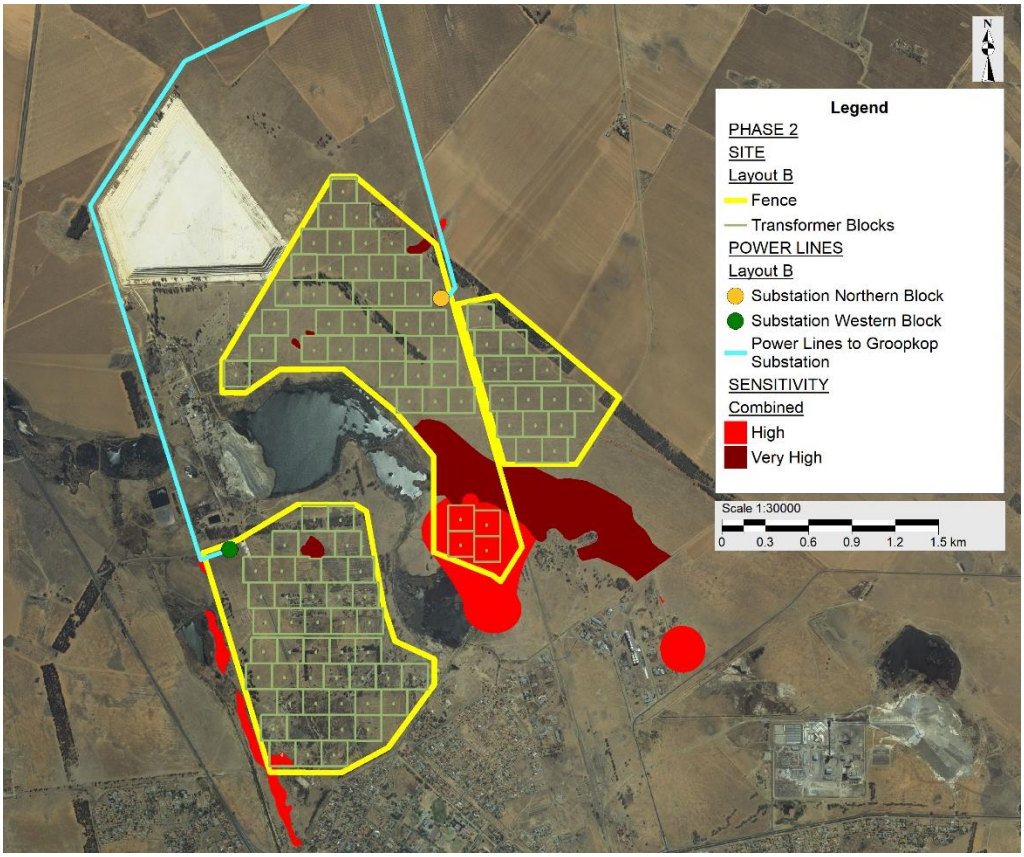


Figure 85: **Comparison of alternative layouts for Phase 2 Power Lines and Substations (based on sensitivity at PV Sites) – zooming in on southern section**
(Note: not all components of the Phase 1 PV Facility are shown)

The Phase 1 Substation Option 2 was identified as the preferred alternative in the Terrestrial Ecology Assessment and Avifaunal Assessment, as this option negates the need for an additional road that would have been required to access the Substation Option 1 Site. However, the impacts associated with the additional road can be suitably managed by the mitigation measures provided.

From a technical (engineering) perspective, the Phase 1 Substation Option 1 is the preferred position, as it will lead to less shading of the solar PV panels by the transmission lines and substation and the associated power line to Euclid Substation will be shorter. The Substation Option 2 Site is located further north and more central in the Phase 1 PV Site, and has the advantage of shorter 33kV cables lengths.

The others specialist studies did not express any preferences in terms of the Phase 1 Substation options.

15.5 BPEO

Based on the recommendations of the specialists, technical considerations and the comparison of the impacts, the following options were collectively identified as the BPEO:

- Layout – Layout Alternative B; and
- Phase 1 Substation – Option 1.

Layout diagrams of the BPEO for Phase 1 and Phase 2 are shown in **Figure 86** and **Figures 87 – 89** below, respectively.

The BPEO provides a balance between technological, energy and environmental aspects, while retaining the flexibility required in the final design stage of the Project.

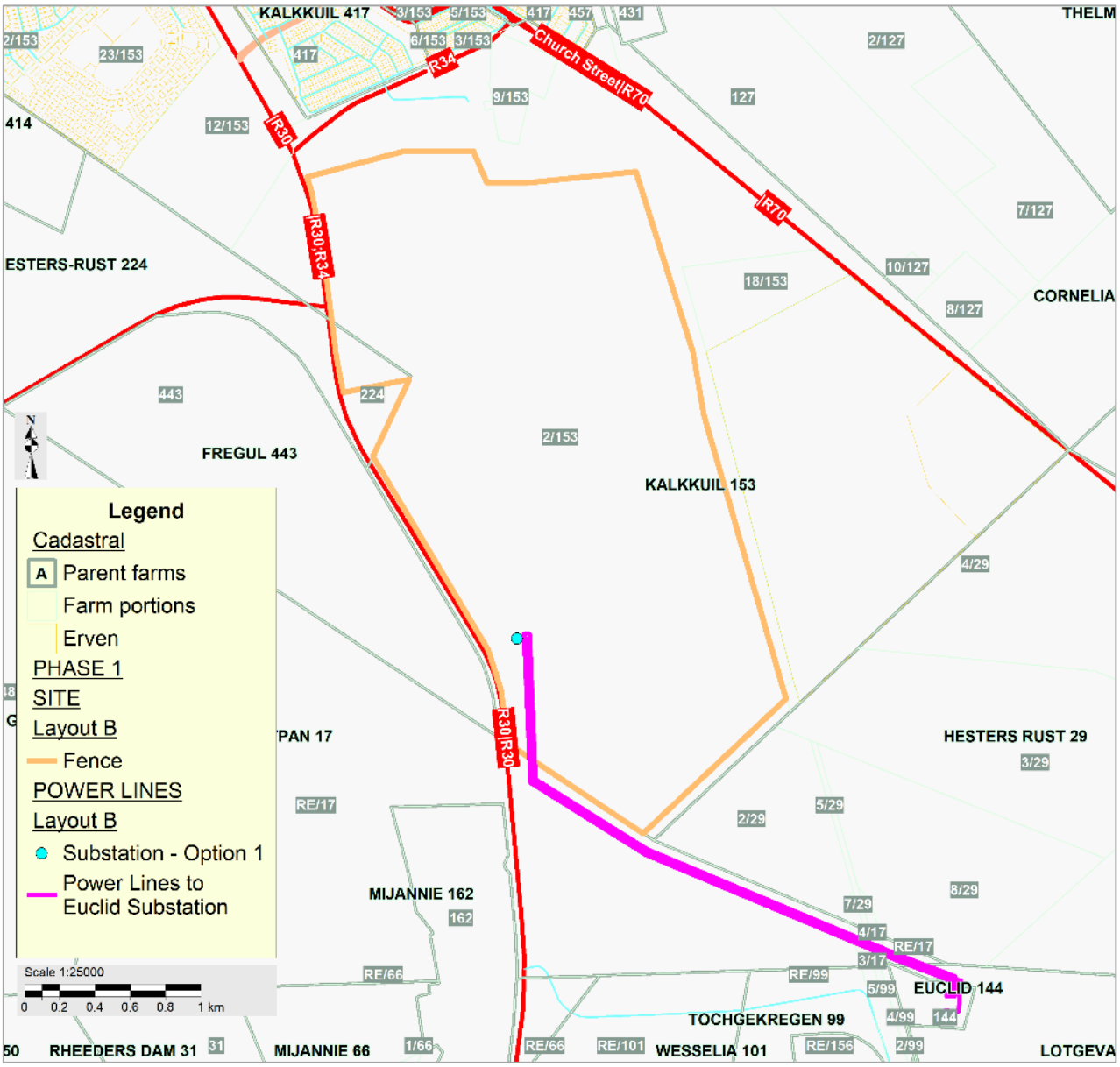


Figure 86: Layout of BPEO for Phase 1
(Note: not all components of the Phase 1 PV Facility are shown)

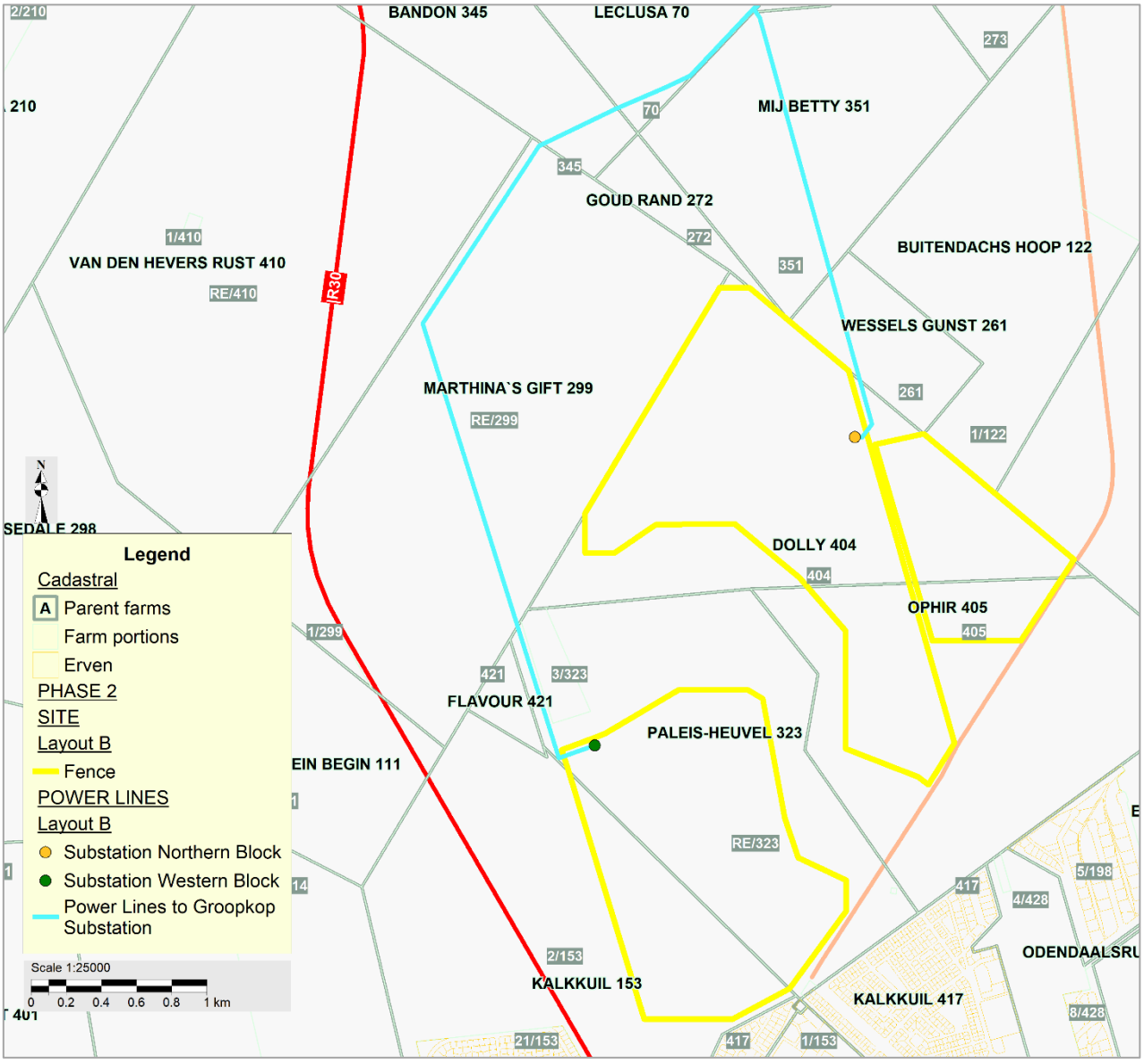


Figure 87: Layout of BPEO for Phase 2 – southern section
(Note: not all components of the Phase 2 PV Facility are shown)

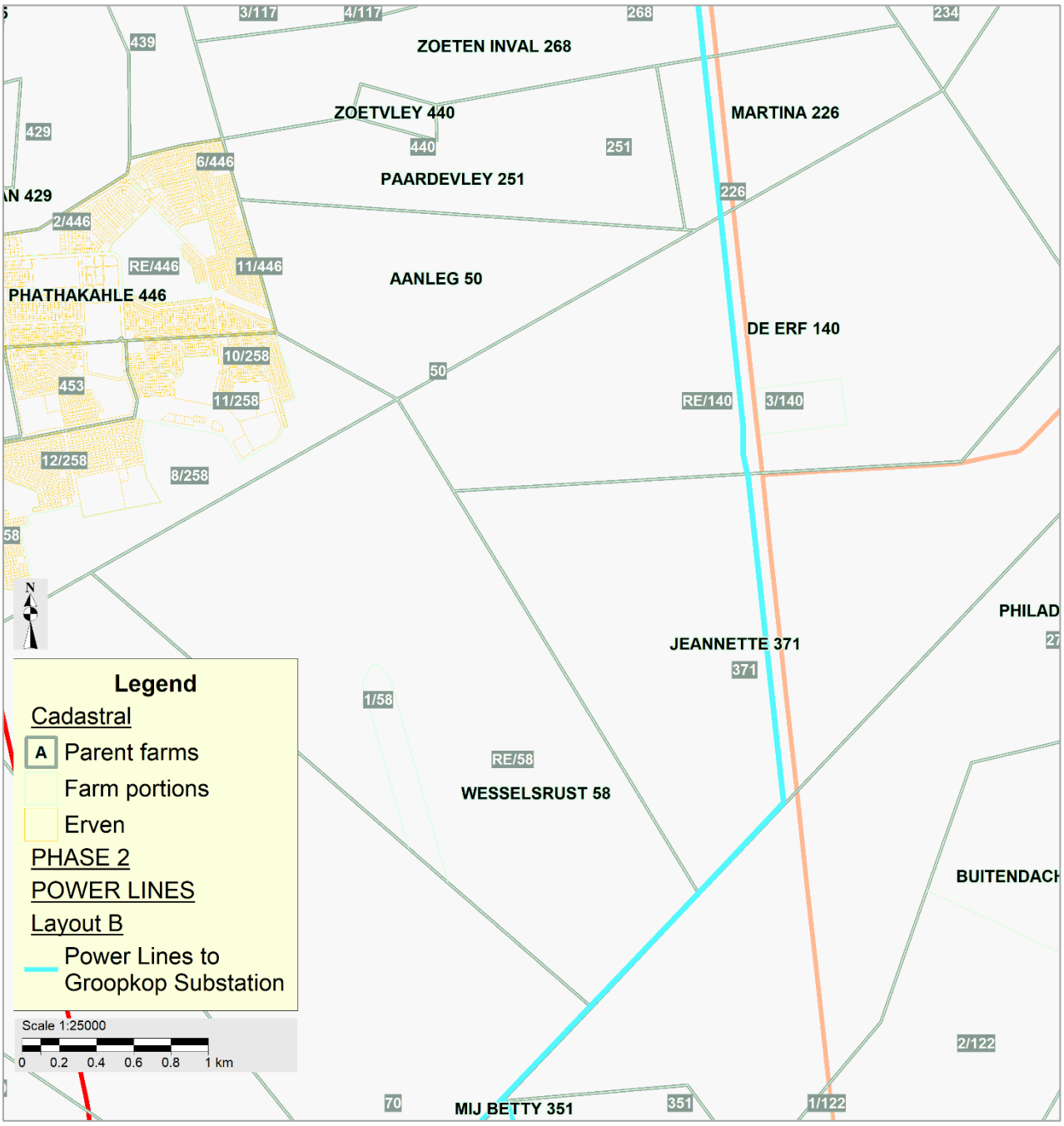


Figure 88: Layout of BPEO for Phase 2 – central section

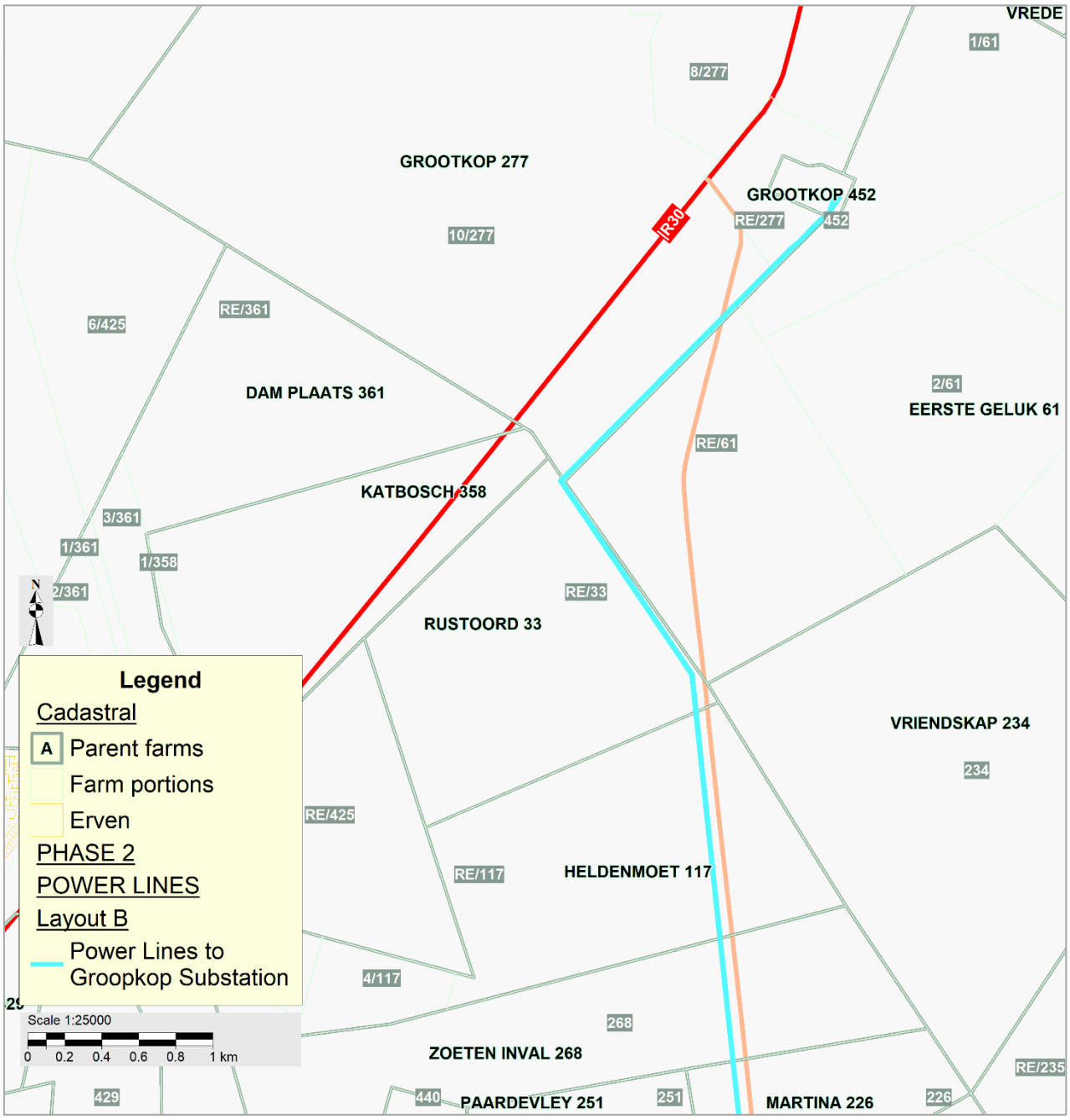


Figure 89: Layout of BPEO for Phase 2 – northern section

16 PUBLIC PARTICIPATION

16.1 General

The purpose of public participation includes the following:

1. To provide IAPs with an opportunity to obtain information about the Project;
2. To allow IAPs to express their views, issues and concerns with regard to the Project;
3. To grant IAPs an opportunity to recommend measures to avoid or reduce adverse impacts and enhance positive impacts associated with the Project; and
4. To enable the Applicant to incorporate the needs, concerns and recommendations of IAPs into the Project, where feasible.

The public participation process for the proposed Project is governed by NEMA and GN No. R 982 of 4 December 2014 (as amended). **Figure 90** below outlines the public participation process for the Basic Assessment.

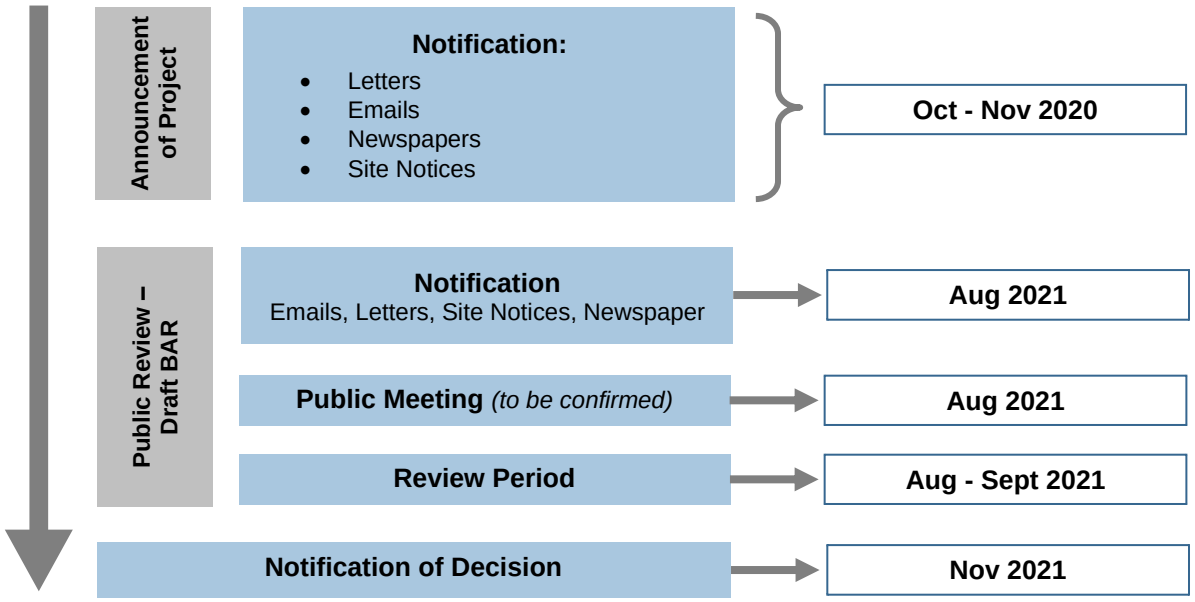


Figure 90: Outline of Public Participation Process

A combined Public Participation Process is being undertaken for the proposed Phase 1 and Phase 2 PV Sites (review of Draft EIA Report) and the Power Lines (review of the Draft BAR).

16.2 Database of IAPs

A database of IAPs, which includes authorities, different spheres of government (national, provincial and local), parastatals, ward councillors, stakeholders, landowners (where information was available), interest groups and members of the general public, was prepared for the Project and is contained in **Appendix H**.

16.3 Adherence to the National State of Disaster declared for the COVID-19 Pandemic

The Minister of Environment, Forestry and Fisheries published the Directions regarding measures to address, prevent and combat the spread of COVID-19 relating to National Environmental Management Permits and Licences in Government Notice No. 650 of 5 June 2020.

A Public Participation Plan for the Basic Assessment for the proposed Project: Phase 1 and Phase 2 Power Lines and Substations was compiled in terms of the abovementioned Directions, which was submitted to DFFE and subsequently approved.

16.4 Project Announcement

The tasks listed in the sub-sections to follow were undertaken during the Project announcement phase.

16.4.1 Notification Letter

A Notification Letter and Reply Form were forwarded to each of the IAPs contained in the database in October 2020.

The Reply Form granted the opportunity to register as an IAP and to raise queries or concerns regarding the Project.

16.4.2 Site Notices

Site notices (English and Afrikaans) were placed at strategic points for Phase 1 and Phase (refer to **Table 45** below) in October 2020. Onsite notices were primarily placed in proximity to the Project components, based on the availability of public access. Refer to **Appendix I** for photographs of the onsite notices.

Table 45: Locations of onsite notices

No.	Coordinates	Description
Phase 1		
1	27°54'10.76"S; 26°41'11.81"E	Main entrance to Phase 1 PV Site from R30
2	27°54'19.44"S; 26°41'41.08"E	Near existing power lines on Phase 1 Site
3	27°55'20.90"S; 26°41'39.46"E	Entrance to gravel road (S289) from R30
Phase 2		
1	27°51'17.07"S; 26°39'39.36"E	Main entrance to Phase 2 PV Site from R30
2	27°51'09.24"S; 26°40'11.00"E	Along gravel road, near Substation Western Block
3	27°49'48.90"S; 26°39'19.30"E	Opposite entrance to Target Mine 3 Shaft, along R30
4	27°43'24.45"S; 26°41'20.10"E	T-junction of S86 with R30

No.	Coordinates	Description
Phase 1		
5	27°43'35.18"S; 26°41'36.57"E	Crossing of S86 by power line to Groopkop Ss
6	27°43'47.82"S; 26°41'22.30"E	Crossing of S86 by power line to Groopkop Ss
7	27°44'50.11"S; 26°41'18.69"E	Bend point along power line to Groopkop Ss along S86
8	27°45'56.20"S; 26°41'26.91"E	Power line to Groopkop Ss along S86
9	27°47'08.48"S; 26°41'36.62"E	T-junction of S86 with gravel road (power line to Groopkop Ss)
10	27°48'3.70"S; 26°41'42.22"E	Bend point along power line to Groopkop Ss along S86
11	27°50’13.30”S; 26°41’8.44”E	Along railway line at Substation Northern Block (power line to Groopkop Ss)
12	27°51’7.57”S; 26°42’4.08”E	At Substation South Eastern Block
13	27°51’39.75”S; 26°42’9.07”E	Crossing of tar road by power line to Geduld Ss – Option 2
14	27°52'17.57"S; 26°42’4.47”E	Corner of Ceder and R34 (power line to Geduld Ss – Option 2)
15	27°52'12.55"S; 26°42'29.65"E	Entrance to Harmony Tshepong Mine (power line to Geduld Ss – Option 2)
16	27°51'58.94"S; 26°42'54.28"E	Near Geduld Substation

16.4.3 Newspaper Notices

Notices were placed in the Vista local newspaper and Volksblad provincial newspaper (refer to copies of the newspaper advertisements contained in **Appendix I**).

16.4.4 Comments Received during the Announcement Phase

Copies of comments received from IAPs during the Announcement Phase are contained in **Appendix J** and were also incorporated into the Comments and Responses Report contained in **Appendix K**.

16.5 Review of Draft BAR

16.5.1 Review Period

In accordance with Regulation 43(1) of GN No. R 982 of 4 December 2014 (as amended), IAPs are granted an opportunity to review and comment on the Draft BAR from **16 August until 16 September 2021**.

16.5.2 Notification of Review of Draft BAR

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

- Site notices were erected at places conspicuous to and accessible by the public within the project footprint;
- A notice was placed in the Vista Newspaper; and
- IAPs were notified via email.

Proof of notification will be provided in the Final BAR.

16.5.3 IAPs' Access to the Draft BAR

A copy of the Draft BAR was placed at the Odendaalsrus Public Library. The Draft BAR was also uploaded to the following website, for downloading purposes - https://nemai.co.za/environmental/downloadable-documents/.

16.5.4 Copies of Draft BAR to Authorities

Copies of the Draft BAR were provided to the following regulatory and commenting authorities:

- DFFE;
- DESTEA;
- DWS Free State Regional Office;
- DPRT;
- FSHRA;
- DMRE;
- LDM; and
- MLM.

16.5.5 Public Meeting to Present the Draft BAR

Anyone that has an interest in attending a virtual public meeting will need to inform Nemai Consulting in writing by 23 August 2021 and will need to provide an email address. Only pre-registered parties that confirmed interest will receive an invitation to the public meeting.

16.5.6 Adherence to COVID-19-related Requirements

All IAPs accessing the hardcopy of the Draft BAR will need to comply with the prevailing COVID-19-related protocols and requirements.

16.5.7 Commenting on the Draft BAR

Comments on the Draft BAR need to be forwarded in writing to the EAP. A Comment Sheet is provided in **Appendix N**, which may be used to provide comments.

CONTACT DETAILS OF EAP:

Contact Person:	*Donavan Henning*
Tel:	*(011) 781 1730*
Fax:	*(011) 781 1731*
Email:	*donavanh@nemai.co.za*
Postal Address:	*PO Box 1673, Sunninghill, 2157*

16.5.8 Comments Received on the Draft BAR

Comments received from authorities and IAPs during the review period for the Draft BAR will be included in the Comments and Responses Report, which will be appended to the Final BAR.

16.6 Notification of DFFE's Decision

Registered IAPs will be notified after having received written notice from DFFE (in terms of NEMA) on the final decision for the Project. The notification will include the appeal procedure to the decision and key reasons for the decision.

17 CONCLUSIONS

17.1 Outcomes of the Basic Assessment

The following key tasks were undertaken during the Basic Assessment for the proposed Project: Phase 1 and Phase 2 Power Lines and Substations:

- Specialist studies were undertaken and the findings were incorporated into the BAR in terms of understanding the environmental status quo and sensitive features, assessing the potential impacts and establishing concomitant mitigation measures, as well as identifying the preferred alternatives;
- Potentially significant impacts pertaining to the pre-construction, construction and operational phases of the Project were identified and assessed, and mitigation measures were provided; and
- Alternatives for achieving the objectives of the proposed activity were considered, and the BPEO was identified. The “no-go” option is not supported when considering the implications of not implementing the Project.

The outcomes of these tasks are captured below.

17.2 Sensitive Environmental Features

The following sensitive and significant environmental features and aspects that are associated with the Project: Phase 1 and Phase 2 Power Lines and Substations and its receiving environment are highlighted, for which mitigation measures are included in the BAR and EMPr:

- Wetlands were identified and delineated along the Phase 1 and Phase 2 Power Line routes.
- According to the Free State Biodiversity Conservation Plan, the proposed Project footprint encroaches into the following areas -
  - Phase 1 – ESA 1; and
  - Phase 2 – CBA1, ESA1 and ESA2.
- The Phase 2 Power Line traverses an Endangered terrestrial ecosystem.
- Several plant species that are protected by the Free State Nature Conservation Ordinance 8 of 1969 were observed in various parts of the Project area.
- The Phase 2 Power Line route traverses habitat capable of supporting all the regionally occurring SCC avifauna.
- Areas of avifaunal sensitivity for both Phase 1 and Phase 2 Power Line routes were based on a combination of wetland delineation data and abundance data on congregations of collision and electrocution prone species. All wetland areas within the 40m wide survey corridor were assigned a very high importance and sensitivity while their 15m buffer zones are afforded a moderate sensitivity.
- The Phase 1 Power Lines are located on grazing land and the Phase 2 Power Lines affect cultivated areas and grazing land.

- Soils are encountered on the Phase 1 and Phase 2 Project areas that are prone to erosion.
- Radiological sources are present at both the PV Sites.
- The surrounding road network, including the R30, R34, S289, A48 / S86, as well as affected roads and streets in the Odendaalsrus Urban Area.
- Existing infrastructure that is traversed / in close proximity to the power lines, including a regional railway line, existing power lines and roads.

Combined sensitivity maps of the BPEO for the Phase 1 and Phase 2 Power Lines and Substations are shown in **Figure 91** and **Figures 92 - 94** below, respectively. Key environmental features that contributed toward the sensitive areas shown in these maps included wetlands, general terrestrial ecological habitats and avifauna habitats, as determined by the respective specialist studies.

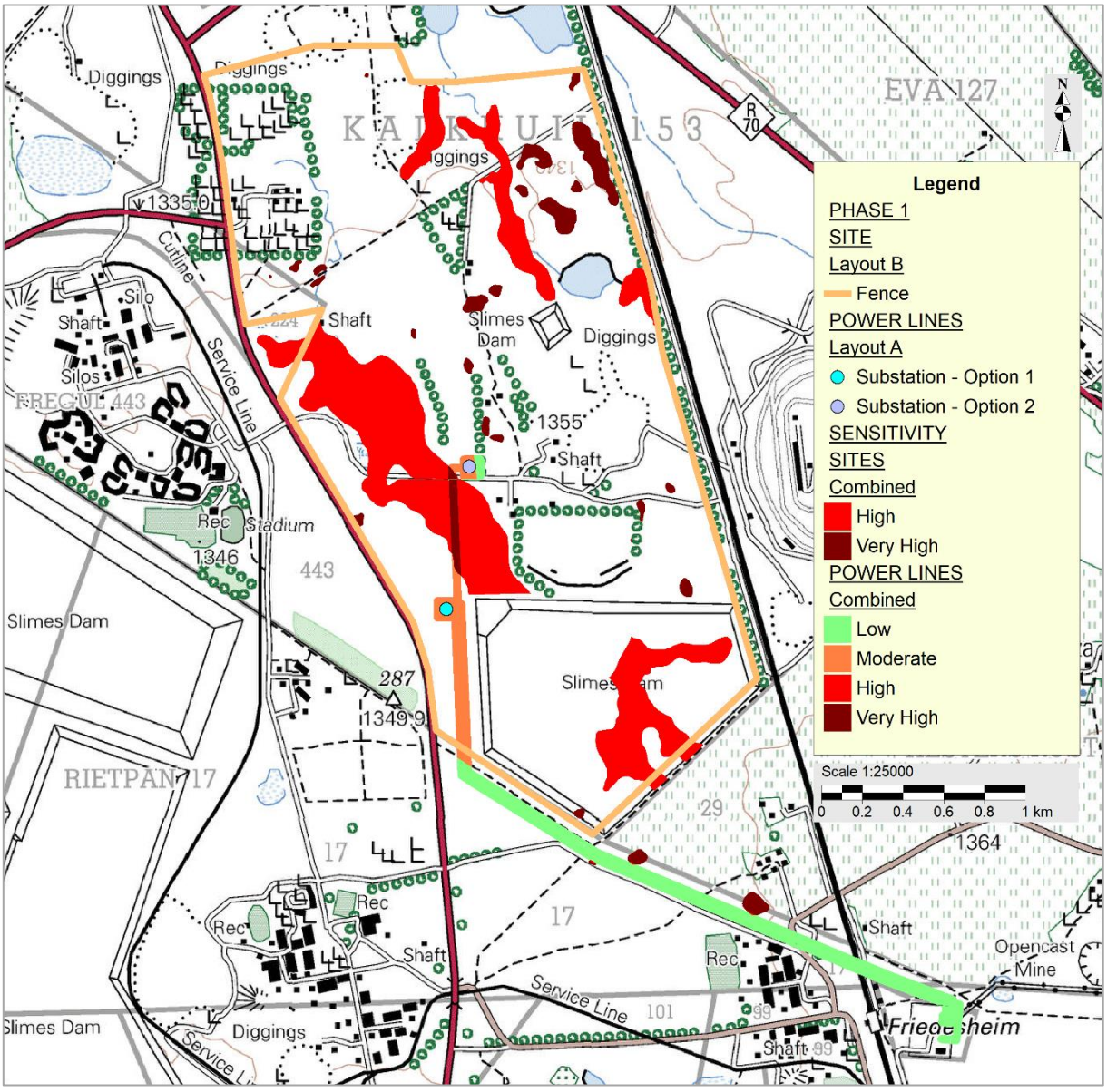


Figure 91: **Phase 1 Power Lines and Substation combined sensitivity map**
(Note: not all components of the Phase 1 PV Facility are shown)

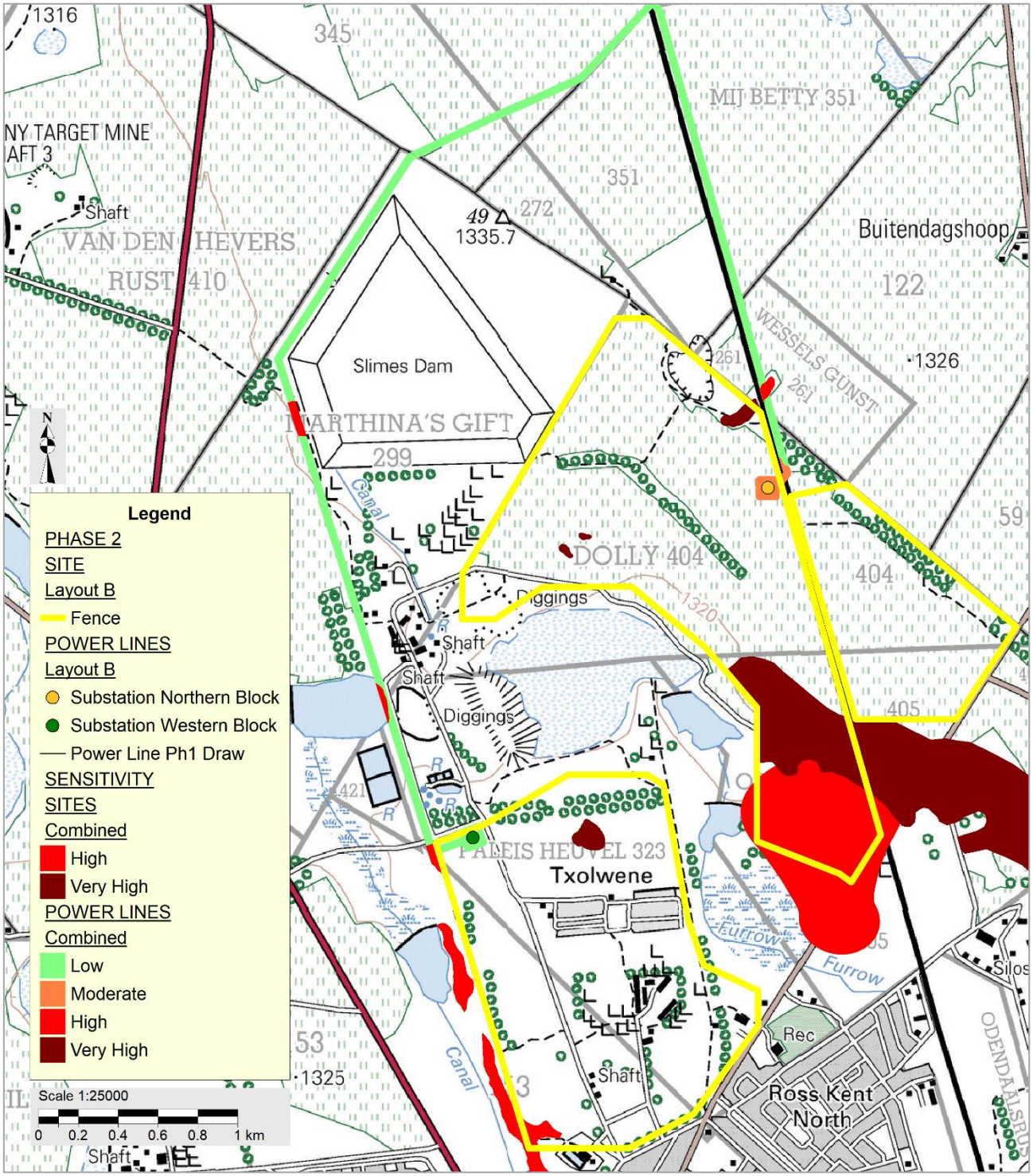


Figure 92: **Phase 2 Power Lines and Substations combined sensitivity map – southern section**
(Note: not all components of the Phase 2 PV Facility are shown)

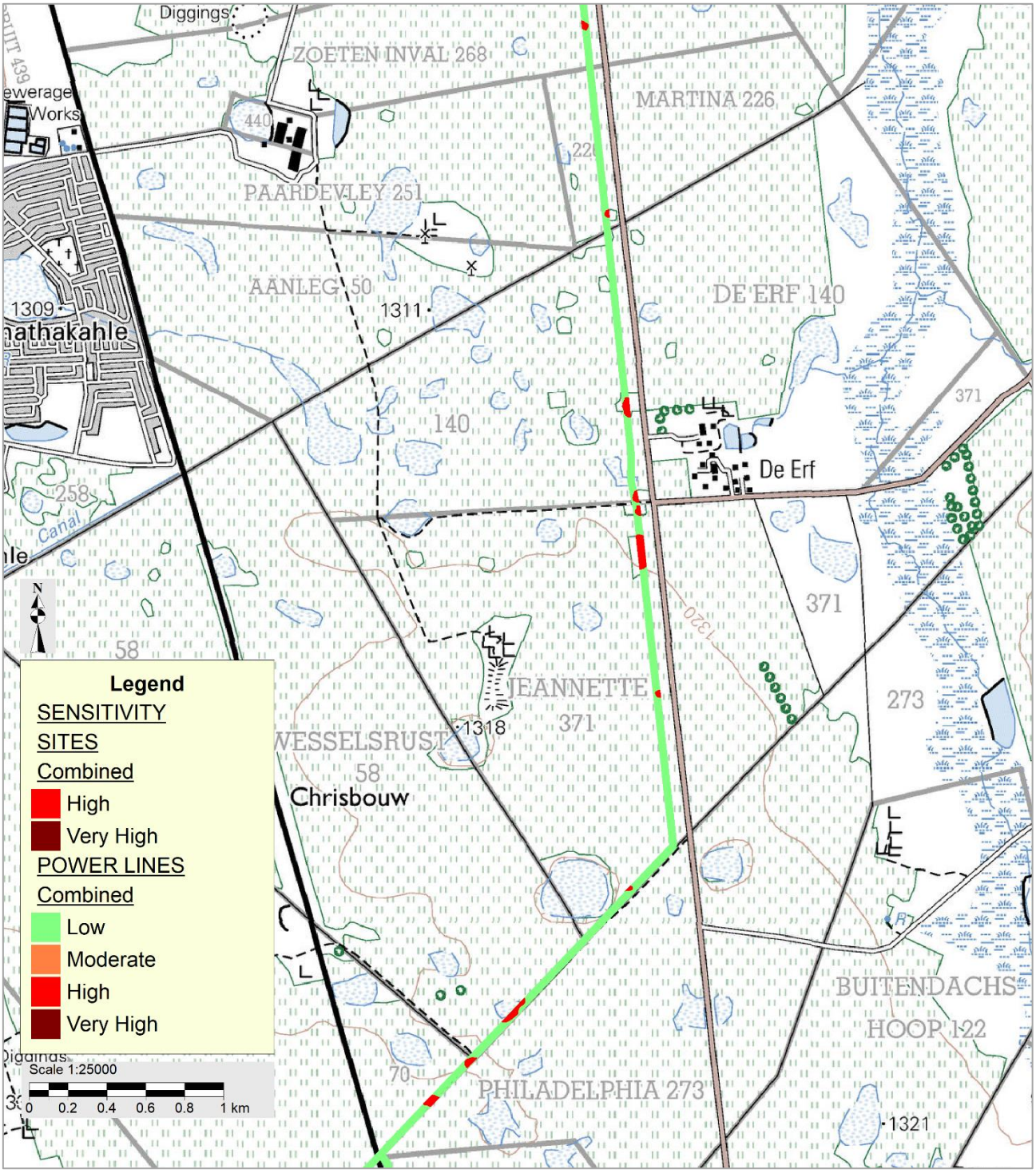


Figure 93: **Phase 2 Power Lines combined sensitivity map – central section**

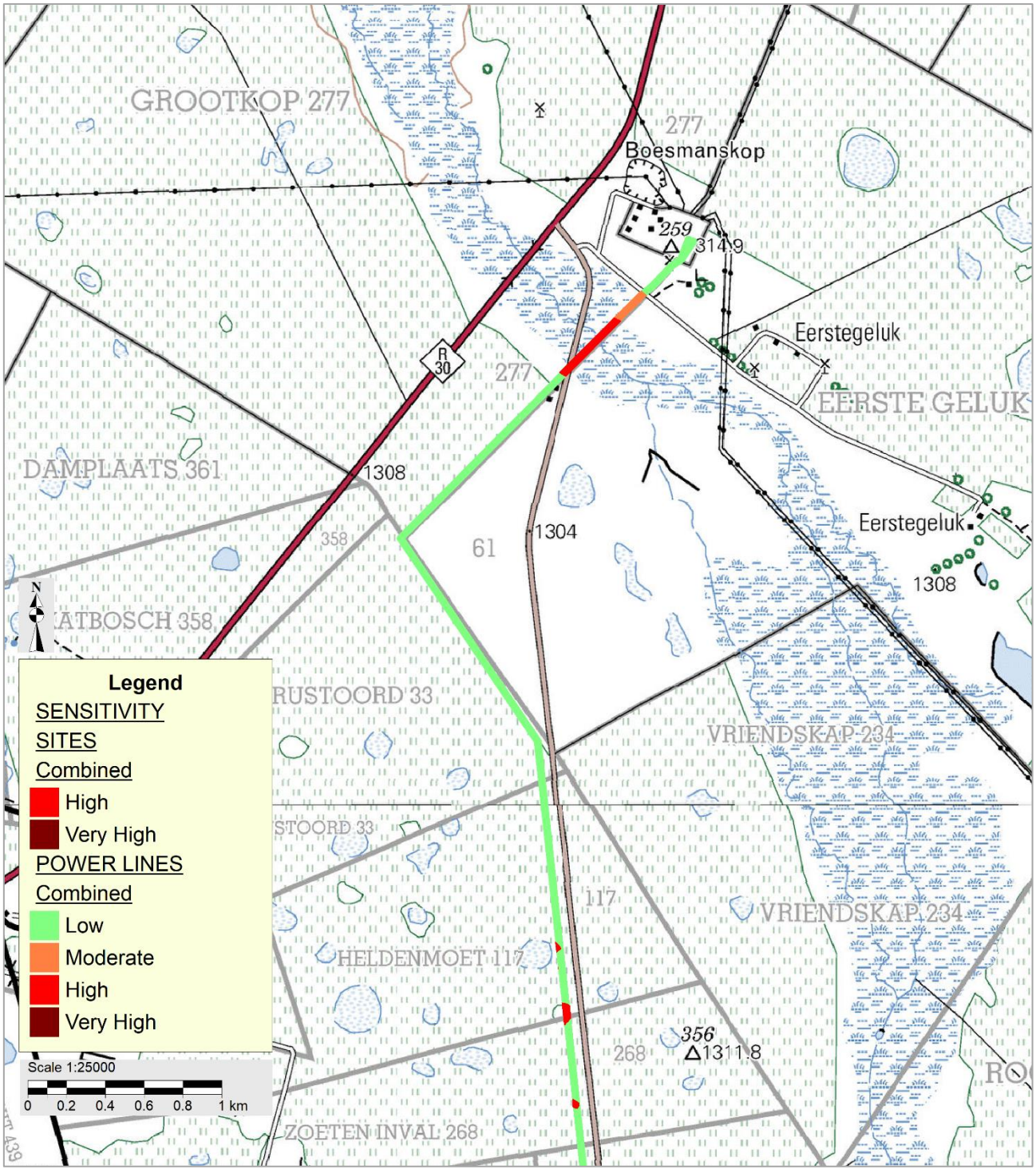


Figure 94: **Phase 2 Power Lines combined sensitivity map – northern section**

17.3 Environmental Impact Statement

The overall Project's strategic intent is linked to the South African Government's pursuit of promoting the country's renewable energy development imperatives, which encourages the role of Independent Power Producers (IPPs) to feed into the national grid.

The rationale for the siting of the overall Project is based on its suitable geographic location, including the area's high solar yield area, flat topography, sparsely populated land, grid connection, water supply, good transport infrastructure and the availability of a large portion of municipal land, as well as the intended value that the Project will provide to MLM and users of electricity/energy. The proposed Project's PV Sites have been secured and the MLM has entered into a Long-Term Land Lease Agreement with the Applicant.

A Network Integration Study was undertaken to investigate the integration of the proposed Solar PV Plant into the Eskom electrical network. The results showed that the Eskom grid has sufficient spare capacity to absorb the phases of the Project.

To minimise impacts to the receiving environment and current land uses, the proposed Phase 1 and Phase 2 Power Line routes attempt to remain alongside existing linear-type infrastructure, such as Eskom's power line corridors, roads (S289 and A48 / S86 roads), the railway line and farm boundaries.

The potentially significant environmental impacts were investigated through the relevant specialist studies. Key findings from the Basic Assessment, apart from the sensitive environmental features and aspects listed in **Section 17.2** above, which may also influence the conditions of the Environmental Authorisation (if granted), include the following:

- The Water Resources Impact Assessment recommended that the potential impacts associated with the alignment of the Phase 2 Power Lines with the pre-existing, yet ecologically sub-optimal existing Eskom servitude, be offset by; (1) utilising a powerline design endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, (2) installing perch structures according to South African standards and (3) installing bird flappers at 10 m intervals at all wetland crossings, with smaller spacing intervals at the areas identified as collision hotspots.
- It is crucial that the activities contained in the Tripartite and Rehabilitation Agreement between Harmony Gold Mining Company Ltd, MLM and the Applicant be implemented, including the rehabilitation of areas affected by mining activities. The scheduling of these activities is also crucial for the implementation of the Project.
- According to the Radiological Survey, radioactive tailings present on the PV Sites will need to be removed, which links to the rehabilitation activities to be undertaken by the Harmony Gold Mining Company Ltd. A follow-up survey is to be undertaken once the tailings material has been removed to verify that the activity concentrations in the respective areas are below 0.5 Bq/g. In addition, the proposed development of the PV Sites will need to adhere to all requirements of the NNR.
- Suitable measures need to be implemented to prevent erosion, manage site drainage and rehabilitate cleared areas during the project life-cycle.
- The Layout Alternative A was revised to avoid areas with very high sensitivity ratings, based on the findings of the specialist studies. The evolved layout, which was termed Layout Alternative B, was determined to be the BPEO, together with the Phase 1 Substation Option 1.

The Project is considered to be compatible with existing land uses encountered in the area. The impacts and risks assessed as part of the Basic Assessment process that was undertaken for the Project are considered manageable with the effective implementation of the measures stipulated in this BAR and EMPr.

With the selection of the BPEO, the adoption of the mitigation measures included in the BAR and the dedicated implementation of the EMPr, it is believed that the significant environmental aspects and impacts associated with this Project can be suitably mitigated. With the aforementioned in mind, it can be concluded that there are no fatal flaws associated with the Project and that authorisation can be issued, based on the findings of the specialists and the impact assessment, through the compliance with the identified environmental management provisions.

It is further the opinion of the EAP and EIA team that the Basic Assessment was executed in an objective manner and that the process and BAR conform to the requirements stipulated in the EIA Regulations of 2014 (as amended).

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APPENDICES