PROPOSED GROOTVLEI 600MW SOLAR PLANT, BATTERY ENERGY STORAGE SYSTEMS & GRID CONNECTION PROJECT NORTH WEST OF VENTERSDORP, JB MARKS LOCAL MUNICIPALITY, NORTH WEST PROVINCE

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

DFFE REFERENCE NO.: 14/12/16/3/3/2/2386

DRAFT

OCTOBER 2023

APPLICANT: LTM GREEN ENERGIES (PTY) LTD

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TITLE AND APPROVAL PAGE

Project Name:	Proposed Grootvlei 600MW Solar Plant, Battery Energy Storage Systems & Grid Connection Project north west of Ventersdorp, JB Marks Local Municipality, North West Province
Report Title:	Environmental Impact Assessment Report
Authority Reference:	14/12/16/3/3/2/2386
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Applicant:	LTM Green Energies (Pty) Ltd

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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 (SA) on coal to produce electricity. LTM Green Energies (Pty) Ltd (the "Applicant") has proposed the development of Grootvlei 600MW Solar Plant, Battery Energy Storage Systems (BESS) and Grid Connection Project north west of Ventersdorp within the JB Marks Local Municipality in the North West Province (the "Project").

The electricity generated by the Project will be transmitted through Option 1 which consists of 2 x 132kV powerlines, approximately 14km kilometres (km) in length, from the new facility 33kV substation to new 400/132kV Main Transmission Substation (MTS) to Loop In-Loop Out (LILO) of the Pluto – Watershed 275kV power line and Option 2 that comprises of 2.8km 132 kV line from the new facility 33kV substation facility 33kV substation to the Makokskraal Substation.

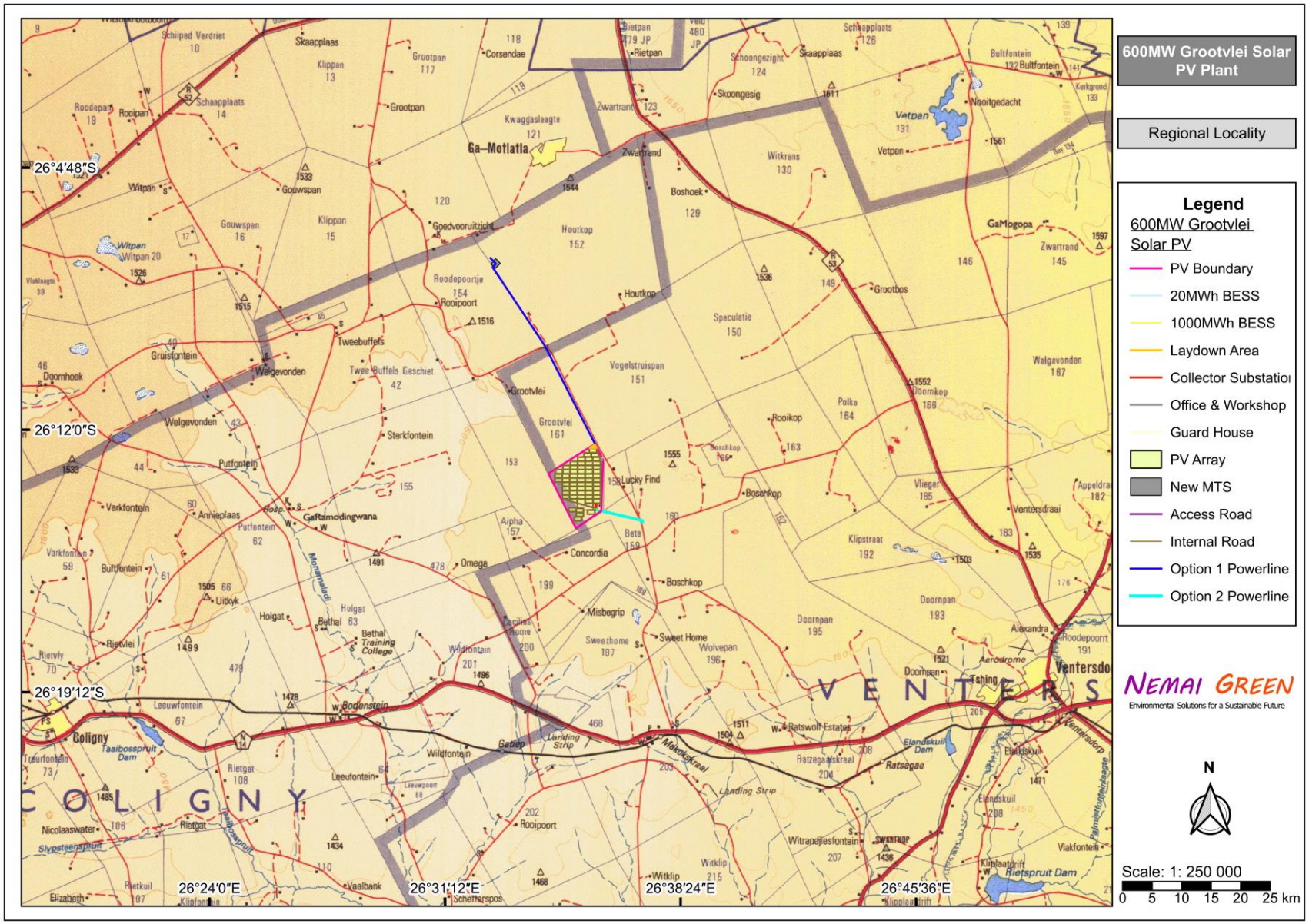
In terms of the Grid Connection Capacity Assessment (GCCA) 2024, which is a report presents the results of available generation connection capacity of all the transmission substations in all the supply areas in all the provinces of South Africa, the Project is located within the North West Supply Area. Based on the latest GCCA that was released by Eskom in March 2022, the GCCA confirms that the North West Supply Area currently has 4370MW generation connection capacity available. The Project Site is located approximately14km from the Pluto – Watershed 275kV power line.

The Applicant intends to bid for the current and future Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows and/or other renewable energy markets within SA.

This document serves as the **draft Environmental Impact Assessment (EIA) Report** for the proposed Project.

B. PROJECT LOCATION

The Project is located approximately 20km to the north west of Ventersdorp central business district (CBD) and falls within Ward 34 of the JB Marks Local Municipality, in the North West Province. The site can be accessed via the N14 (main access) and the R53 (gravel road). The property earmarked for the Project covers a combined area of approximately 655 hectares (ha).



Regional locality map

C. LEGISLATION AND GUIDELINES CONSIDERED

Pertinent legislation that has possible bearing on the proposed Solar PV Project from an environmental perspective is briefly discussed in the EIA Report.

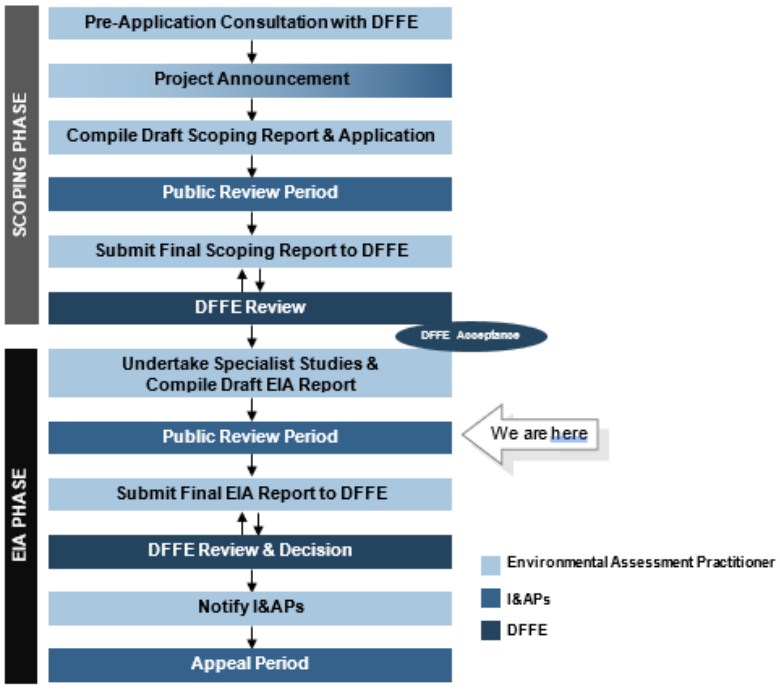
The relationship between the Project and the following key pieces of environmental legislation is also explained:

- National Environmental Management Act (Act No. 107 of 1998);
- National Environmental Management: Waste Act (Act No. 59 of 2008);
- National Water Act (Act No. 36 of 1998);
- Mineral and Petroleum Resources Development Act (Act No. 28 of 2002);
- 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).

D. SCOPING AND EIA PROCESS

The process for seeking Environmental Authorisation for the Project under the National Environmental Management Act (Act No. 107 of 1998) (NEMA) is being undertaken in accordance with the Environmental Impact Assessment (EIA) Regulations of 2014 (as amended). In terms of NEMA, the lead decision-making authority for the environmental assessment is the Department of Forestry, Fisheries and the Environment (DFFE).

Based on the types of activities involved the requisite environmental assessment for the Project is a Scoping and Environmental Impact Reporting (S&EIR) process. An outline of the process is provided in the diagram to follow.



Overview of S&EIR Process

E. PROJECT'S TECHNICAL DESCRIPTION

The Project consists of the following systems, sub-systems or components (amongst others):

- 600MW PV solar panels or modules (arranged in arrays);
- Mounting structures to support the PV panels;
- DC-AC current inverters stations, transformers, and internal electrical reticulation (underground cabling);
- Grid Connection: Route 1 which consists of 2 x 132kV powerlines, approximately 14km kilometres (km) in length, from the new facility 33kV substation to new 400/132kV Main Transmission Substation (MTS) to Loop In-Loop Out (LILO) of the Pluto – Watershed 275kV power line and Route 2 that comprises of 3 km 132 kV line from the new facility 33kV substation to the Makokskraal Substation;
- On site switching station/substation;
- Administration Buildings (Offices);
- Workshop areas for maintenance and storage;
- Temporary laydown areas;
- Internal access roads and perimeter fencing of the footprint area;
- Lithium-ion battery energy storage system (BESS);
- Security Infrastructure; and
- Site access from unnamed gravel road via the N14 and/or R53.

The EIA Report provides an overview of the components of the proposed Solar PV Facility, as well as the BESS and grid connection. It further explains the project life-cycle, as well as the resources required to execute the Project. The alternatives under consideration for the Project include design/layout alternatives, technology alternatives and the no-go option.

E. PROFILE OF THE RECEIVING ENVIRONMENT

The Environmental Impact 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
- Climate
- Geology and Soil
- Hydrogeology
- Topography
- Surface Water
- Flora & Fauna
- Socio-Economic Environment
- Agriculture
- Air quality
- Noise
- Historical and Cultural Features
- Planning
- Existing Structures and Infrastructure
- Transportation
- 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. Freshwater Impact Assessment;
2. Terrestrial Biodiversity Compliance Statement;
3. Avifaunal Impact Assessment;
4. Agricultural Compliance Statement;
5. Heritage Impact Assessment;
6. Paleontological Impact Assessment;
7. Visual Impact Assessment; and
8. Social Impact Assessment.

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

- The information was used to complete the description of the receiving environment in a more detailed and site-specific manner;
- A summary of each specialist study is provided, focusing on the approach to each study, key findings and conclusions drawn;
- The specialists' impacts assessments, and the identified mitigation measures, were included in the overall project impact assessment;
- 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
- Salient recommendations made by the specialists were taken forward to the final Conclusions.

H. IMPACT ASSESSMENT

The EIA 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;
- Impacts identified during the Scoping phase;
- 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 (EMPr) provides a comprehensive list of mitigation measures for specific elements of the Project, which extends beyond the impacts evaluated in the body of the Environmental Impact 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 will not be realised. The "no-go option" is thus not preferred.

From a cumulative impact perspective, there are two (2) known approved renewable energy application within a 30km radius of the Project's PV Site. Cumulative impacts in relation to the Project were assessed individually in the EIA Report and mitigation measures were developed for each of the impact categories.

Other aspects considered in terms of cumulative impacts included:

- Traffic-related impacts in terms of the local road network;
- The cumulative area of indigenous vegetation to be cleared;
- 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;
- Increase in noise levels during the construction phase;
- Problems associated with the influx of employment seekers; and
- Positive cumulative economic effects from the construction of multiple developments in the area.

H. ANALYSIS OF ALTERNATIVES

Based on the recommendations of the specialists, technical considerations, feedback from I&APs and the comparison of the impacts, PV Layout Alternative 2 was identified as the Best Practicable Environmental Option (BPEO).

J. PUBLIC PARTICIPATION

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

- Maintaining the database of I&APs;

- Review period for the draft EIA Report;
- Notification of review of the draft EIA Report;
- Means of accessing the draft EIA Report; and
- Comments received on the draft EIA Report.

I. CONCLUSION

The following key tasks were undertaken during the EIA phase for the proposed Project:

- The specialist studies identified in the Plan of Study for the EIA were undertaken and the findings were incorporated into the EIA 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 BPEO was identified. The “no-go” option is not supported when considering the implications of not implementing the Project.

Attention is drawn to specific sensitive environmental features for which mitigation measures are included in the EIA Report and EMPr’s. A combined sensitivity map overlaid with the Project’s BPEO is also provided. Key environmental features that contributed toward the sensitive areas shown in the map included wetlands and their associated buffer zones and heritage sites.

An Environmental Impact Statement is also provided, which includes highlighting key findings from the EIA, which may also influence the conditions of the Environmental Authorisation (if granted). With the selection of the BPEO, the adoption of the mitigation measures included in the EIA Report and the dedicated implementation of the EMPr’s, 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.
October 2023	Draft for Review by Authorities and the Public	0

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LIST OF ACRONYMS & ABBREVIATIONS

AC	Alternating Current
AEL	Atmospheric Emission Licence
ASAPA	Association for Southern African Professional Archaeologists
BPEO	Best Practicable Environmental Option
CBA	Critical Biodiversity Area
CBD	Central Business District
COD	Commercial Operation Date
COVID-19	Coronavirus Disease 2019
CPV	Concentrated Photovoltaics
CSP	Concentrated Solar Photovoltaics
CR	Critically Endangered
DARD	Department of Agriculture and Rural Development
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DEAT	Department of Environmental Affairs and Tourism
DEL	Department of Employment and Labour
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
EIA	Environmental Impact Assessment
EHS	Environmental, Health, and Safety
EMPr	Environmental Management Programme
EN	Endangered
ESA	Ecological Support Area
NWHRA	North West Heritage Resources Authority
GHG	Greenhouse Gas
GIS	Geographical Information System
GN	Government Notice
GVA	Gross Value Added
HV	High Voltage
I&APs	Interested and Affected Parties
IBA	Important Bird & Biodiversity Area
IDP	Integrated Development Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
IRP	Integrated Resource Plan
JB MLM	JB Marks Local Municipality
MOSS	Metropolitan Open Space System

Na	Sodium
NaS	Sodium-Sulphur
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:PAA	National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
NEM:WA	National Environmental Management: Waste Act (Act No. 59 of 2008)
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NWA	National Water Act (Act No. 36 of 1998)
OHS	Occupational Health and Safety
PS	Performance Standards
PV	Photovoltaic
REDZ	Renewable Energy Development Zones
REEA	Renewable Energy EIA Application
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
RFI	Radio Frequency Interference
S	Sulphur
S&EIR	Scoping and Environmental Impact Reporting
SA	South Africa
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency
SANS	South African National Standard
SAPAD	South African Protected Areas Database
SARAO	South African Radio Astronomy Observatory
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
SIP	Strategic Integrated Projects
SOTER	Soil and Terrain
ToR	Terms of Reference
VFB	Vanadium Flow Battery
VRB	Vanadium Redox Battery
VU	Vulnerable
WMA	Water Management Area

UNITS OF MEASUREMENT

°C	Degrees Celsius
ha	Hectare
km	Kilometre
kV	Kilovolt
l/s	Litres per Second
m	Metre
m^2	Square metre
mm	Millimetre
MW	Megawatt
MWh	Megawatt hour
%	Percentage

1 PURPOSE OF THIS DOCUMENT

Nemai Green (Nemai) was appointed by LTM Green Energies (Pty) Ltd (the "Applicant") to conduct the Environmental Impact Assessment (EIA) for the **proposed Grootvlei 600MW Solar Plant, Battery Energy Storage Systems (BESS) and Grid Connection Project north west of Ventersdorp, in the North West Province** (the "Project").

The EIA is being undertaken according to the process prescribed in the EIA Regulations of 2014, published under Government Notice (GN) No. 982 in Gazette No. 38282 of 4 December 2014 and amended by GN 326 of 7 April 2017 published in Gazette No. 40772 (the "EIA Regulations"). The EIA Regulations were promulgated in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA). This document serves as the **draft EIA Report** for the proposed Project.

To date, the Scoping phase of the overall environmental assessment for the Project has been completed. The final Scoping Report and Plan of Study for the EIA were approved by the Department of Forestry, Fisheries and the Environment (DFFE) on the 4th of September 2023. DFFE is the competent authority to decide on the application in terms of NEMA.

According to the EIA Regulations, the objectives of the EIA process are to undertake the following, through a consultative process:

- Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
- Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted Scoping Report;
- Identify the location of the development footprint within the approved site as contemplated in the accepted Scoping Report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
- Determine the –
  - Nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
  - Degree to which these impacts -
    - Can be reversed;
    - May cause irreplaceable loss of resources; and
    - Can be avoided, managed or mitigated.
- Identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted Scoping Report based on the lowest level of environmental sensitivity identified during the assessment;

- Identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity;
- Identify suitable measures to avoid, manage or mitigate identified impacts; and
- Identify residual risks that need to be managed and monitored.

The draft EIA Report will be made available to Interested and Affected Parties (I&APs) for a 30-day review period from **09 October 2023 to 07 November 2023** All comments that are received will be addressed in the final EIA Report and will also be included in the Comments and Responses Report. The final EIA Report will then be submitted to the DFFE for review and decision-making.

2 DOCUMENT ROADMAP

As a minimum, this EIA Report aims to satisfy the requirements stipulated in Appendix 3 of the EIA Regulations. **Table 1** presents the document's composition in terms of the aforementioned regulatory requirements.

Table 1: EIA Report 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	–	–
4	Project Location	3(1)(b)	The location of the development footprint of the activity on the approved site as contemplated in the accepted Scoping Report, including: (i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; and (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties.
		3(1)(c)	A plan which locates the proposed activity or activities applied for as well as the 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; and (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken.
5	Legislation and Guidelines Considered	3(1)(e)	A description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context.
6	Scoping and EIA Process	3(1)(a)	Details of- (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae.
		3(1)(u)	An indication of any deviation from the approved scoping report, including the plan of study, including- (i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and (ii) a motivation for the deviation.
		3(1)(v)	Any specific information that may be required by the competent authority.
7	Assumptions and Limitations	3(1)(p)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed.
8	Need and Desirability	3(1)(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 development footprint within the approved site as contemplated in the accepted Scoping Report.
9	Project Description	3(1)(d)	A description of the scope of the proposed activity, including-

Chapter	Title	Correlation with GN No. R. 982	GN No. R. 982 Description
			(i) all listed and specified activities triggered and being applied for; and (ii) a description of the associated structures and infrastructure related to the development.
		3(1)(g)	A motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report.
		3(1)(h)(i)	A full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including: (i) details of the development footprint alternatives considered.
		3(1)(h)(ix)	If no alternative development footprints for the activity were investigated, the motivation for not considering such.
		3(1)(t)	Where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts.
10	Alternatives	3(1)(h)(i)	Details of the development footprint alternatives considered.
11	Profile of the Receiving Environment	3(1)(h)(iv)	The environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.
12	Summary of Specialist Studies	3(1)(k)	Where applicable, a summary of the findings and recommendations of 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 assessment report.
13	Impact Assessment	3(1)(h)(v)	The impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (i) can be reversed; (ii) may cause irreplaceable loss of resources; and (iii) can be avoided, managed or mitigated.
		3(1)(h)(vi)	The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks.
		3(1)(h)(vii)	Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.
		3(1)(h)(viii)	The possible mitigation measures that could be applied and level of residual risk.
		3(1)(i)	A full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report 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; and (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.
		3(1)(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;

Chapter	Title	Correlation with GN No. R. 982	GN No. R. 982 Description
			(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; and (vii) the degree to which the impact and risk can be mitigated.
		3(1)(m)	Based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the Environmental Management Programme (EMPr) as well as for inclusion as conditions of authorisation.
14	Analysis of Alternatives	3(1)(h)(ix)	If no alternative development locations for the activity were investigated, the motivation for not considering such.
		3(1)(h)(x)	A concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted Scoping Report.
		3(1)(n)	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment.
15	Public Participation – EIA Phase	3(1)(h)(ii)	Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs.
16	EIA Conclusions	3(1)(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 development footprint on the approved site as contemplated in the accepted scoping report 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.
		3(1)(o)	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.
		3(1)(q)	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.
17	References	-	-
Appendix A	Map	3(1)(c)	A plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale.
Appendix D	Specialists' Reports	R23(5)	Specialist Reports containing all information set out in Appendix 6 of GN No. R. 982 of 4 December 2014 (as amended).
Appendix G	EMPr	R23(4)	Environmental Management Programme containing all information set out in Appendix 4 of GN No. R. 982 of 4 December 2014 (as amended).
Appendix F	Comments and Responses Report	3(1)(h)(ii)	Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs.
		3(1)(h)(iii)	A summary of the issues raised by Interested and Affected Parties (IAPs), and an indication of the manner in which the issues were incorporated, or the reasons for not including them.

Chapter	Title	Correlation with GN No. R. 982	GN No. R. 982 Description
Appendix H	Oath of Environmental Assessment Practitioner	3(1)(s)	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 IAPs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to IAPs and any responses by the EAP to comments or inputs made by IAPs.
16		3(1)(r)	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised**.**
N/A		3(1)(w)	Any other matters required in terms of section 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.

The Applicant has proposed the development of the Grootvlei 600MW Solar Plant and Grid Connection Project north west of Ventersdorp within the JB Marks Local Municipality in the North West Province. The electricity generated by the Project will be transmitted through Option 1 which consists of 2 x 132kV powerlines, approximately 14km kilometres (km) in length, from the new facility 33kV substation to new 400/132kV Main Transmission Substation (MTS) to Loop In Loop Out (LILO) of the Pluto – Watershed 275kV power line and Option 2 that comprises of 2.8km 132 kV line from the new facility 33kV substation facility 33kV substation to the Makokskraal Substation.

The Applicant intends to bid for the current and future Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows and/or other renewable energy markets within SA.

4 PROJECT LOCATION

4.1 Location of the Project relative to Solar Yield Area

The location of the Project in relation to SA's PV power potential is shown in **Figure 1** below. The Project Area is considered to have favourable solar irradiation levels, which makes it ideal for the production of solar power via PV Panels.

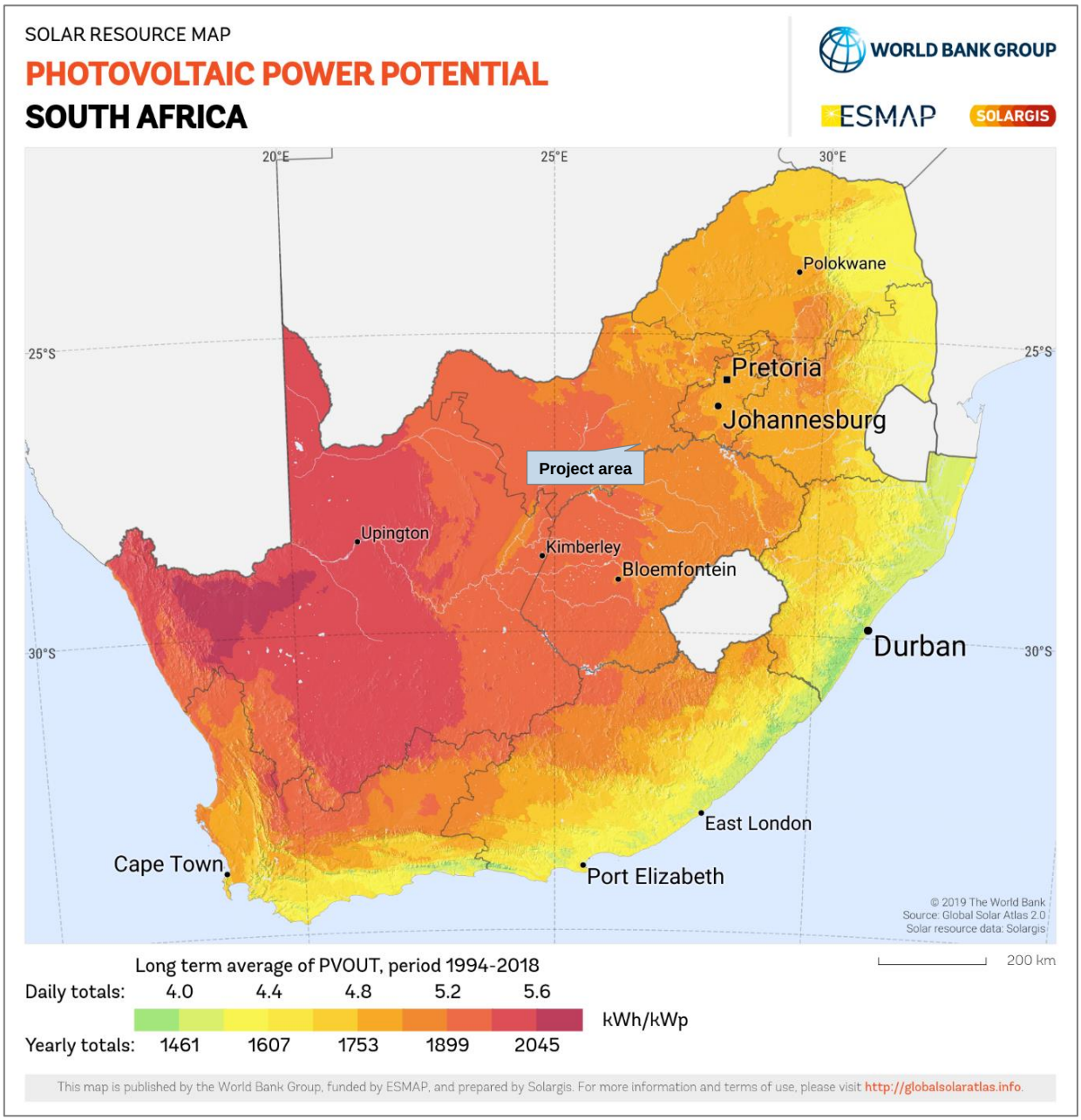

Figure 1: Location of the Project relative to PV Power Potential
(© 2019 The World Bank, Source: Global Solar Atlas 2.0, Solar resource data: Solargis)

4.2 Geographical Context

The Project is located approximately 20km to the north west of Ventersdorp's central business district (CBD) and falls within Ward 34 of the JB Marks Local Municipality (JB MLM), in the North West Province. The locality and layout maps are provided in **Figure 2** and **Figure 3** below, and are also contained in **Appendix A**.

The property earmarked for the Project PV site covers (excluding. powerline and access roads) a combined area of approximately 655 hectare (ha). The details of the affected properties are provided in **Table 2** below.

Table 2: Details of the affected properties

Farm Details	21-digit Surveyor General No.
Solar Plant	
Portion number 0 of the farm Grootvlei 161 IP	T0IP00000000016100000
New Main Transmission Substation	
Portion number 1 of the Farm Houtkop 152	T0IP00000000015200001
Powerline Route Option 1	
Portion number 1 of the Farm Houtkop 152	T0IP00000000015200001
Portion number 9 of the Farm Houtkop 152	T0IP00000000015200009
Portion number 11 of the Farm Houtkop 152	T0IP00000000015200011
Portion number 12 of the Farm Houtkop 152	T0IP00000000015200012
Portion number 3 of the Farm Vogelstruispan 151	T0IP00000000015100003
Portion number 4 of the Farm Vogelstruispan 151	T0IP00000000015100004
Portion number 7 of the Farm Vogelstruispan 151	T0IP00000000015100007
Portion number 0 of the Farm Lucky Find 158	T0IP00000000015800000
Portion number 0 of the farm Grootvlei 161 IP	T0IP00000000016100000
Powerline Route Option 2	
Portion number 0 of the farm Grootvlei 161 IP	T0IP00000000016100000
Portion RE of the Farm Beta 159 IP	T0IP00000000015900000
Portion 0 of the Farm Boschkop	T0IP00000000016090000

The Project's coordinates are as follows (shown in **Table 3 – 8** below):

- **PV Site property boundaries** –

Table 3: PV Site Boundary Coordinates

Description	Coordinates
Corner and Bend Coordinates of buildable area	26°12'23.35"S; 26°35'46.73"E
	26°13'12.21"S; 26°34'21.48"E

Description	Coordinates
	26°14'42.18"S; 26°35'12.08"E
	26°14'13.47"S; 26°35'58.67"E
	26°12'48.63"S; 26°36'1.47"E

- **Grid Connection** (start and end points, as well as bend points) –

Table 4: Grid Connection Coordinates

Description	Coordinates
Option 1 Powerline	
Start point (at PV area)	26°14'4.46"S; 26°35'48.06"E
Bend 1	26°14'4.85"S; 26°35'58.93"E
Bend 2	26°12'48.80"S; 26°36'1.52"E
Bend 3	26° 9'41.20"S; 26°34'14.73"E
Bend 4	26° 7'32.23"S; 26°32'39.15"E
Bend 5 (at new Main Transmission Substation)	26° 7'26.50"S; 26°32'45.33"E
LILO to Pluto to Watershed 275kV power line from new Main Transmission Substation.	26° 7'17.26"S; 26°32'35.35"E
Option 2 Powerline	
Start point (at PV area)	26°14'4.60"S; 26°35'48.29"E
Bend 1	26°14'11.48"S; 26°35'48.22"E
Bend 2	26°14'29.59"S; 26°37'14.62"E
End point (at Makokskraal Substation)	26° 7'26.50"S; 26°32'45.33"E

- **New Main Transmission Substation** –

Table 5: New Main Transmission Substation Coordinates

Description	Coordinates
Corners of buildable area	26° 7'26.91"S; 26°32'36.21"E
	26° 7'33.84"S; 26°32'44.39"E
	26° 7'25.78"S; 26°32'53.02"E
	26° 7'17.84"S; 26°32'44.49"E

- **Collector Substation** –

Table 6: Collector Substation Coordinates

Description	Coordinates
Corners of buildable area	26°14'1.65"S; 26°35'47.50"E
	26°14'8.18"S; 26°35'47.56"E
	26°14'8.19"S; 26°35'49.98"E
	26°14'1.66"S; 26°35'49.95"E

- **Battery Energy Storage System (BESS) areas** –

Table 7: BESS area Coordinates

Description	Coordinates
1000MWh BESS	
Corner and Bend Coordinates of buildable area	26°14'1.55"S; 26°35'52.87"E
	26°14'10.97"S; 26°35'52.87"E
	26°14'10.99"S; 26°35'57.56"E
	26°14'1.51"S; 26°35'57.56"E
20MWh BESS (01)	
Corner and Bend Coordinates of buildable area	26°14'1.82"S; 26°35'39.66"E
	26°14'2.22"S; 26°35'39.66"E
	26°14'2.21"S; 26°35'41.91"E
	26°14'1.82"S; 26°35'41.90"E
20MWh BESS (02)	
Corner and Bend Coordinates of buildable area	26°13'54.31"S; 26°34'57.44"E
	26°13'54.32"S; 26°34'59.69"E
	26°13'54.73"S; 26°34'59.69"E
	26°13'54.71"S; 26°34'57.44"E
20MWh BESS (03)	
Corner and Bend Coordinates of buildable area	26°13'48.76"S; 26°35'14.79"E
	26°13'48.76"S; 26°35'15.22"E
	26°13'50.79"S; 26°35'15.22"E
	26°13'50.79"S; 26°35'14.79"E
20MWh BESS (04)	
Corner and Bend Coordinates of buildable area	26°13'14.81"S; 26°35'42.59"E
	26°13'14.81"S; 26°35'43.03"E
	26°13'16.85"S; 26°35'43.04"E
	26°13'16.83"S; 26°35'42.61"E
20MWh BESS (05)	
Corner and Bend Coordinates of buildable area	26°13'14.79"S; 26°35'14.10"E
	26°13'14.80"S; 26°35'14.52"E
	26°13'16.84"S; 26°35'14.53"E
	26°13'16.83"S; 26°35'14.08"E
20MWh BESS (06)	
Corner and Bend Coordinates of buildable area	26°12'53.24"S; 26°35'43.25"E
	26°12'53.25"S; 26°35'43.69"E
	26°12'55.28"S; 26°35'43.70"E
	26°12'55.29"S; 26°35'43.24"E

- **Laydown area –**

Table 8: Laydown area Coordinates

Description	Coordinates
Corners of buildable area	26°12'24.34"S; 26°35'46.52"E
	26°12'30.35"S; 26°35'36.80"E
	26°12'30.36"S; 26°35'50.02"E

- **Office and Workshop area –**

Table 9: Office and Workshop area Coordinates

Description	Coordinates
Corners of buildable area	26°12'47.35"S; 26°35'59.74"E
	26°12'49.21"S; 26°36'0.82"E
	26°12'49.82"S; 26°35'59.51"E
	26°12'47.97"S; 26°35'58.44"E

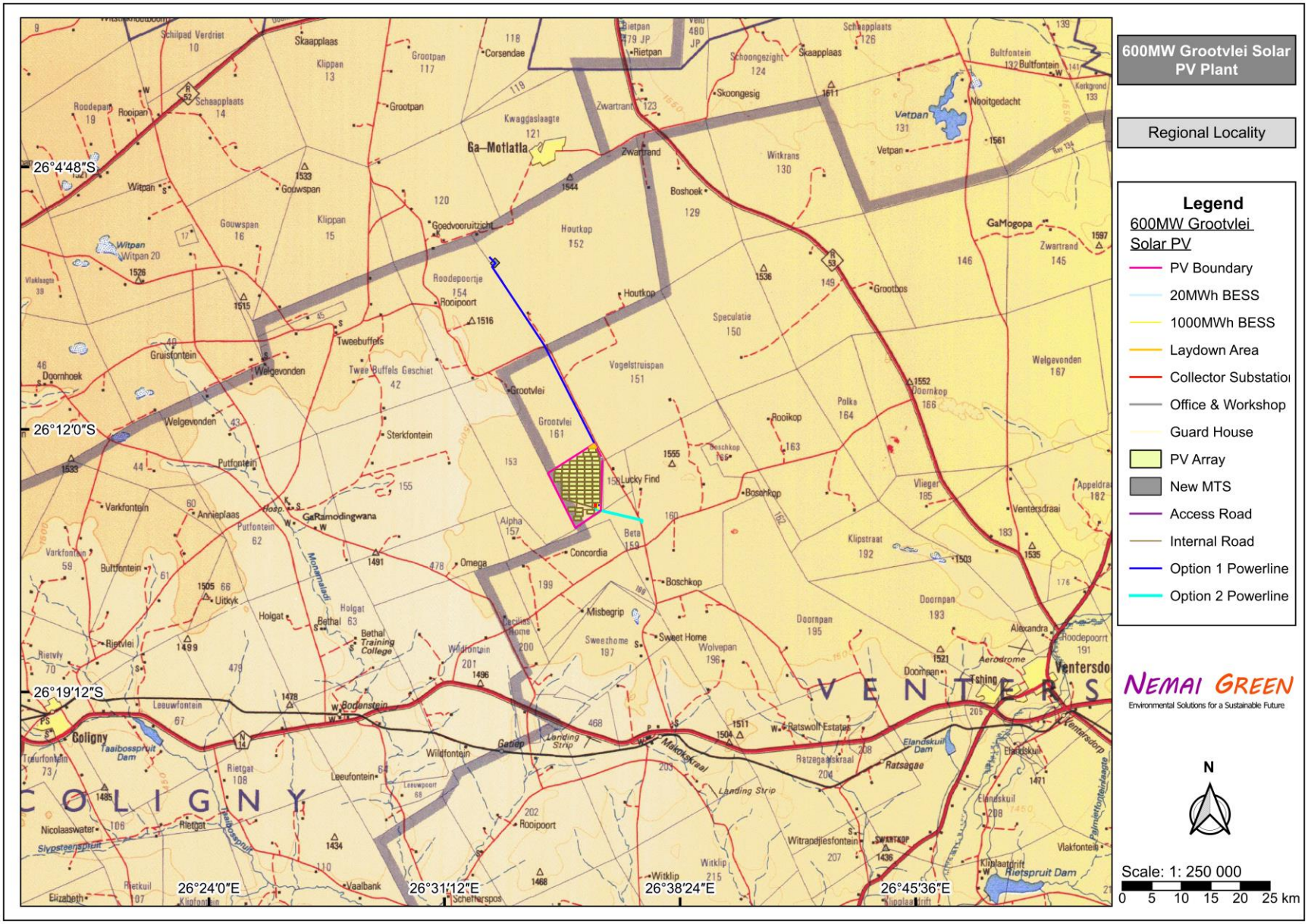

Figure 2: **Regional locality map.**

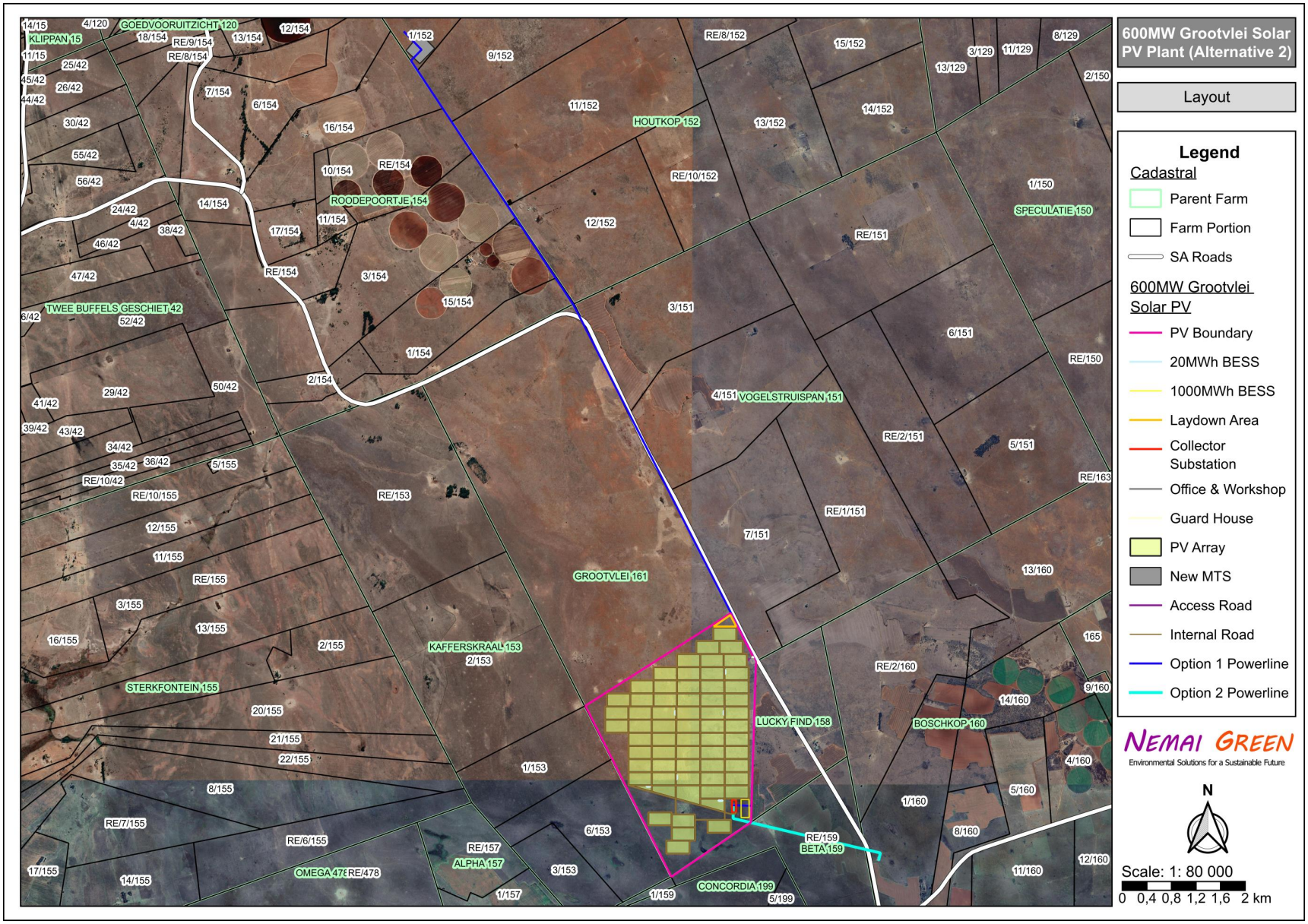

Figure 3: Locality/Layout Map.

5 LEGISLATION AND GUIDELINES CONSIDERED

5.1 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.

5.2 Legislation

5.2.1 Environmental Statutory Framework

The legislation that has possible bearing on the proposed Project from an environmental perspective is captured in **Table 10** 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 10: 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.

<table>
<tr><th>Legislation</th><th colspan="2">Description and Relevance</th></tr>
<tr><td>National Environmental Management Act (Act No. 107 of 1998)</td><td colspan="2">▪ 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.
▪ Authorisation type – Environmental Authorisation.
▪ Authorities – DFFE (national) (competent authority for this application) and the North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT) (provincial).</td></tr>
<tr><td>EIA Regulations</td><td colspan="2">▪ 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.</td></tr>
<tr><td rowspan="3">GN No. R. 983 of 4 December 2014 (as amended) (Listing Notice 1)</td><td colspan="2">▪ 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 the EIA Regulations. However, according to Regulation 15(3) of the EIA Regulations, Scoping and Environmental Impact Reporting (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.
▪ The following activities under Listing Notice 1 are relevant to this Project:</td></tr>
<tr><td>GN No. R. 983 – Activity 11(i)
The development of facilities or infrastructure for the transmission and distribution of electricity—
<u>(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or</u>
(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.</td><td>The capacity of the proposed Loop-in-Line power lines will be more than 33 but less than 275 kilovolts, outside an urban area. Electricity will be evacuated from the project via two powerline options (Powerline Option 1 and Option 2) which will have a capacity of 132kV.

The project will further require the construction and operation of a new 33kV facility substation and a new 400/132kV Main Transmission Substation.</td></tr>
<tr><td>GN No. R.983 – Activity 24(ii):

The development of a road -
(i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or
<u>(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;</u>
<u>but excluding a road -</u>
(a) which is identified and included in activity 27 in Listing Notice 2 of 2014;
(b) where the entire road falls within an urban area; or
(c) which is 1 kilometre or shorter.</td><td>New roads will be required for the Projects (construction and operational phases).

▪ The internal roads will be up to 6m wide.
▪ The access road from the unnamed gravel road of the N14 and/or the R53 will be up to 8m wide.</td></tr>
</table>

Legislation	Description and Relevance	
	GN No. R.983 – Activity 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, outside of an urban area.*
	GN No. R.983 – Activity 56(i) & (ii) *The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre—* *(i) where the existing reserve is wider than 13,5 meters; or* *(ii) where no reserve exists, where the existing road is wider than 8 metres;* *excluding where widening or lengthening occur inside urban areas.*	*The existing access road/access point for would need to be widened by more than 6m to accommodate heavy vehicle turning.*
GN No. R. 984 of 4 December 2014 (as amended) (Listing Notice 2)	▪ 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 S&EIR process, as prescribed in regulations 21 to 24 of the EIA Regulations. ▪ The following activities under Listing Notice 2 are relevant to this Project:	
	GN No. R.984 – Activity 1: *The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs -* *(a) within an urban area; or* *(b) on existing infrastructure.*	*The proposed Project involves the development of a 600MW Solar facility.*
	GN No. R.984 – Activity 4: *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 more than 500 cubic metres.*	*Installation of BESS (lithium ion technology).*
	GN No. R.984 – Activity 9: *The development of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex 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*	*Option 1 powerline connection will be transmitted through 2 x 132kV powerlines, approximately 14km kilometres (km) in length, from the new facility 33kV substation to new 400/132kV Main Transmission Substation (MTS) to Loop In-Loop Out (LILO) of the Pluto – Watershed 275kV power line.*

Legislation	Description and Relevance	
	(d) will be removed within 18 months of the commencement of development.	
	GN No. R.984 – Activity 15: *The clearance of an area of 20 hectares or more of indigenous vegetation, excluding 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.*	*Cumulative area to be cleared for entire Project (excluding linear components) will exceed 20 hectares.*
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 the EIA Regulations. However, according to Regulation 15(3) of the EIA Regulations, 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. ▪ The following activities under Listing Notice 3 are relevant to this Project:	
	GN No. R.985 – Activity 4 - (h)(iv): *The development of a road wider than 4 metres with a reserve less than 13,5 metres.* *h. North West* *i. A protected area including municipal or provincial nature reserves as contemplated by NEMPAA or other legislation;* *ii. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *iii. Sites or areas identified in terms of an international convention;* *iv. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority;* *v. Core areas in biosphere reserves;* *vi. Areas within 5 kilometres from protected areas identified in terms of NEMPAA or from a biosphere reserve;* *vii. Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; or* *viii. All Heritage Sites proclaimed in terms of National Heritage Resources Act, 1999 (Act No. 25 of 1999).*	*New roads will be required for the Projects (construction and operational phases).* ▪ *The internal roads will be up to 6m wide.* ▪ *The access road from the unnamed gravel road of the N14 and/or the R53 will be up to 8m wide.* *The project site is located within a Critical Biodiversity Area (CBA) 2 and ESA 1 in terms of the North West Biodiversity Plan.*
	GN No. R.985 – Activity 12 - (h)(iv) & (vi) *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.* *h. North West* *i. World Heritage Sites; core of biosphere reserve; or sites or areas identified in terms of an international convention;* *ii A protected area including municipal or provincial nature reserves as contemplated by NEMPAA or other legislation;* *iii. All Heritage Sites proclaimed in terms of National Heritage Resources Act, 1999 (Act No. 25 of 1999);*	*Clearance of areas of indigenous vegetation as part of the development footprint within the following sensitive areas:* ▪ *CBA2.* ▪ *Within 100 metres from the edge of a wetland.*

Legislation	Description and Relevance	
	iv. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority; *v. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; or* *vi. Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.*	
	GN No. R.985 – Activity 18(h)(v) *The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.* *h. North West* *i. A protected area including municipal or provincial nature reserves as contemplated by NEMPAA or other legislation;* *ii. Areas within 5 kilometres from protected areas identified in terms of NEMPAA or from a biosphere reserve;* *iii. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *iv. Sites or areas identified in terms of an international convention;* *v. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority;* *vi. Core areas in biosphere reserves;* *vii. Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose;* *viii. All Heritage Sites proclaimed in terms of National Heritage Resources Act, 1999 (Act No. 25 of 1999); or* *ix. Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.*	*The existing access road/access point for would need to be widened by more than 6m to accommodate heavy vehicle turning within the following sensitive areas:* ▪ *CBA2.*
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. ▪ Authorisation type – General Authorisation / Water Use Licence (*required for the Project)* ▪ Authority – Department of Water and Sanitation (DWS).	
National Environmental Management: Waste Act (Act No. 59 of 2008)	▪ Management of waste. ▪ Key sections (amongst others): o Section 16 – General duty in respect of waste management. o Chapter 5 – licensing of waste management activities listed in GN No. R. 921 of 29 November 2013 (as amended). ▪ Authorisation type – Waste Management Licence (*not required for the Project*). ▪ Authority – DFFE (national) and (DEDECT) (provincial).	
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 (*not required for the Project*). ▪ Authority – DFFE (national), (DEDECT) (provincial) and municipality.	
National Environmental Management: Biodiversity	▪ Management and conservation of the country's biodiversity. ▪ Protection of species and ecosystems.	

Legislation	Description and Relevance
Act, 2004 (Act No. 10 of 2004)	▪ Authorisation type – Permit (*not required for the Project*). ▪ Authority – DFFE (national) and DEDECT (provincial).
National Forests Act (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. ▪ Authorisation type – Licence (*not required for the Project*). ▪ Authority – DFFE.
National Environmental Management: Protected Areas Act (Act No. 57 of 2003)	▪ Protection and conservation of ecologically viable areas representative of SA's biological diversity and natural landscapes. ▪ No protected areas are directly affected by the Project.
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 (*Section 53 Consent is required for the Project*). ▪ Authorisation type – Mining Permit / Mining Right (*not required for the Project*). ▪ Authority – Department of Mineral Resources and Energy (DMRE).
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 (*not required for the Project*). ▪ Authority – South African Heritage Resources Agency (SAHRA) and North West Heritage Resources Agency.
Conservation of Agricultural Resources Act (Act No. 43 of 1983)	▪ Control measures for erosion. ▪ Control measures for alien and invasive plant species. ▪ Authority – North West Department of Agriculture and Rural Development (DARD).
North West Province Nature Conservation Ordinance 8 of 1969	▪ Provides for the listing of certain protected plant species.
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.

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

5.2.2 National Environmental Management Act

NEMA is the framework legislation regulating the environment in SA. According to Section 2(3) of NEMA, "*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, 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, 2 and 3, and thus needs to be subjected to a Scoping and Environmental Impact Reporting (S&EIR) process. The listed activities are explained within the context of the Project in **Table 10** above and **Table 11** below.

Table 11: Listed activities Triggered by the Project

Project Components	Relevant Listed Activities	Description of relevance
Solar PV Plant	***GN No. R.983 (as amended)***	
	Activity no. 28(ii)	Footprint of proposed Solar PV Plant on land that was previously used for agricultural purposes, outside of an urban area.
	GN No. R.984 (as amended)	
	Activity no. 1	The planned generation capacity of the proposed Solar PV Plant is 600 MW.
	Activity no. 15	The cumulative area to be cleared for entire Project (excluding linear components) will exceed 20 hectares.
	GN No. R.985 (as amended)	
	Activity no. 12 - (h)(iv) & (vi)	Clearance of indigenous vegetation as part of the development footprint within an area classified as a CBA2 and within 100m from the edge of a wetland.
Power Line, BESS & Facility Substations	***GN No. R.983 (as amended)***	
	Activity no. 11(i)	The capacity of the proposed Loop-in-Line power lines will be more than 33 but less than 275 kilovolts, outside an urban area. Electricity will be evacuated from the project via two powerline options (Powerline Option 1 and Option 2) which will have a capacity of 132kV. The project will further require the construction and operation of a new 33kV facility substation and a new 400/132kV Main Transmission Substation.
	GN No. R.984 (as amended)	
	Activity no. 4	Installation of BESS (lithium ion technology).
	Activity no. 9	Option 1 powerline connection will be transmitted through 2 x 132kV powerlines, approximately 14km kilometres (km) in length, from the new facility 33kV substation to new 400/132kV Main Transmission Substation (MTS) to Loop In-Loop Out (LILO) of the Pluto – Watershed 275kV power line.
	GN No. R.985 (as amended)	
	Activity no. 12 - (h)(iv) & (vi)	Clearance of indigenous vegetation as part of the development footprint within an area classified as a CBA2 and within 100m from the edge of a wetland.

Project Components	Relevant Listed Activities	Description of relevance
Roads	***GN No. R.983 (as amended)***	
	Activity no. 24(ii)	New roads required for the Project (construction and operational phases). Internal roads within the PV sites will be 6m wide. The access road from the unnamed gravel road of the N14 and/or the R53 will be up to 8m wide.
	Activity 56 (i)& (ii)	The existing access road/access point for would need to be widened by more than 6m to accommodate heavy vehicle turning.
	GN No. R.985 (as amended)	
	Activity no. 4 - (h)(iv)	New roads will be required for the Project (construction and operational phases). The internal roads will be up to 6m wide. The access road from the unnamed gravel road of the N14 and/or the R53 will be up to 8m wide.
	Activity no. 12 - (h)(iv) & (vi)	Clearance of areas of indigenous vegetation as part of the development footprint within an area classified as CBA2 and within 100m from the edge of a wetland.
	Activity no. 18 – (h)(vi)	The upgrading and widening of existing access road/access point by more than 6m within an area classified as CBA2.

Note that the dimensions of the Project's proposed 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 that were submitted to the DFFE with the draft Scoping Report. A refinement of these activities will take place as the EIA process unfolds. An amended Application Form will be submitted with the Final EIA Report, which will include changes related to the refinement of the listed activities triggered by the project.

5.2.3 National Environmental Management: Waste Act

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

- 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;
- To provide for institutional arrangements and planning matters;
- To provide for specific waste management measures;
- To provide for the licensing and control of waste management activities;
- To provide for the remediation of contaminated land; and
- To provide for compliance and enforcement.

"Waste" is defined in NEM:WA as "*any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to this Act*".

Schedule 3 of the NEM:WA groups waste into two categories, namely hazardous waste and general waste. The classification of waste determines the associated management and licencing

requirements. ‘‘Hazardous waste’’ is defined as “*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 and includes hazardous substances, materials or objects within business waste, residue deposits and residue stockpiles*”.
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, as the Project will not include any listed waste management activities. 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 Environmental Management Programme (EMPr) will make 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 from the on-site office and workshop will be sent to licenced municipal waste disposal sites; and
  - Waste generated during maintenance or replacement of panels and inverters will be sent to suitable disposal sites.

5.2.4 National Water Act

The purpose of the National Water Act (Act No. 36 of 1998) (NWA) 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 entails 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.

The Applicant will seek authorisation from DWS in terms of the NWA for the above water uses associated with the Project.

5.2.5 National Environmental Management: Air Quality Act

The purpose of the National Environmental Management: Air Quality Act (Act No. 39 of 2004) (NEM:AQA) 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.

5.2.6 National Environmental Management: Biodiversity Act

The purpose of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEM:BA) 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 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.

The implications of NEM:BA for the Project *inter alia* include the requirements for managing invasive and alien species, protecting threatened ecosystems and species, as well as for rehabilitating the areas affected by the Project (outside of the development footprint).

The findings from the Freshwater Impact Assessment, Terrestrial Biodiversity Compliance Statement and Avifaunal Impact Assessment are included in **Section 12.3**, **Section 12.4**, and **Section 2.5** below, respectively.

5.2.7 National Heritage Resources Act

The purpose of the National Heritage Resources Act (Act No. 25 of 1999) (NHRA) 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 the NHRA, certain listed activities require authorisation from provincial agencies, which include the following:

- 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 Heritage Impact Assessment and Palaeontological Impact Assessment that were undertaken for the Project are included in **Section 12.7** and **Section 12.8** below, respectively.

5.3 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);
  - IRP 2010;
  - 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.

5.4 Guidelines

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

- Integrated Environmental Management Information Series, in particular Series 2 – Scoping (DEAT, 2002);
- Guideline on Alternatives, EIA Guideline and Information Document Series (DEA&DP, 2010a);
- Guideline on Need and Desirability (DEA, 2017);

- 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).

5.5 National and Regional Plans

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

- Dr Kenneth Kaunda District Municipality Integrated Development Plan (IDP) and Spatial Development Framework (SDF);
- JB MLM's Spatial Development Framework (SDF);
- JB MLM's Integrated Development Plan (IDP);
- North West Biodiversity Plan (2015) (Collins, 2016); and
- Relevant national, provincial and local policies, strategies, plans and programmes.

5.6 Renewable Energy Development Zones

A Strategic Environmental Assessment (SEA) was undertaken by the former DEA, which is now known as 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 footprint in relation to the REDZs are shown in **Figure 4** below.

As shown in **Figure 4** below, the Project is located within the Northern Corridor of the Strategic Transmission Corridors but not within any REDZs. According to GNR 114 of 16 February 2018, where an Application for Environmental Authorisation for large scale wind or solar PV 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.

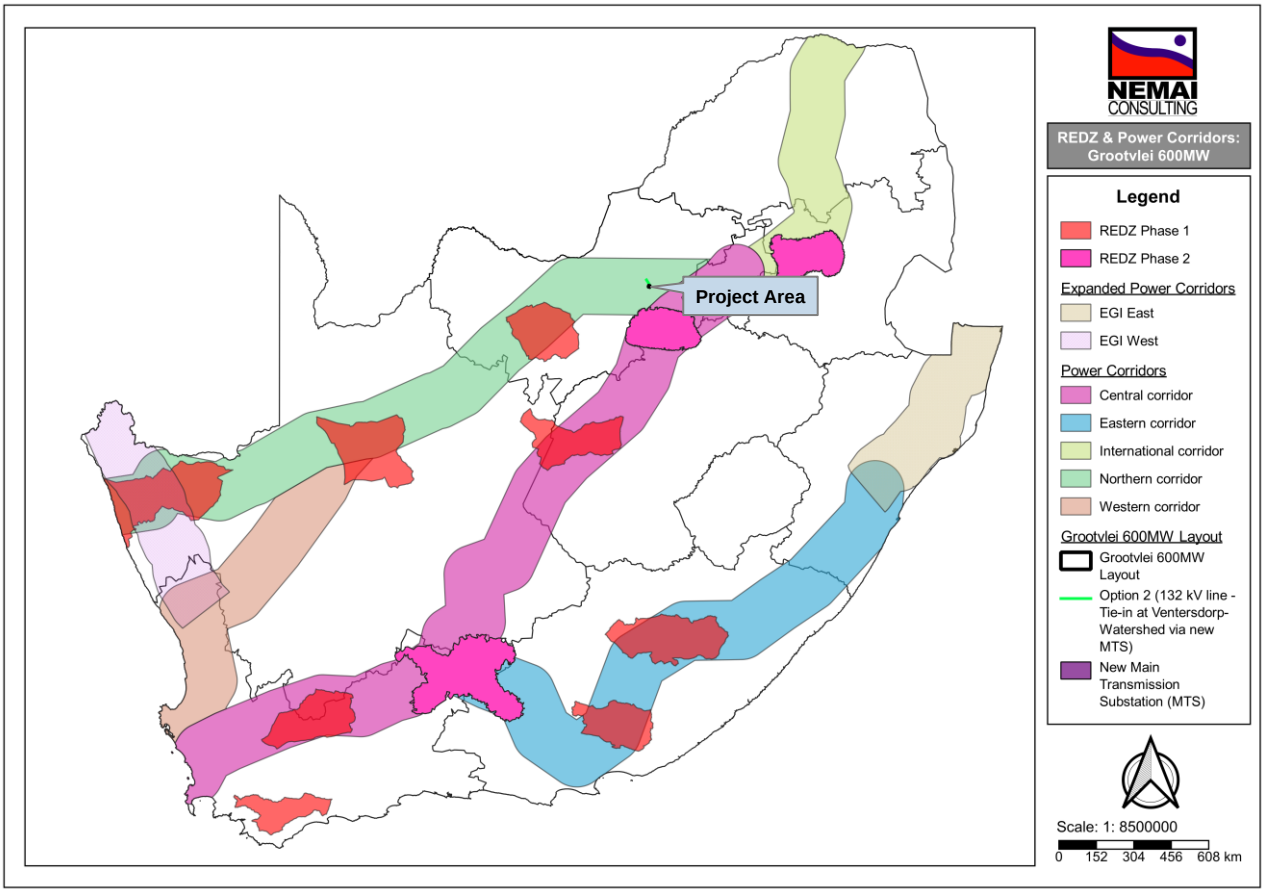

Figure 4: **The Project in relation to REDZs.**

6 SCOPING AND EIA PROCESS

6.1 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, DEDECT 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 5.2** above) will also be consulted during the course of the EIA. Refer to the database of Interested and Affected Parties (I&APs) contained in **Appendix E** for a list of the government departments.

6.2 Environmental Assessment Practitioner

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

In accordance with Appendix 2, Section 2(1)(a) of the EIA Regulations, this section provides an overview of Nemai and the company's experience with EIA's, as well as the details and experience of the EAP's that form part of the Scoping and EIA team.

Nemai is an independent, specialist environmental, social development and Occupational Health and Safety (OHS) consultancy. 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 that are involved with the S&EIR process for the Project are captured in **Table 12** below, and their respective Curricula Vitae are contained in **Appendix C**. The oath of the EAP is contained in **Appendix H**.

Table 12: Scoping and EIA Core Team Members

Name	Qualifications	Selected Experience - Renewable Energy & Bulk Power Projects
D. Henning (20 years' experience)	MSc (River Ecology) EAPASA Registered	▪ Matjhabeng 400 MW Solar PV Power Plant with 80 MW (320 MWh) Battery Energy Storage Systems, Free State Province, SA. ▪ Beaufort West 75MW Solar PV Project, Western Cape, SA. ▪ Extraction of Gas and Electric Power Production Plant in the Rubavu District, Rwanda. ▪ Impompomo Hydropower Plant, Mpumalanga, SA.

Name	Qualifications	Selected Experience - Renewable Energy & Bulk Power Projects
		▪ Hydropower Plant within Hydraulic Network at Rand Water's Zoekfontein Site, Gauteng Province, SA. ▪ uMkhomazi Water Project Phase 1 with hydropower facilities, KwaZulu-Natal, SA. ▪ Neptune-Poseidon Transmission Line, including 200km of 400 kV transmission line, Eastern Cape, SA. ▪ Makalu B (Igesi) Substation and Associated Transmission Loop-In Lines, Free State Province, SA. ▪ Anderson Dinaledi Transmission Line, including 80km of 132 kV transmission line with substations, North-West Province, SA.
D. Naidoo (25 years' experience)	BSc Eng (Chem)	▪ Bronkhorstspruit Biogas Plant, Gauteng Province, SA. ▪ Construction of the Xina Solar One Parabolic Trough Technology 100MW Solar Plant, Northern Cape Province, SA. ▪ Construction of the Biotherm Solar Photovoltaic Power Plants, Northern Cape, SA. ▪ Construction of the Roodeplaat Wind Farm, Eastern Cape, SA. ▪ North-South Strengthening Scheme, including 300km of 400 kV transmission line with substations, Mpumalanga, SA. ▪ Mookodi-Mahikeng 400 kV Transmission Line, North-West Province, SA. ▪ Watershed 275/88/132 kV Substation, North-West Province, SA.

6.3 Environmental Screening

According to GN 960 of 5 July 2019, an application for Environmental Authorisation must be accompanied by the report generated by the National Web Based Environmental Screening Tool, as contemplated in Regulation 16(1)(b)(v) of the EIA Regulations.

The aims of the National Web Based Environmental Screening Tool include the following:

- ❑ To screen a proposed site for any environmental sensitivity;
- ❑ To provide site specific EIA process and review information;
- ❑ To identify related exclusions and/or specific requirements including specialist studies applicable to the proposed site and/or development, based on the national sector classification and the environmental sensitivity of the site; and
- ❑ To allow for a Screening Report to be generated.

The respective Screening Reports for the proposed PV Site and power line were appended to the Application Form and were also included in the Scoping Report.

6.4 Environmental Assessment Triggers

The process for seeking authorisation under NEMA is undertaken in accordance with the EIA Regulations, promulgated in terms of Chapter 5 of NEMA. Based on the types of activities involved the requisite environmental assessment for the project is a S&EIR process. Refer to **Section 5** above for the Project's legal framework and specifically the activities triggered in terms of Listing Notices 1, 2 and 3 of the EIA Regulations.

6.5 S&EIR Process

6.5.1 *Formal Process*

An outline of the S&EIR process for the proposed Project is provided in **Figure 6** below. The objectives of the Scoping phase, based on the EIA Regulations, are captured in **Section 1** above.

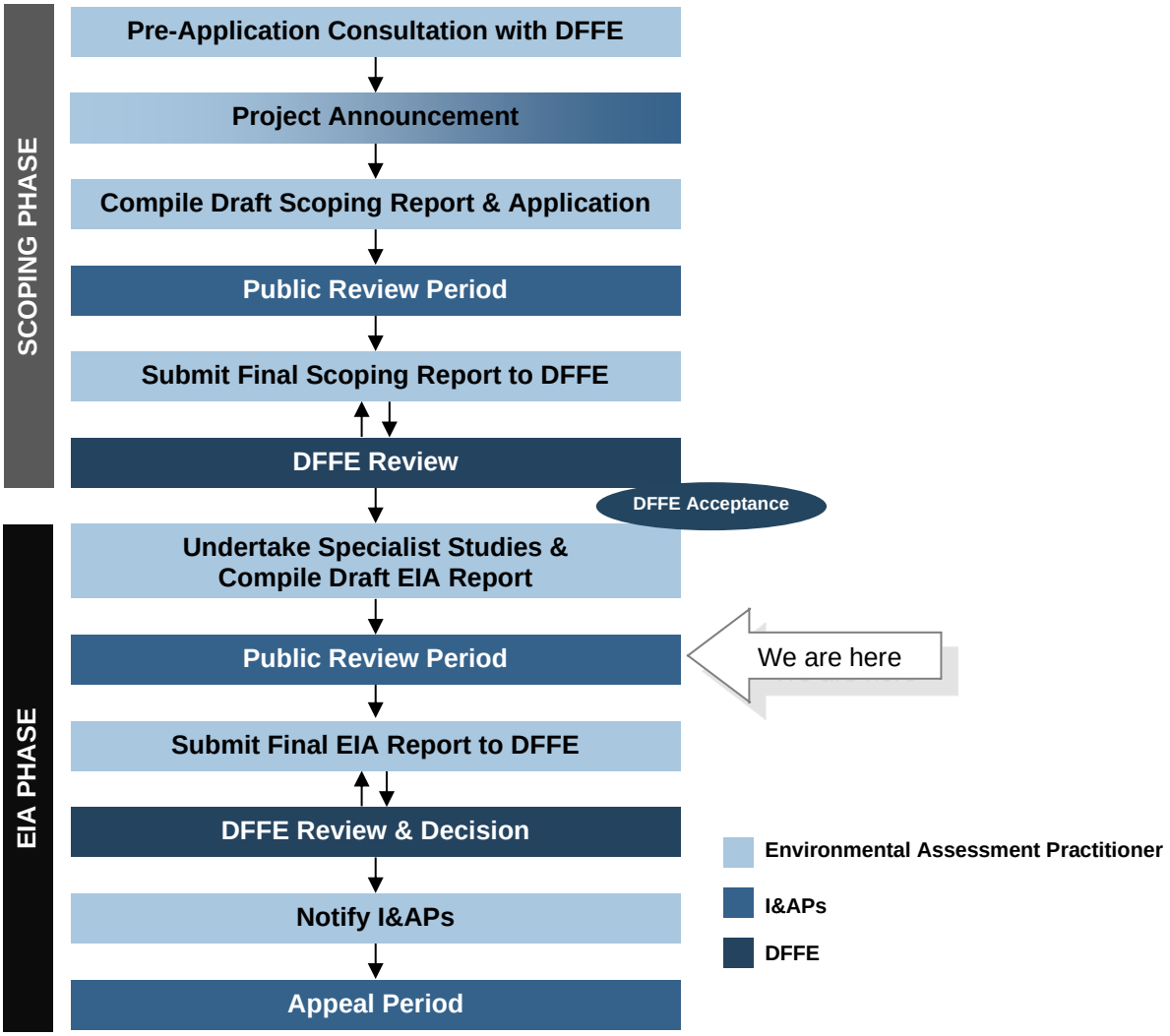

Figure 5: S&EIR process outline

6.5.2 *The EIA Process to Date*

The following key milestones have been reached to date as part of the EIA process:

- A Pre-Application Meeting was held with DFFE on November 2022;
- A draft Scoping Report, which conformed to Appendix 2 of the EIA Regulations, was compiled. This document included the following salient information (amongst others):
  - A Scoping-level impact assessment to identify potentially significant environmental issues for detailed assessment during the EIA phase;

- Screening and investigation of feasible alternatives to the project for further appraisal during the EIA phase; and
- A Plan of Study, which explained the approach to be adopted to conduct the EIA for the proposed project.

❑ The application was withdrawn from the DFFE on 14 June 2023.
❑ The Application for Environmental Authorisation and draft Scoping Report were resubmitted to DFFE on 26 June 2023;
❑ The draft Scoping Report was lodged for public review from 28 June 2023 to 28 July 2023.
❑ The final Scoping Report was submitted to DFFE on 26 July 2023;
❑ DFFE accepted the Scoping Report and Plan of Study for the EIA on 04 September 2023 (refer to **Appendix B**), which allowed the commencement of the EIA phase.
❑ The draft EIA Report will be lodged for public review from 09 October 2023 to 07 November 2023.

6.6 Alignment with the Plan of Study

The Plan of Study, which was contained in the Scoping Report and was accepted by DFFE, explained the approach to be adopted to conduct the EIA for the proposed Project. The manner in which the EIA Report addresses the requirements of the Plan of Study is shown in **Table 13** below.

Table 13: Alignment of EIA Report with Plan of Study

No.	Plan of Study Requirement	Reference to Section in EIA Report
1.	Assess potentially significant environmental issues identified during Scoping through: 1. Applying an appropriate impact assessment methodology. 2. Conducting specialist studies. 3. Identifying suitable mitigation measures.	• **Section 12** • **Section 13**
2.	Assessment of feasible alternatives.	• **Section 14**
3.	Specialist studies to be completed in accordance with Terms of Reference.	• **Section 12** • **Appendix D**
4.	Public participation to include the following: • Update the database of I&APs. • Allow for the review of the draft EIA Report. • Convene a public meeting. • Compile and maintain a Comments and Responses Report (CRR). • Notification of DFFE's decision.	• **Section 15**
5.	EIA Report to satisfy the minimum requirements stipulated in Appendix 3 of the EIA Regulations.	• **Section 2**
6.	Authority Consultation.	• **Section 15**

6.7 Addressing DFFE's Requirements

6.7.1 Acceptance of Scoping Report

The manner in which DFFE's specific requirements, as listed in the letter dated 04 September 2023 from this Department for the acceptance of the Scoping Report (refer to Appendix B), have been attended to are described in **Table 14** below.

Table 14: DFFE's Specific Requirements – Acceptance of the Scoping Report

DFFE's Requirements	Response/Status
(a) Specific Comments	
(i) The co-ordinates in the EIAr must be specific to each activity and infrastructure that is proposed on site. The co-ordinates for each corner of the solar fields, the substation and all associated infrastructure must be included in the EIAr, i.e., we require that you provide us with the specific development footprints for each development parameter, and not an area outlining the entire site.	Refer to **Table 3** to **Table 8** under **Section 4.2.**
(ii) Please provide a concise, but complete, summary and bullet list of the project description and associated infrastructure {or project scope) to be included in the decision {or as it should appear in the decision), should a positive Environmental Authorisation be granted. This must include a list of all development components and associated infrastructure.	Refer to **Section E** under the Executive Summary and **Section 9.4.3**.
(iii) Kindly ensure the development footprints (hectares/square metres) and specifications of all proposed infrastructure and associated infrastructure during all phases are included in the EIAr.	Refer to **Section 9.4** (Project Overview) and **Table 16** (Technical details of the proposed solar plant).
(b) Listed Activities	
(i) The EIAr must provide an assessment of the impacts and mitigation measures for each of the listed activities applied for.	Refer to **Section 13** below for the assessment of the listed activities and the identified mitigation measures.
(ii) The listed activities represented in the EIAr and the application form must be the same and correct.	As a conservative approach, all possible activities that could possibly be triggered by the Project were included in the Application Form that were submitted to the DFFE with the draft Scoping Report. A refinement of these activities will take place as the EIA process unfolds. An amended Application Form will be submitted with the Final EIA Report, which will include changes related to the refinement of the listed activities triggered by the project.
(iii) The EIAr must include and assess the correct sub listed activity for each listed and specified activity applied for	Refer to **Table 10** and **Table 11** above for the sub-listed activity for each listed activity triggered by the Project. Refer to **Section 13** below for the assessment of the listed activities and the identified mitigation measures.
(c) Public Participation	
(i) Please ensure the language used to inform potential I&APs in the newspaper advertisement is not only communicated in the language English but should also utilise other dominant languages spoken in the study area. The EAP must ensure that the newspaper medium adequately caters for all potential I&APs in the study area. This should also apply to any site notification boards as well.	The notification of the project and the availability of the draft Scoping Report was provided in the languages of English and Afrikaans.
(ii) Please ensure that comments from all relevant stakeholders are submitted to the Department with the EIAr. This includes but is not limited to the NW DEDEC&T, the JB Marks Local Municipality, the Department of Water and Sanitation (DWS), the provincial Department	Copies of the draft EIA Report were provided to the key regulatory and commentary authorities listed in **Section 15** below. Comments received on the draft EIA Report will be appended to the final EIA Report, which will be submitted

DFFE's Requirements	Response/Status
of Agriculture, the South African Heritage Resources Agency (SAHRA), the Endangered Wildlife Trust (EWT), BirdLife SA, the Department of Mineral Resources, the Department of Rural Development and Land Reform, the Department of Forestry, Fisheries and the Environment: Directorate Biodiversity and Conservation, and the Directorate Protected Areas.	to DFFE. These comments will also be incorporated into the CRR.
(iii) Please ensure that all issues raised and comments received during the circulation of the draft SR and draft EIAr from registered I&APs and organs of state which have jurisdiction in respect of the proposed activity are adequately addressed in the final EIAr.	The CRR contained in **Appendix F** includes comments received during the Scoping phase. The CRR will be updated with comments received during the review of the draft EIA Report.
(iv) Proof of correspondence with the various stakeholders must be included in the final EIAr. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments.	Proof of correspondence with various stakeholders will be included in the final EIAr.
(v) A Comments and Response trail report (C&R) must be submitted with the final EIAR. The C&R report must incorporate all comments for this development. The C&R report must be a separate document from the main report and the format must be in the table format as indicated in Appendix 1 of this comments letter in chronological order. Please refrain from summarising comments made by I&APs. All comments from I&APs must be copied verbatim and responded to clearly. Please note that a response such as "noted" is not regarded as an adequate response to I&AP's comments.	The CRR is contained in **Appendix F**.
(vi) Comments from I&APs must not be split and arranged into categories. Comments from each submission must be responded to individually.	The CRR, which is contained in **Appendix F**, does not categorise the comments received.
(vii) The Public Participation Process must be conducted in terms of Regulation 39, 40, 41, 42, 43 & 44 of the EIA Regulations, 2014, as amended	The approach to Public Participation during the EIA phase is explained in **Section 15** below.
(d) Layout & Sensitivity Maps	
(i) The EIAr must provide coordinate points for the proposed development site and all proposed infrastructure (note that if the site has numerous bend points, at each bend point coordinates must be provided) as well as the start, middle and end point of all linear activities.	Refer to **Section 4.2** and **Table 3** to **Table 8.**
(ii) The EIAr must provide a copy of the final preferred layout map. All available biodiversity information must be used in the finalisation of the layout map. Existing infrastructure must be used as far as possible e.g., roads. The layout map must indicate the following: a) A clear indication of the envisioned area for the proposed solar energy facility; b) Position of the solar panels; c) Powerlines; d) Internal roads; e) All supporting onsite infrastructure such as laydown area, guard house and control room etc; f) Substations, transformers, switching stations and inverters; g) Battery Energy Storage System; h) Connecting routes (including pylon positions) to the distribution/transmission network; i) All existing infrastructure on the site, especially railway lines and roads; and j) Buildings, including accommodation.	Based on the findings of the specialist studies the layout of the PV project was revised to cater for environmental sensitivity (refer to **Section 12** below). The combined sensitivity maps for the project are presented in **Section 16** and **Appendix A.** The preferred layout alternative (Layout Alternative 2) is shown in **Figure 12** and **Appendix A**.
(iii) Please provide an environmental sensitivity map which indicates the following:	Sensitivity maps, based on the findings of the specialist studies, are presented in **Section 12** below. The combined sensitivity maps are presented in **Section 16** below.

DFFE's Requirements	Response/Status
a) The location of sensitive environmental features identified on site, e.g. CBAs, protected areas, heritage sites, wetlands, drainage lines etc. that will be affected by the facility and its associated infrastructure; b) Buffer areas; and c) All "no-go" areas.	
(iv) The above layout map must be superimposed (overlain) with the sensitivity map and a cumulative map which shows neighbouring and existing infrastructure.	
(v) Google maps will not be accepted.	
(e) Specialist assessments	
(i) The EAP must ensure that the terms of reference for all the identified specialist studies must include the following: a) A detailed description of the study's methodology; indication of the locations and descriptions of the development footprint, and all other associated infrastructures that they have assessed and are recommending for authorisation. b) Provide a detailed description of all limitations to the studies. All specialist studies must be conducted in the right season and providing that as a limitation will not be allowed. c) Please note that the Department considers a 'no-go' area, as an area where no development of any infrastructure is allowed; therefore, no development of associated infrastructure including access roads is allowed in the `no-go' areas. d) Should the specialist definition of 'no-go' area differ from the Departments definition; this must be clearly indicated. The specialist must also indicate the 'no-go' area's buffer if applicable. e) Bird specialist studies must have support from Birdlife South Africa. f) All specialist studies must be final, and provide detailed/practical mitigation measures for the preferred alternative and recommendations, and must not recommend further studies to be completed post EA. g) Should a specialist recommend specific mitigation measures, these must be clearly indicated.	Provision was made in the terms of reference for the specialist studies to cater for these requirements.
(ii) Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons; and were necessary, include further expertise advice.	The specialists did not provide contradicting recommendations.
(iii) It is further brought to your attention that Procedures for the Assessment and Minimum Criteria for Reporting in identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation, which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020 (i.e. protocols for terrestrial plant and animal species), have come into effect. Please note that specialist assessments must be conducted in accordance with these protocols.	When specialists are appointed, their terms of reference include that they needed to be compliant with protocols which is how they have undertaken the assessment.
(iv) Please also ensure that the EIAr includes the Site Verification Report and Compliance Statements (where applicable) as required by the relevant themes.	The verification of site sensitivity, based on the Screening Tool, was undertaken by the relevant specialists. Refer to **Section 12** below for the findings from the specialists in this regard.
(v) Please note further that the protocols, if applicable, require certain specialists' to be SACNASP registered. Please ensure that the relevant specialist certificates are attached to the relevant reports.	All assessments have been undertaken by suitably registered SACNASP registered scientists.

DFFE's Requirements	Response/Status
(vi) As such, the Specialist Declaration of Interest forms must also indicate the scientific organisation registration/member number and status of registration/membership for each specialist.	Specialist Declaration of Interest Forms indicate the required information.
(vii) The following Specialist Assessments will form part of the EIAr: Aquatic Impact Assessment & Delineation Terrestrial Ecological Impact Assessment; Avifaunal Impact Assessment; Heritage Impact Assessment; Desktop Palaeontological Impact Assessment. Agricultural Impact Assessment; Visual Impact Assessment; and Social Impact Assessment.	Refer to the findings from these specialist studies contained in **Section 12** and **Section 13** below.
(viii) Please ensure that each specialist study has the correct and same project description and layout to assess.	Each specialist was provided with the correct and same project description and layout to assess.
(ix) Please include a table that shows the proposed studies and the relevant specialists carrying out the study. In addition, a summary should be included of the specialist's recommendations in terms of the alternatives that are preferred based on the findings of their study.	Refer to **Section 12** for a summary of each specialist study. This section also include the details of each specialist and recommendations made by the respective specialists including recommendations regarding the preferred alternative.
(f) Cumulative Assessment	
(i) If there other similar facilities proposed within a 30km radius of the proposed development site, a cumulative impact assessment must be conducted for all identified and assessed impacts which must be refined to indicate the following: a) Identified cumulative impacts must be clearly defined, and where possible the size of the identified impact must be quantified and indicated, i.e. hectares of cumulatively transformed land. b) Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project. c) The cumulative impacts significance rating must also inform the need and desirability of the proposed development. d) A cumulative impact environmental statement on whether the proposed development must proceed.	Refer to **Section 13.27**.
(g) General	
(i) The EIAr must provide the technical details for the proposed facility in a table format as well as their description and/or dimensions (Annexure 2).	Refer to **Section 9.4.1** and **Table 16.**
(ii) The EAP must provide landowner consent for all non-linear infrastructure proposed on the farm portions affected by the proposed project.	Landowner consent is attached to the Application Form that were submitted together with the draft Scoping Report. Landowner consent will also be attached to the updated Application Form that will be submitted with the Final EIA Report.
(iii) A construction and operational phase EMPr that includes mitigation and monitoring measures must be submitted with the final EIAr.	Refer to **Appendix G.**
(iv) The final EIAr must include a list providing a clear description of the infrastructure associated with the development.	Refer to **Section 9.4.3.**
(v) The EAP must provide an outline of where in the final EIAr each of this Department's comments are addressed. This must be a separate document and must submitted as an appendix to the EIAr.	A separate document will be provided in the final EIAr.

6.8 Other Applications in 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.

According to the REEA Database (REEA Quarter 2 of 2023), the following renewable energy applications has been made for properties that are located within a 30km radius of the PV Site (refer to **Figure 6** below):

- The proposed development of Biochemical refinery plant, a 130MW PV solar plant and associated infrastructure JB Marks local municipality, Dr Kenneth Kaunda District, North West Province (Application Ref No.: 14/12/16/3/3/2/2184), (status: Approved); and
- Proposed Establishment of a Photovoltaic (PV) Installation at the Bloemfontein Airport, Free State Province (Application Ref No.: 12/12/20/2149/A3), (status: Approved). Note that although this project is located according to the REEA Database within a 30km radius of the proposed PV project, the project may have been incorrectly captured in the database as it relates to a project that is located in Bloemfontein, Free State Province.

Potential cumulative impacts associated with the Project and these other renewable energy applications are discussed in **Section 13.27** below.

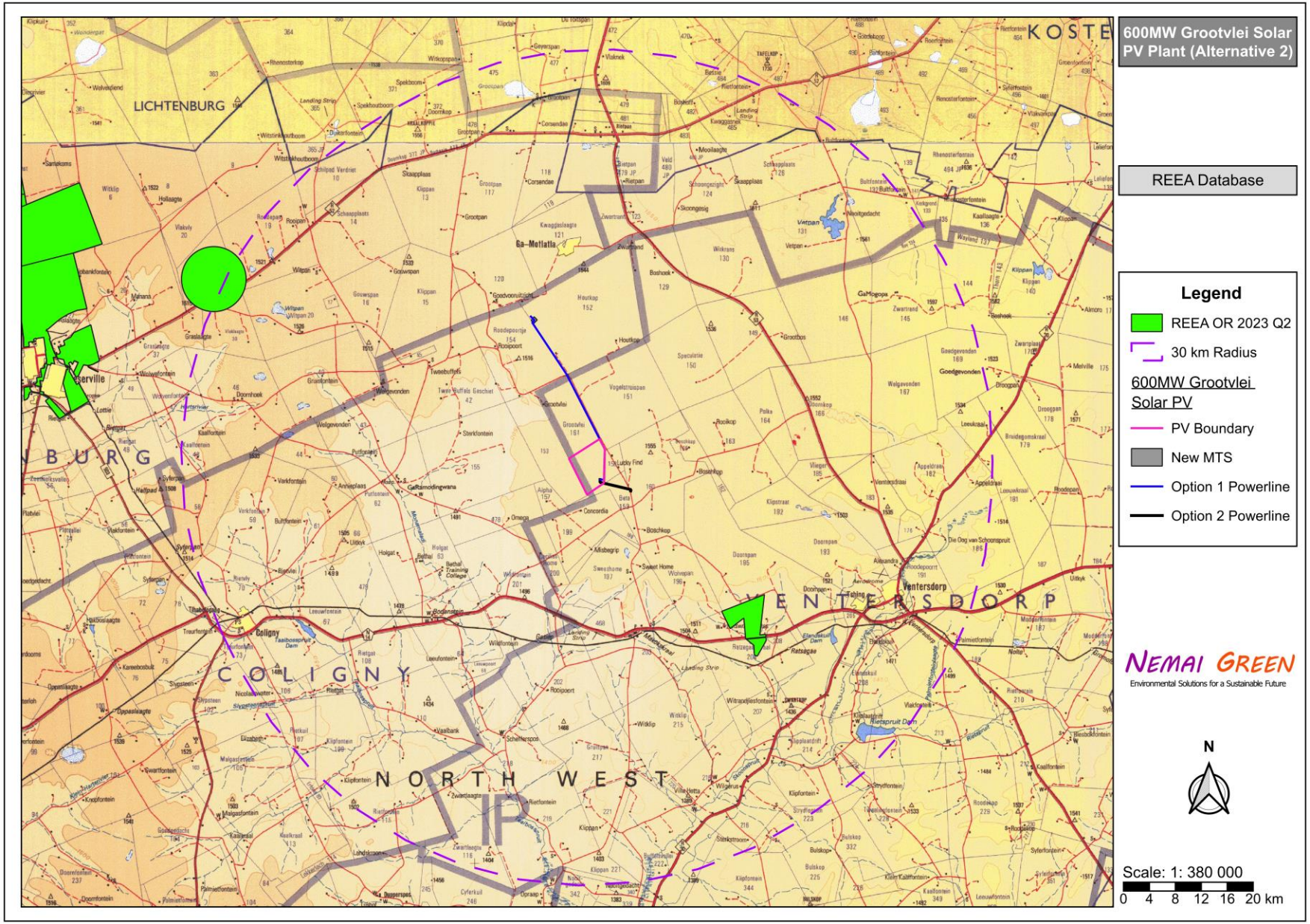

Figure 6: **Renewable energy applications in relation to the Project (within a 30km radius)**

7 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations accompany the EIA 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 limitations were noted as part of the Specialist Studies:
  - Freshwater Impact Assessment (Van Rooyen, 2023) –
    - This report is based on the information and layout received from the proponent;
    - The findings, observations, conclusions and recommendations are based on the author's best professional and scientific knowledge;
    - Wetland just outside the study area has been delineated based on visual observation of wetland vegetation indicators as well as latest Google Earth Satellite Imagery. Therefore, the portions of the wetland outside the PV site should be delineated for the purposes of the WUL application; and
    - The assessment of wetlands presented in this report is limited to the proposed project footprint and does not include the extended 500m radius regulated area of the 600MW Grootvlei Solar PV Plant. This report is therefore not sufficient for use in a WUL application.
  - Terrestrial Biodiversity Compliance Statement (Human, 2023) –
    - The assessment area was based on the area provided by the client and any alterations to the route and/or missing GIS information pertaining to the assessment area would have affected the area surveyed;
    - The area was only surveyed during a single season and therefore, this assessment does not consider temporal trends;
    - Only a single season survey will be conducted for the respective studies, this would constitute a wet season survey with its limitations;
    - Some winter flowering plants could have been missed due to the wet season survey timing;
    - It must be noted that during the survey, only a fraction of the expected geophytes was visible due to their variable emergence patterns; and
    - Whilst every effort is made to cover as much of the project area as possible, representative sampling is completed and by its nature, it is possible that some plant and animal species that are present across the project area were not recorded during the field investigations.
  - Avifauna Impact Assessment (Kemp, 2023) –

- The Project Area of Influence (PAOI) was based on the project footprint area as provided by the client. Any alterations to the area and/or missing Geographic Information Systems (GIS) information pertaining to the assessment area would have affected the area surveyed and hence the results of this assessment;
- Only one site visit was conducted but supplemented by another project ~ 15 southeast of the proposed development for this regime 2 assessment. The field investigation was conducted in Autumn, over 4 days from the 21st to the 24th of April 2023. This one site visit, in addition to supplementary reports and data, is considered sufficient from a seasonal perspective, and no additional season assessment is required;
- Whilst every effort was made to cover as much of the PAOI as possible, it is possible that some species that are present within the PAOI were not recorded during the field investigations due to their secretive behaviour; and
- The GPS used in the assessment has an accuracy of 5 m and consequently, any spatial features delineated may be offset by up to 5 m.

- Heritage Impact Assessment (Kitto, 2023) –
  - This assessment assumes that all the information provided by the Client and the Environmental Assessment Practitioner (EAP) regarding the project footprint (Including the powerline) is correct and current;
  - The project area traverses various properties separated by fences, and access was sometimes restricted by locked gates or extremely long and dense grass and other vegetation in some areas.
  - The large area of the project footprint meant that it was not feasible to undertake a pedestrian survey of the whole area and the fieldwork therefore, comprised a combination of vehicle and pedestrian investigation. The extremely dense and long vegetation in several areas meant that archaeological and heritage visibility was low in those areas. Therefore, there is a possibility that some heritage resources were not identified, specifically, informal graves or burial sites.
- Palaeontological Impact Assessment (Butler, 2023) –
  - 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 not been reviewed by palaeontologists and data is generally based on aerial photographs. 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 used to provide information on the existence of fossils in an area which was not yet been documented. When similar Assemblage Zones and geological formations for Desktop studies is used it is generally assumed that exposed fossil heritage is present within the footprint.
- Visual Impact Assessment (Buys, 2023) –
  - Determining the value, quality and significance of a visual resource or the significance of the visual impact that any activity may have on it, in absolute terms, is not achievable. Visual perception is by nature a subjective experience, as it is influenced largely by

personal opinions and world views. For instance, what one viewer may experience as an intrusion in the landscape, another may regard as positive. Such differences in perception are greatly influenced by culture, education, and socio-economic background. A degree of subjectivity is therefore bound to influence the rating of visual impacts. It is therefore impossible to conduct a visual assessment without relying to some extent on the opinion of an experienced consultant, which is inherently subjective. The subjective opinion of the visual consultant is however unlikely to materially influence the findings and recommendations of this study, as a wide body of scientific knowledge exists in the industry of VIA, on which findings are based;

- A once-off field survey was sufficient to characterise the baseline visual characteristics of the site;
- The primary objective of this study was to assess the visual environment;
- The fieldwork relevant to this study was a once-off assessment that was conducted;
- A preliminary layout was available. Detailed dimensions, such as the vertical offset of proposed surface infrastructure above ground level, were however not available and were assigned based on experience from similar infrastructure in previous projects;
- All viewsheds were based on terrain level. As such these viewsheds do not incorporate distractive views in the form of vegetation or land use (infrastructure, buildings, etc.);
- This study did not include an illumination or social assessment; and
- The assessment of impacts and recommendation of mitigation measures was informed by the site-specific aspects identified and based on the assessor's working knowledge and experience with similar activities.

- Social Impact Assessment (Tanhuke, 2023) –
  - The information obtained during the public participation phase provides a comprehensive account for the community structure and community concerns for the project;
  - The study was done with the information and the time frames available to the specialist at the time of executing the study. The specialist took an evidence-based approach in the compilation of this report and did not intentionally exclude information which is relevant to the assessment; and
  - No relocation of families will take place for this project.

8 NEED AND DESIRABILITY

This section serves to expand on the motivation for the proposed Project that is provided in **Section 3** above. The format contained in the Guideline on Need and Desirability (DEA, 2017) was used in **Table 15** below.

Table 15: Need for and desirability of the proposed Project

Question No.	Response
1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area? *1.1. How were the following ecological integrity considerations taken into account?:* *1.1.1. Threatened Ecosystems.* *1.1.2. Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.* *1.1.3. Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs").* *1.1.4. Conservation targets.* *1.1.5. Ecological drivers of the ecosystem.* *1.1.6. Environmental Management Framework.* *1.1.7. Spatial Development Framework.* *1.1.8. Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).*	The following specialist studies will be undertaken to assess the impacts of the Project on the ecological integrity of the area: ▪ Aquatic Assessment; ▪ Terrestrial Ecological Assessment; and ▪ Avifaunal Assessment. The findings of the above studies will be presented in the EIA Report. Management objectives will be included in the EIA Report and EMPr to safeguard the sensitive ecological features. One of the goals identified in the municipal IDP (JB MLM, 2022) to domesticate the Sustainable Development Goals is to promote developments in renewable energy. This IDP further states that the JB MLM uses large amounts of energy and will face increased energy demand as a result of climate change over and above increases in population growth. The IDP notes that the energy sector is already embattled as it is and despite the increased focus on greener energy, the country is still very dependent on fossil fuels. The Project falls within an area that is designated for crop farming in terms of the SDF (JB MLM, 2022). An Agricultural Impact Assessment will be undertaken during the EIA Phase and the findings will be presented in the EIA Report. The Applicant intends to bid for the current and future REIPPPP bid windows and/or other renewable energy markets within SA. The REIPPPP is a competitive tender process that was designed to facilitate private sector investment into grid-connected renewable energy (RE) generation in SA.
1.2. How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Potential disturbances to ecosystems may include the following: ▪ Clearance of large areas of indigenous vegetation associated with the construction footprint of the PV and BESS Site and associated infrastructure; ▪ Potential loss of sensitive environmental features; ▪ Pollution of water resources; ▪ Soil destabilisation and subsequent erosion; and ▪ Proliferation of alien and invasive species. The following specialist studies will be undertaken to assess the impacts of the Project on the ecological integrity of the area: ▪ Aquatic Assessment; ▪ Terrestrial Ecological Assessment; and ▪ Avifaunal Assessment. The findings of the above studies will be presented in the EIA Report. Mitigation measures will be included in the EIA Report and EMPr to disturbances to ecosystems, according to the mitigation hierarchy.
1.3. How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to	The Project may cause surface water, groundwater, soil, air, noise and light pollution during the construction and operational phases.

Question No.	Response
minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	The above impacts will be assessed during the EIA Phase. Mitigation measures will be included in the EIA Report and EMPr to manage these impacts.
1.4. What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	The waste to be generated by the Project includes the following: ▪ Construction – o 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. All the waste disposed of will be recorded. o Wastewater will include sewage, water used for washing purposes and drainage over contaminated areas. ▪ Operation – o Refuse (domestic waste) generated during the operational phase will be removed on a weekly basis and will be disposed of at a permitted waste disposal facility. Mitigation measures to manage all waste and wastewater generated during the construction and operational phases will be included in the EMPr.
1.5. How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	Potential disturbances to cultural heritage may include the following: ▪ Possible direct impacts to graves, heritage resources and 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 A Heritage Impact Assessment will be undertaken during the EIA Phase and the findings will be presented in the EIA Report.
1.6. How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	During the construction phase electricity will be obtained from diesel generators and / or temporary supply via cables from the site power grid. No alternative energy sources were considered for the generation of electricity. The generation of electricity will be derived from a renewable energy source, namely, the sun. During the operational phase electricity will be sourced from this renewable energy-generation facility itself and/or from the existing electrical infrastructure on the property.
1.7. How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts? *1.7.1. Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life).* *1.7.2. Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources this the proposed development alternative?)*	The Solar Plant to generate electricity from a renewable energy resource, namely the sun. The total generation capacity of the Project will be 600MW renewable solar energy. Impacts to the receiving environment will be assessed during the EIA Phase and will be presented in the EIA Report. Opportunity costs are associated with the net benefits forgone for the development alternative. This will be assessed further during the EIA Phase.

Question No.	Response
1.7.3. Do the proposed location, type and scale of development promote a reduced dependency on resources?	
1.8. How were a risk-averse and cautious approach applied in terms of ecological impacts? *1.8.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?* *1.8.2. What is the level of risk associated with the limits of current knowledge?* *1.8.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?*	The following specialist studies will be undertaken to assess the impacts of the Project on the ecological integrity of the area: ▪ Aquatic Assessment; ▪ Terrestrial Ecological Assessment; and ▪ Avifaunal Assessment. The findings of the above studies will be presented in the EIA Report.
1.9. How will the ecological impacts resulting from this development impact on people's environmental right in terms following: *1.9.1. Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?* *1.9.2. Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?*	Potential impacts to the social environment include the following: ▪ Construction phase – o Influx of people seeking employment and associated impacts (e.g. foreign workforce, cultural conflicts, squatting, demographic changes) o Safety and security o Use of local road network o Nuisance from dust and noise o Consideration of local labourers and suppliers in area – stimulation of local economy (positive impact) o Transfer of skills (positive impact) ▪ Operational phase – o Direct and indirect economic opportunities as a result of the Project. o Threats to human and animal health from electromagnetic field. A Social Impact Assessment will be undertaken during the EIA Phase and the findings will be presented in the EIA Report. Mitigation measures to manage impacts to the social environment will be included in the EMPr.
1.10. Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	The areas affected by the proposed Project footprint are rural in nature. The Project is located approximately 20 km north west of Ventersdorp's CBD. There is evidence that the Project Site was previously used for agricultural purposes, which will be assessed further as part of the Agricultural Impact Assessment.
1.11. Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?	Refer to the response to question no. 1 above.
1.12. Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?	There were no site alternatives considered. The layout will be assessed by the respective specialists during the EIA Phase and will be adjusted to avoid sensitive features, as necessary. Options under consideration are presented in **Section 10** below. The BPEO will be identified in the EIA Report, taking into consideration of the specialists' findings.
1.13. Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	Other renewable energy applications that have been made within a 30km radius of the Project Site, according to DFFE's REEA Database, are discussed in **Section 6.6** above. Cumulative impacts are discussed in **Section 13.3** below. The EIA Report will provide an assessment of the potential cumulative impacts.
2.1. What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?: *2.1.1. The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area,* *2.1.2. Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),*	The socio-economic environment is discussed in **Section 11.9** below. The following is noted from a planning perspective: ▪ One of the goals identified in the municipal IDP (JB MLM, 2022) to domesticate the Sustainable Development Goals is to promote developments in renewable energy. ▪ The Project will contribute towards both National and Provincial targets for renewable energy and Eskom's target for Independent Power Producer (IPPs), as well as assist in

Question No.	Response
2.1.3. Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and *2.1.4. Municipal Economic Development Strategy ("LED Strategy").*	meeting the increasing electricity demands in South Africa and specifically in the grid network. ▪ The Project falls within an area that is designated for crop farming in terms of the SDF (JB MLM, 2022). An Agricultural Impact Assessment will be undertaken during the EIA Phase and the findings will be presented in the EIA Report. ▪ The Project Site and power line are located outside of the urban edge and should not impact on future urban expansion. ▪ The Project's proposed overhead power line will be aligned alongside property boundaries and existing power lines as far as possible. ▪ According to the findings from the National Web Based Environmental Screening Tool, the Project Site has low sensitivity in terms of the relative civil aviation theme.
2.2. Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area? *2.2.1. Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?*	Refer to the response to question no. 1.9 above.
2.3. How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	
2.4. Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short- and long-term?	
2.5. In terms of location, describe how the placement of the proposed development will: *2.5.1. result in the creation of residential and employment opportunities in close proximity to or integrated with each other,* *2.5.2. reduce the need for transport of people and goods,* *2.5.3. result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),* *2.5.4. compliment other uses in the area,* *2.5.5. be in line with the planning for the area,* *2.5.6. for urban related development, make use of underutilised land available with the urban edge,* *2.5.7. optimise the use of existing resources and infrastructure,* *2.5.8. opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),* *2.5.9. discourage "urban sprawl" and contribute to compaction/densification,* *2.5.10. contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,* *2.5.11. encourage environmentally sustainable land development practices and processes,* *2.5.12. take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),* *2.5.13. the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential),* *2.5.14. impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and* *2.5.15. in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?*	2.5.1. The Project will result in increased economic activity, as well as increased opportunities for employment and for SMMEs. 2.5.2. Not deemed to be relevant, due to the nature of the development. 2.5.3. Not deemed to be relevant, due to the nature of the development. 2.5.4. Impacts on surrounding land uses will be assessed as part of the Agricultural Impact Assessment, Social Impact Assessment and Visual Impact Assessment (amongst others). 2.5.5. Refer to the response to question no. 2.1 regarding planning. 2.5.6. The Project Site and power line are located outside of the urban edge and should not impact on future urban expansion, based on the SDF. 2.5.7. The resources and services required for construction and operation are discussed in **Section 5.7** below. 2.5.8. The Project does not include the expansion of any bulk infrastructure. 2.5.9. Not deemed to be relevant, due to the nature of the development. 2.5.10. Not deemed to be relevant, due to the nature of the development. 2.5.11. Provision will be made in the EMPr to manage the impacts associated with the Project. 2.5.12. Locational factors that favour the proposed site include the favourable solar irradiation levels, short distance to grid connection point, flat topography, suitable site access and availability of land. 2.5.13. The socio-economic benefits associated with the Project will be further identified in the EIA Report. 2.5.14. Refer to the response to question no. 1.5 above. 2.5.15. Refer to the response to question no. 2.1 above regarding planning.
2.6. How were a risk-averse and cautious approach applied in terms of socio-economic impacts? *2.6.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?*	The findings of the Social Impact Assessment will be included in the EIA Report.

Question No.	Response
2.6.2. What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge? *2.6.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?*	
2.7. How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following: *2.7.1. Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?* *2.7.2. Positive impacts. What measures were taken to enhance positive impacts?*	Refer to the responses to questions no. 1.9 and 2.1 above. These impacts will be assessed as part of the Agricultural Impact Assessment, Social Impact Assessment and Visual Impact Assessment (amongst others).
2.8. Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socio-economic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	Refer to the responses to questions no. 1.7 and 1.10 above.
2.9. What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	The BPEO will only be identified in the EIA Report, taking into consideration of the specialists' findings.
2.10. What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? *Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?*	
2.11. What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	The areas affected by the proposed Project footprint are rural in nature. The Project Site is vacant. Consent has been provided by the landowner for the proposed development in terms of the Option to Lease Agreement.
2.12. What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	The findings of the Social Impact Assessment will be included in the EIA Report. Mitigation measures to manage these impacts will be included in the EMPr. Also refer to the response to question no. 1.9 above.
2.13. What measures were taken to: *2.13.1. ensure the participation of all interested and affected parties,* *2.13.2. provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,* *2.13.3. ensure participation by vulnerable and disadvantaged persons,* *2.13.4. promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,* *2.13.5. ensure openness and transparency, and access to information in terms of the process,* *2.13.6. ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge, and* *2.13.7. ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein were be promoted?*	**Section 12** below provides an overview of the public participation process to date, which includes the following: ▪ Compiling the database of I&APs; ▪ Notification provided during the announcement phase; ▪ Notification of review of the draft Scoping Report; ▪ Means of accessing the draft Scoping Report; ▪ Supplying copies of the draft Scoping Report to authorities; and ▪ Commenting on the draft Scoping Report. Comments received from authorities and I&APs during the announcement phase are contained in **Appendix E4**.
2.14. Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g.. a mixture of low-, middle-, and high-	The findings of the Social Impact Assessment will be included in the EIA Report. Also refer to the responses to questions no. 1.9 and 2.5 above.

Question No.	Response
income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	
2.15. What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	Health and safety related risks associated with the Project during the construction and operational phases will be assessed in the EIA Report. These risks will be addressed through mitigation measures that will be included in the EMPr. Additional management requirements will be included in the Project's Occupational Health and Safety system.
2.16. Describe how the development will impact on job creation in terms of, amongst other aspects: *2.16.1. the number of temporary versus permanent jobs that will be created,* *2.16.2. whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),* *2.16.3. the distance from where labourers will have to travel,* *2.16.4. the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and* *2.16.5. the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).*	The Project will have a beneficial impact on local employment during the construction and operational phases. Further information will be included in the EIA Report.
2.17. What measures were taken to ensure: *2.17.1. that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and* *2.17.2. that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?*	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. The Applicant intends to bid for the current and future REIPPPP bid windows and/or other renewable energy markets within SA. The REIPPPP is a competitive tender process that was designed to facilitate private sector investment into grid-connected renewable energy (RE) generation in SA.
2.18. What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	The Solar Plant proposes to generate electricity from a renewable resource, namely the sun. The total generation capacity of the Project will be 600MW renewable solar energy. Some of the electricity generated from the renewable energy source will be stored in the BESS which will generate electricity during peak evening hours when the sun goes down. During the distribution of electricity, as the energy source is renewable, there will be no Greenhouse Gas Emissions (GHG), such as Carbon Dioxide, that will be released into the atmosphere, thus providing a clean environment for the local community and public in general. Impacts to the receiving environment will be assessed through various specialist studies that will be included in the EIA Report.
2.19. Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	The intention is for the mitigation measures that will be included in the EIA Report and EMPr to be realistic and for the residual risks to be managed to an acceptable level.
2.20. What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	The solar plant will have an estimated lifespan of 25 years. It is at this time impossible to accurately predict the exact nature of the surrounding environment in 25 years' time or whether the area would have developed to the point where the solar plant will be upgraded to continue providing electricity, or decommissioned. Decommissioning of facilities that require environmental authorisation such as the solar plant is also a listed activity in terms of NEMA and will thus require the decommissioning and closure to be approved by the relevant

Question No.	Response
	authorities at the time, based on the current legislative framework. However, it is also not possible to predict the legal framework in 25 years' time. For the purposes of this EIA, it is assumed that the facility will eventually be decommissioned, and the site rehabilitated.
2.21. Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	The BPEO will only be identified in the EIA Report, taking into consideration all of the specialists' findings.
2.22. Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	Other renewable energy applications that have been made within a 30km radius of the PV Site, according to DFFE's REEA Database, are discussed in **Section 6.6** above. Cumulative impacts are discussed in **Section 13.3** below. The EIA Report will provide an assessment of the potential cumulative impacts.

9 PROJECT DESCRIPTION

9.1 Solar Technology

Solar energy facilities operate by converting solar energy into a useful form (i.e. electricity). The use of solar energy for electricity generation is a non-consumptive use of a natural resource and consumes no fuel for continuing operation. Solar power produces an insignificant quantity of greenhouse gases over its lifecycle as compared to conventional coal-fired power stations. The operational phase of a solar facility does not produce carbon dioxide, sulphur dioxide, mercury, particulates, or any other type of air pollution, as fossil fuel power generation technologies do.

9.2 CSP Technology Overview

Concentrating Solar Plant (CSP) plants concentrate beams of light from the sun to heat a fluid and produce steam. The steam rotates a turbine connected to a generator, producing electricity to run a traditional power plant. There are four types of CSP technologies: parabolic troughs, power towers, dish/engine systems, and linear Fresnel reflectors. The parabolic trough system was the first CSP technology, thus it is the most developed and most replicated system.

9.2.1 Parabolic Trough Technology

Parabolic trough technology uses parabolic reflectors to concentrate the sun's rays into a receiver pipe along the reflector's focal line. The receiver heats a liquid which generates steam for power. This collector system rotates with the sun's movement to optimize solar energy generation. Refer to **Figure 7** for an example of parabolic tough panels.

Figure 7: Parabolic Trough Technology (www.e-education.psu.edu)

9.2.2 Power Tower Systems

Power tower system use flat mirrors to reflect the sun's rays onto a water-filled boiler atop a central tower (refer to **Figure 8**). The liquid is heated to a very high temperature and runs the turbine to create electricity.

Figure 8: Power Tower Technology (Planta Solar 10, Spain)

9.2.3 Dish/engine Systems

The dish/engine system is a concentrating solar power (CSP) technology that produces relatively small amounts of electricity compared to other CSP technologies typically in the range of 3 to 25 kilowatts. Dish/engine systems use parabolic reflectors to direct the sun's rays at a receiver placed at the reflector's focal point (refer to **Figure 9**). The liquid in the receiver is heated and runs a Stirling engine to create power.

Figure 9: Dish/Engine Technology www.e-education.psu.edu)

9.2.4 Linear Fresnel Reflector Technology

Linear Fresnel Reflector technology works much like the parabolic trough system, except that it uses flat mirrors that reflect the sun onto water-filled pipes that generate steam (refer to **Figure 10**). This is a significant cost advantage because flat mirrors are much less expensive to produce than parabolic mirrors. Current advances in CSP allow these technologies to produce electricity several hours after sunset and on days with low intensity of solar radiation through heat accumulators and hybrid configurations.

Figure 10: Linear Fresnel Reflector Technology (social.csptoday.com)

9.3 PV Technology Overview (Preferred)

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 11** below provides an overview of a typical Solar PV Power Plant.

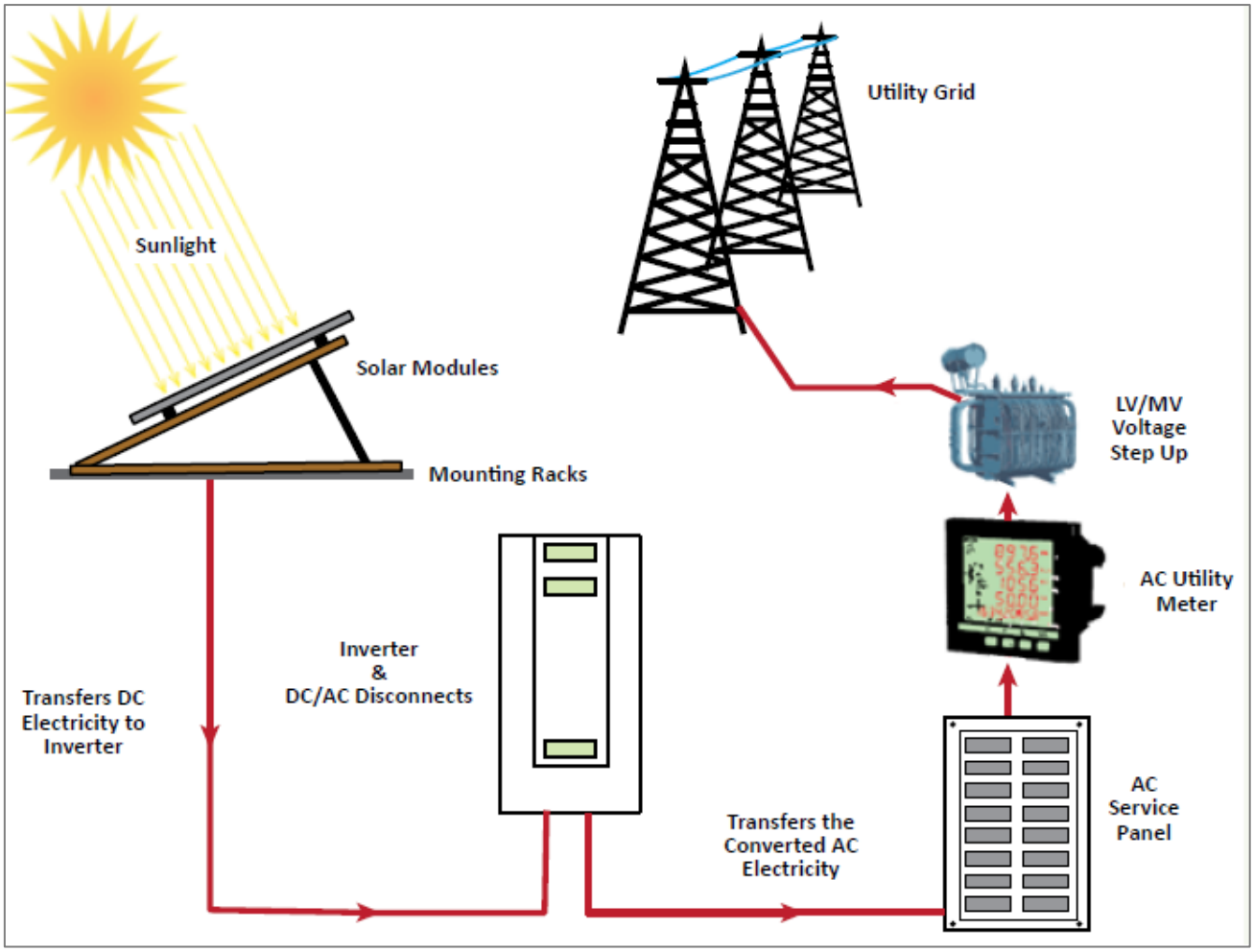

Figure 11: Overview of Solar PV Power Plant (IFC, 2015)

9.4 Project Overview

9.4.1 Overview of Technical Details

The technical details of the proposed Solar Plant are captured in **Table 16** below.

Table 16: Technical details of the proposed Solar Plant

No.	Component	Description / Dimensions
1.	Height of PV panels	± 2.5m
2.	Area of PV Array	± 490 ha
3.	Number of inverters required	Approximately 240x 2.5MW inverters
4.	Area occupied by inverter / transformer stations / substations	• Area occupied by inverter stations =0.35ha • Area occupied by Operation and Maintenance infrastructure = ± 0.1 ha • Area occupied by facility (step-up/Collector) substation = 0.2 ha • Area occupied by the onsite substations = 0.1 ha
5.	Capacity of on-site substation	Up to a maximum of 600 MW, 6.6kV/275kV
6.	Area occupied by buildings and BESS	• Area occupied by Operation & Maintenance infrastructure =± 0.1 ha • Area occupied by BESS = 0.35 ha
7.	Area occupied by both permanent and construction laydown areas	• Construction areas = 0.25 ha • Operation & Maintenance infrastructure = ± 0.1 ha • Total combined = ± 0.35 ha
8.	Area occupied by buildings	1.5 ha
9.	Length of internal roads	± 15km
10.	Width of internal roads	• Internal roads will have a 5m road width. • Access road will have a 14m reserve and road width of 8m.
11.	Proximity to grid connection	Grid Connection: Route 1 which consists of 2 x 132kV powerlines, approximately 14km kilometres (km) in length, from the new facility 33kV substation to new 400/132kV Main Transmission Substation (MTS) to Loop In-Loop Out (LILO) of the Pluto – Watershed 275kV power line; and Route 2 that comprises of 2.8km 132 kV line from the new facility 33kV substation facility 33kV substation to the Makokskraal Substation.
12.	Height of fencing	Up to 3m
13.	Type of fencing	Type will vary around the site, welded mesh, palisade and electric fencing

9.4.2 Project Layout

The layout of the Solar Plant is shown in **Figure 12** below. The desirability of the earmarked site for the development of the proposed Solar Plant is due to the following key characteristics:

- **Solar Irradiation**: The feasibility of a solar facility is dependent on the direct solar irradiation levels (refer to **Section 4.1** above).
- **Topography**: The suitability of the surface area is an important characteristic for the construction and operation of solar facilities. Most of the site has a low gradient slope and is suitable for this development.

- **Grid capacity and connection:** In terms of the Grid Connection Capacity Assessment (GCCA) 2024, which is a report presents the results of available generation connection capacity of all the transmission substations in all the supply areas in all the provinces of South Africa, the Project is located within the North West Supply Area. Based on the latest GCCA that was released by Eskom in March 2022, the GCCA confirms that the North West Supply Area currently has 4370MW generation connection capacity available. The Project Site is located approximately 14km from the LILO of the Pluto – Watershed 275kV power line and 2.8km from the Makokskraal Substation.
- **Extent of site**: The overall extent of the site is sufficient for the installation of the Solar Plant.
- **Site access**: The site can be accessed via an unnamed gravel road off the N14 and/or R53.

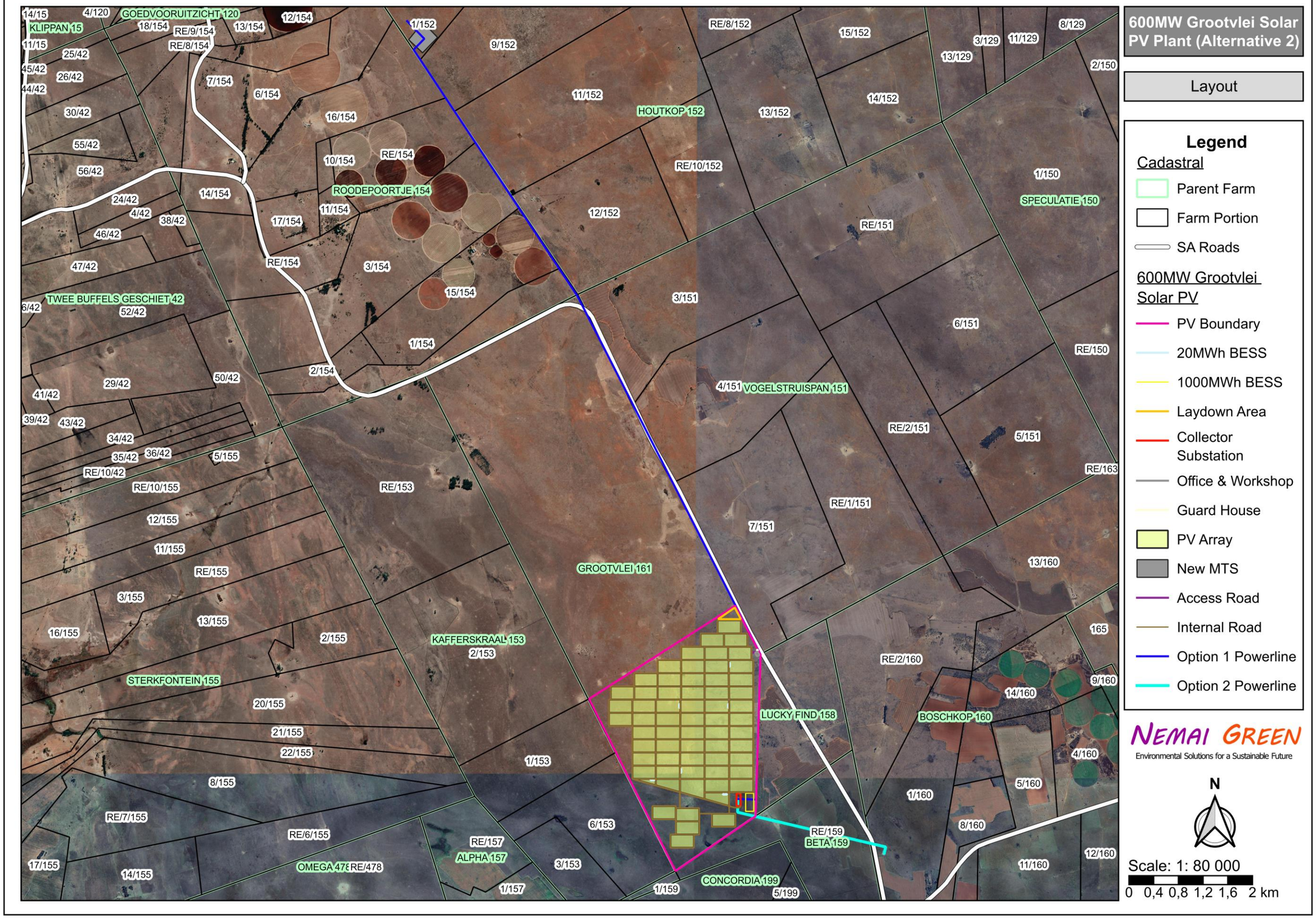

Figure 12: **Proposed Layout of the Solar Plant and Grid Connection (Preferred Alternative – Alternative 2)**

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

- Requirements of the Solar Plant;
- Preliminary understanding of sensitive features on the site (e.g., watercourses). This will be refined based on the findings from the specialist studies during the EIA Phase; and
- Existing servitudes and infrastructure.

9.4.3 Components of the Proposed Solar PV Plant

The Project consists of the following systems, sub-systems or components (amongst others):

- 600MW PV solar panels or modules (arranged in arrays);
- Mounting structures to support the PV panels;
- DC-AC current inverters stations, transformers, and internal electrical reticulation (underground cabling);
- Grid Connection: Route 1 which consists of 2 x 132kV powerlines, approximately 14km kilometres (km) in length, from the new facility 33kV substation to new 400/132kV Main Transmission Substation (MTS) to Loop In-Loop Out (LILO) of the Pluto – Watershed 275kV power line and Route 2 that comprises of 2.8km 132 kV line from the new facility 33kV substation facility 33kV substation to the Makokskraal Substation.
- New 400/132kV Main Transmission Substation;
- On site switching station/substation;
- Administration Buildings (Offices);
- Workshop areas for maintenance and storage;
- Temporary laydown areas;
- Internal access roads and perimeter fencing of the footprint area;
- Lithium-ion battery energy storage system (BESS);
- Security Infrastructure; and
- Site access from unnamed gravel road via the N14 and/or R53

The components of the proposed Solar Facility are discussed below. Reference Source: Solar Power Plant - Types, Components, Layout and Operation (https://www.electricaltechnology.org/).

9.4.3.1 Solar PV Panels/Modules

A PV panel is the most important component of a solar power plant. It is made up of small solar cells. This is a device that is used to convert solar photon energy into electrical energy.

Generally, silicon is used as a semiconductor material in solar cells. The typical rating of silicon solar cells is 0.5V and 6Amp. And it is equivalent to 3W power. The number of cells is connected in series or parallel and makes a module. The number of modules forms a solar panel.

According to the capacity of power plants, a number of plates are mounted and a group of panels is also known as a PV array.

9.4.3.2 Single Axis Trackers

The following information was sourced from Solar Basics: Single-Axis Tracking (https://www.powerflex.com/).

A solar tracking system adjusts the position of a solar panel along an axis. This is done to ensure a small angle of incidence or the angle that sunlight hits a solar panel. Since the energy output of a solar system increases as the angle of incidence decreases, keeping this angle as small as possible is ideal. Active trackers rely on powered machineries such as gears and motors to move solar panels, whereas passive trackers achieve motion via compressed fluid that shifts sides when heated by the sun, changing the tilt of the panel along with it. Some trackers keep panels aligned with the sun by moving them in the opposite direction of the earth's rotation, and others determine an optimal panel angle based on latitude and longitude data obtained through GPS.

In addition to varying methods of motion, solar trackers differ in terms of the number of axes on which they move. Single axis tracking systems tilt on one axis, tracking the sun as it moves from east to west during the day.

An example of PV modules mounted on a single axis tracker is shown in **Figure 13** below.

Figure 13: Example of PV Module mounted on Single Axis Tracker
(source: Single-ACES – Atlantic Clean Energy Supply – Official Site [https://atlanticces.com/])

The trackers are mounted on steel posts installed in the ground. Concrete bases are sometimes also used. The site would need to be cleared of all trees to prevent shading of the PV modules. The ground between the trackers is sometimes left grassed.

9.4.3.3 Inverters

The following information was sourced from “A Guide to Solar Inverters: how they work and how to choose them” (https://solarmagazine.com/).

A solar inverter is really a converter. Inverters are installed to convert the DC electrical power into AC electrical power, which is used in the grid. The frequency of the AC electricity is synchronised to the grid, which in South Africa is 50Hz, but varies slightly. The purpose of the inverters is to maximise and control the conversion of power from the DC modules to low voltage AC (i.e., less than 1000V). String inverters have multiple inputs for connecting the strings from the trackers. String inverters are normally installed on steel structures under the shade of the PV modules.

9.4.3.4 Low Voltage AC Cabling

AC cables are installed from the inverters to the distribution box located adjacent to the medium voltage transformers. These cables are installed underground in trenches.

9.4.3.5 Medium Voltage Step-Up Transformers

The purpose of medium voltage transformers is to step-up the low voltage to medium voltage. In order to distribute the combined electrical power from a block of tracker rows the voltage is required to be increased. Transformers will typically be in the order of 2.5MVA capacity and similar in appearance to the type as shown in **Figure 14** below.

Figure 14: Example of Medium Voltage Transformer
(source: https://www.ulaginoli.com/)

Transformers will typically be filled with oil for cooling the transformer windings. The cooling oil is circulated through radiator fins mounted on the side of the transformer. The oil remains in the transformer. Oil spills from transformers need to be contained by providing drip trays and special care taken to clean up the spill should it occur.

9.4.3.6 Medium Voltage AC Cabling

Medium voltage AC cabling from the transformers to the high voltage substation is buried in trenches underground. The cables are protected from accidental damage by placing brightly coloured orange danger tape in the trench and sometimes concrete slabs. Cable routes are indicated with concrete cables markers on the ground at bend points, road crossings etc.

9.4.3.7 High Voltage Substations

The medium voltage cables are connected to a medium voltage switchgear room located in a substation yard. High voltage transformers step the medium voltage up to high voltage.

Figure 15: Example of High Voltage Substation
(source: https://www.protogenenergy.com/)

A typical HV Substation will look like the substation shown in **Figure 15** above, 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 16** below).

Figure 16: Example of High Voltage Transformers
(source: https://www.electricityforum.com/)

9.4.3.8 Guardhouses, Operation, Maintenance and Visitor Centre Buildings

Guardhouses, Operation, Maintenance and Visitor Centre Buildings are required for the facility. Buildings will be single story.

The purpose of the buildings is to provide space for staff working on site for the operation and maintenance of the facilities, including storage space for spare parts, tools, etc. Computers will be installed for monitoring the electricity generation and reporting on the condition of the plant. Toilets, kitchens, water, wastewater, and electricity will be required for staff and visitors.

Sustainable building principals will be used including use of rainwater harvesting, energy efficient lighting, insulation, etc.

9.4.3.9 Roads

Existing roads are located on the site. These will serve as the entrance roads to the site. Existing access from main roads will remain as is. The internal roads will be 5m wide and will be gravel, with

the exception of paving close to the buildings for parking and access into the buildings. The entrance road will exceed 7m, most likely 8m wide.

The basic layout consists of rows of single axis trackers, similar to that shown in **Figure 17** below.

Figure 17: Example of Roads Between Trackers and Medium Voltage Substations
(source: https://ecoinventos.com/)

9.4.3.10 Fencing, Security and Lighting

Fencing is required to secure the site. Due to the voltage of the DC wiring (up to 1500V) and high value of the plant the site must be secured. Details of the fencing is still to be finalised and may include electric fencing.

CCTV cameras and security lighting may be installed as part of the security for the plant.

9.4.3.11 Stormwater Infrastructure

The topography of the site is relatively flat, which simplifies the management of stormwater runoff as high velocities in surface drainage channels and pipes underground drainage systems need not be dealt with. Furthermore, surface stormwater drainage channels can be employed to advantage (easier to maintain than an underground pipe system).

9.5 Battery Energy Storage System

9.5.1 Types of Electrical Energy Storage Systems

Electrical Energy storage systems consist of Mechanical, Chemical, Electrical, Thermal and Electrochemical systems. **Figure 18** below summarizes the various Electrical Energy Storage systems. The Electrochemical/battery storage system was selected as the preferred solution to meet the requirements of the Project.

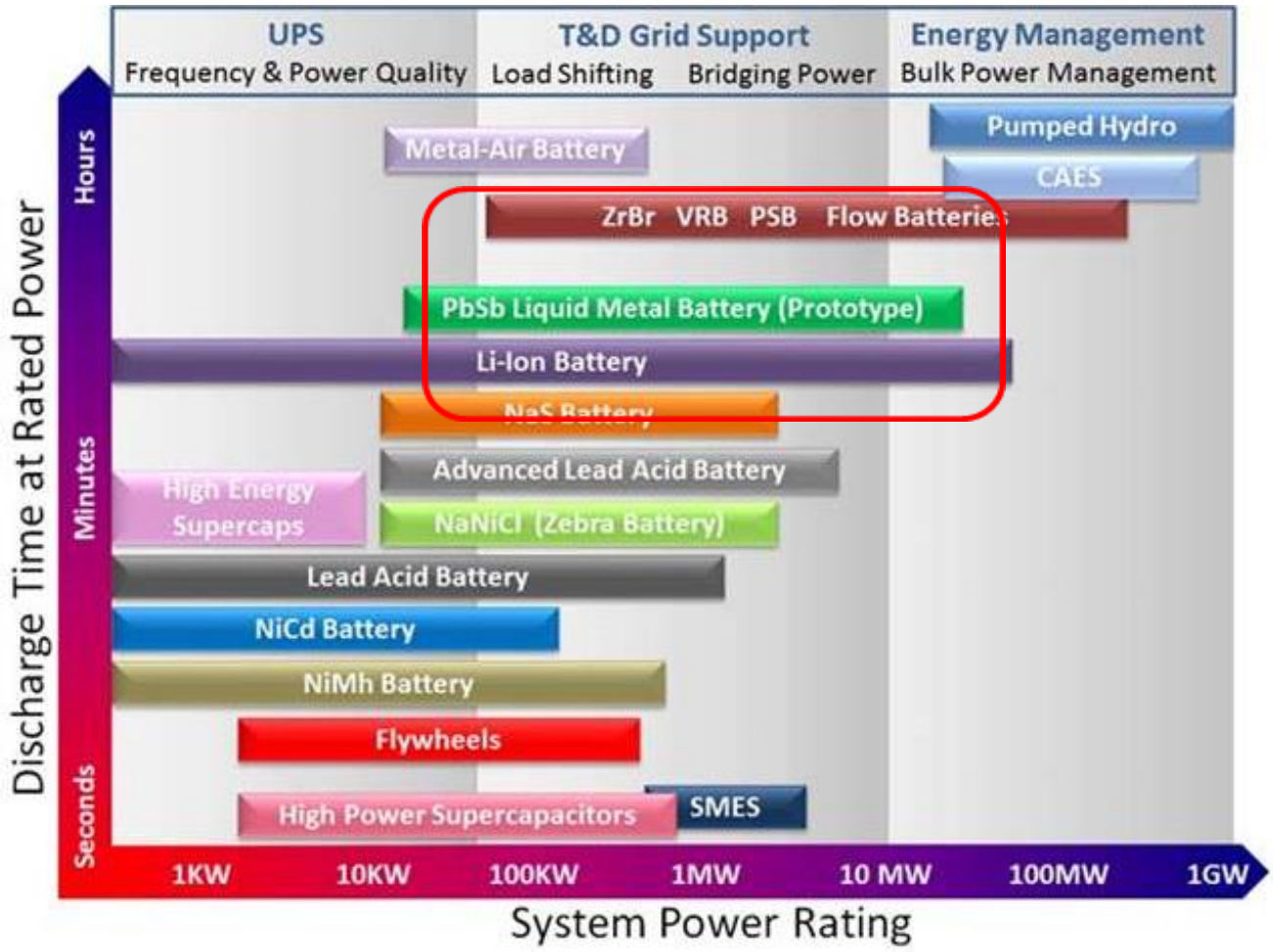

Figure 18: Grid Energy Storage Technologies and Applications
(Adapted from Climate Policy Initiative for the Energy Transitions Committee)

As per https://www.smart-energy.com/, “Batteries, the oldest, most common and widely accessible form of storage, are an electrochemical technology comprised of one or more cells with a positive terminal named a cathode and negative terminal or anode. Batteries encompass a range of chemistries. The best known and in widespread use in portable electronic devices and vehicles are lithium-ion and lead acid. Others solid battery types are nickel-cadmium and sodium-sulphur, while zinc-air is emerging. Another category is flow batteries with liquid electrolyte solutions, including vanadium redox and iron-chromium and zinc-bromine chemistries”.

9.5.2 The Project's BESS Infrastructure

The technology will be the commercially proven solid state battery systems comprising of the Lithium Ion technology.

As per https://www.smart-energy.com/, "This type of technology is widely used in mobile phones and electric vehicles. It is also predominantly used in large utility scale projects". The batteries will be contained in shipping containers.

There will be up to a maximum of 40 shipping containers, each with a battery storage capacity of 1MW. The approximate dimensions of the containers will be up to a maximum of 8m long, 3m wide and 3m high. Level and fenced off platforms would be created for the battery storage areas of approximately 3 000m². The location of the battery energy storage facility will be adjacent to the solar power plant's on-site substation.

An example of similar utility scale BESS is shown in **Figure 19** below.

Figure 19: Example of BESS installation
(https://biiworld.com/)

The containers are environmentally friendly during their life-cycle. However, the Lithium in the technology is considered hazardous / dangerous goods. Used batteries will be removed by the suppliers. Batteries containing chemistries that when charged are a fire risk and at the end of their life need to be recycled. With regard to the fire risk, the battery storage area will have a non-flammable buffer area to prevent the spread of fire. The BESS will have electrical and fire protection measures in the form of battery temperature monitoring, circuit breakers, fire detection and fire suppression as per fire and electrical regulations.

9.6 Grid Connection

The electricity generated by the Project will be transmitted through two powerline options:

- Powerline Option 1: Consists of 2 x 132kV powerlines, approximately 14km kilometers (km) in length, from the new facility 33kV substation to new 400/132kV Main Transmission Substation (MTS) to Loop In-Loop Out (LILO) of the Pluto – Watershed 275kV power line; and
- Powerline Option 2: Comprises of 2.8km 132 kV line from the new facility 33kV substation to the Makokskraal Substation (refer to **Figure 22** below).

Examples of a 132kV transmission line as well as a high voltage transmission line connecting to a substation are shown in **Figure 21** and **Figure 22** below, respectively.

Figure 20: Example of a 132kV transmission line

Figure 21: Example of High Voltage Transmission Line Connecting to Substation

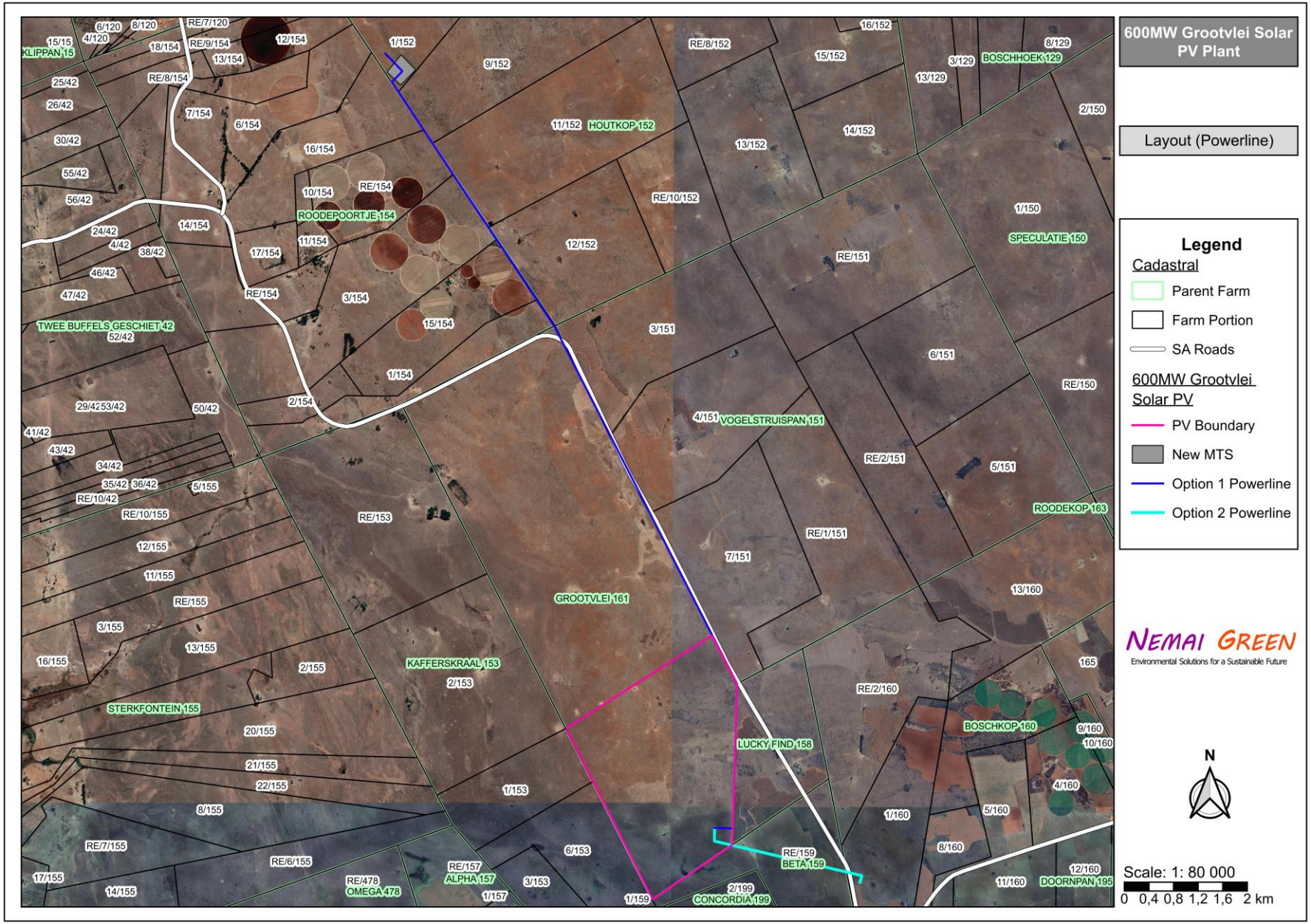

Figure 22: **Proposed Power Line Route (Orthophotograph)**

9.7 Project Life-Cycle

The project life-cycle for a typical Solar Plant includes the following primary activities (high level outline only):

- Feasibility phase - This phase includes confirming the feasibility of the Project by evaluating and addressing the following (amongst others) –
  - Solar resource assessment;
  - Site selection;
  - Project land allocation;
  - Project yield assessment;
  - Permitting and licensing;
  - Legal agreements;
  - Socio economic development;
  - Industrialisation and localisation;
  - Project cost determination;
  - Project financing; and
  - Risk analysis.
- Design phase - This phase includes the following (amongst others) –
  - Confirming key design features such as the type of PV module to be used, tilting angle, mounting and tracking systems, inverters, and module arrangement;
  - Confirming specifications for the components of the Solar Plant;
  - Preparing detailed designs (layout, civil, electrical);
  - Preparing construction plans;
  - Preparing the Project schedule; and
  - Preparing the commissioning plans.
- Construction phase – During the implementation of the Project, the following construction activities will be undertaken –
  - Pegging the footprint of the development;
  - 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, mechanical and electrical work; and
  - Reinstating and rehabilitating working areas outside of permanent development footprint.
- Operational phase - Once the solar park is up and running the facility will be largely self-sufficient. Operational activities associated with the maintenance and control of the Solar Plant will include the following (amongst others) –
  - Testing and commissioning the facility's components;

- Cleaning of PV modules;
- Controlling vegetation;
- Managing stormwater and waste;
- Conducting preventative and corrective maintenance; and
- Monitoring of the facility's performance.

❑ Decommissioning –

Panels are guaranteed to produce at least 80% of their rated power for 20 to 30 years. In practice, panels will perform satisfactorily well beyond this timeframe. At the end of the 20 to 30 year lifespan, two scenarios exist for the panels:

- The old, redundant panels can be disposed of (at a registered disposal facility designated for this purpose); or
- The panels can be recycled, by either using their components to fix or make new panels, or be donated for use elsewhere (e.g., for the electrification of rural schools and clinics).

It is unlikely that the Solar Plant will be decommissioned after 30 years. Instead, the facility will continually be reconditioned as the panels are recycled and replaced with more advanced technology as it becomes available.

In the event that the Solar Plant must be decommissioned, the decommissioning 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 a future desirable use.

9.8 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 will be made in the EMPr to manage impacts associated with aspects listed below, as relevant.

9.8.1 Raw Materials

Construction

Material required for construction purposes, including fencing and construction material (e.g., cement, sand, aggregate, etc.), will be sourced from suitable suppliers. The PV modules and other components of the facility will also be sourced from accredited suppliers.

Operation

During the operational phase, few raw materials will be required. Material such as consumable spares will be used for the operation of the facility.

9.8.2 Water

Construction

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. It is anticipated that cleaning will take place on a quarterly basis depending on annual rainfall, however, the cleaning regime may need to be revised should site conditions make the cleaning regime more frequent.

The project applicant intends to use the boreholes. If this is not feasible alternative options would be to tanker in the required water. Details regarding the sourcing of water for use in panel cleaning will be determined as the project design progress. The potential impact of wash-water on these features will be considered during the EIA phase.

Operation

Water use requirements for a Solar PV Plant during the operational phase depends on the technology and climate conditions at the site. In general, solar power technologies use relatively low volumes of water for cleaning solar collection and reflection surfaces like PV panels, as well as for domestic consumption by the staff. Water will be supplied by the JB MLM, with a water connection to the site.

The washing of the solar panels is likely to cause nominal additional run-off. This process is estimated to occur twice a year and introduce approximately 3 l/m² to the site over a period of approximately 2 weeks (depending on workforce). This runoff would however be spread throughout the site and due to the low localised water volumes, would cause minimal, if any, erosion and may help as a form of dust control. The methods used for washing the panels would impact the necessities for erosion mitigation. Mitigation, if required, could be in the form of phasing the washing of panels or optimising the method used. The overall effect on the natural water courses is expected to be very low provided the cleaning water is free from detergents or comprise of approved biodegradable substances.

9.8.3 Sanitation

Construction

Sanitation services will be required for construction workers in the form of chemical toilets, which will be serviced at regular intervals by the supplier.

Operation

No effluent will be produced during operation of the facility, except for normal sewage from site and operations staff. This will be collected and treated as per normal standards using a septic or conservancy tank. In cases where the JB MLM does not permit the use of sceptic tanks, sewage will be stored in conservancy tank and collected (honey-sucker) by a service provider (the LM/ Contractor) and treated at an approved facility off site.

9.8.4 Waste

Construction

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 licenced waste disposal sites. All waste will be disposed of in scavenger proof bins and temporarily placed in a central location for removal by an appointed contractor. During the EIA, the applicant will request confirmation from the municipality that they have sufficient capacity at their registered landfills for the solid waste.

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).

Suitable measures will be implemented to manage all wastewater generated during the construction period.

Operation

Refuse generated during the operational phase will be removed on a weekly basis and will be disposed of at licenced waste disposal sites.

9.8.5 Roads

Construction

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

Operation

The Project site is accessible via un unnamed gravel road off t the N14 and/or R53.

9.8.6 Stormwater

Construction

Best environmental practices will be implemented during construction to manage stormwater. These measures will be included in the EMPr.

Operation

The stormwater run-off along the main access road will be controlled by side swales and dispersed in a controlled manner at regular intervals. Stormwater run-off from the buildings will be disposed of through soakaways. A formal piped stormwater system is not envisaged for the wider site. Water will be managed on the surface and dispersed into natural drainage routes.

9.8.7 Electricity

Construction

The EPC Contractor will be responsible for the supply of electricity during construction. The electricity supply will be obtained from diesel generators and / or temporary supply via cables from the site power grid (11 kV or 22 kV feeder line).

Operation

The electricity will be supplied by the plant during daylight hours (off-peak times – 07:00 to 17:00). The BESS will supply electricity during night hours (peak times – 05:00 to 07:00 and 17:00 to 19:00). During other times electricity will be supplied from the power grid.

9.8.8 Laydown Areas

Construction

A laydown area will be required during the construction phase. The proposed temporary laydown area of approximately 0.25ha will be required (refer to **Figure 12** above).

9.8.9 Construction Workers

Construction

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

10 ALTERNATIVES

10.1 Introduction

Alternatives are the different ways in which the 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 a project.

The sub-sections to follow discuss the project alternatives considered during the EIA process. A comparative analysis of feasible alternatives from environmental (including specialist input) and technical perspectives is provided in **Section 14** below.

10.2 Site Alternatives

No site alternatives are proposed for this Project. Favourable location factors for the PV Site include suitable solar irradiation levels, short distance to grid connection point, flat topography, suitable site access and availability of land.

10.3 Layout / Design Alternatives

It is anticipated that the space available at the PV Site will be adequate to position the facility and its associated infrastructure to avoid areas of sensitive environmental features (if any), which have been determined in the current EIA Phase through specialist studies.

An initial layout was originally proposed by the Applicant. Through the environmental scoping process and with input from specialist studies, it was established that the initial layout encroached on the following sensitivities:

- Wetland areas; and
- Identified heritage sites.

The initial layout was subsequently refined ensure that the PV project does not encroach into the above-mentioned sensitivities (refer to **Figure 12** above). Two (2) layout alternatives are presented for inclusion in the EIA process that were also assessed as part of the respective specialist studies. The preferred layout alternative is identified in **Section 14** below.

10.4 Technology Alternatives

10.4.1 Solar PV Technology

Solar PV technology consists of either monofacial or bifacial solar panels used on either a fixed mounting system or tracking mounting system.

10.4.2 Solar CSP Technology

Four types of CSP technologies will be considered: parabolic troughs, power towers, dish/engine systems, and linear Fresnel reflectors. The parabolic trough system was the first CSP technology, thus it is the most developed and most replicated system.

Solar PV Technology is considered as the preferred technology.

10.4.3 BESS Technology

The BESS can be broken into solid state and flow battery systems (refer to **Section 9.4** above). A single battery technology, or a combination of two or more technology alternatives, may be implemented for the Project.

10.5 No-Go Option

As standard practice and to satisfy regulatory requirements, the option of not proceeding with the Project is included in the evaluation of the alternatives.

The no-go alternative can be regarded as the baseline scenario against which the impacts of the Project are evaluated. This implies that the current status and conditions associated with the proposed Project footprint will be used as the benchmark against which to assess the possible changes (impacts) associated with the Project.

In contrast, should the proposed Project not go ahead, any potentially significant environmental issues would be irrelevant, and the status quo of the local receiving environment would not be affected by the project-related activities. The objectives of the Project, including the benefits (such as the exploitation of SA's renewable energy resources, potential economic development and related job creation, and increased security of electricity supply), will not materialise.

The no-go option is evaluated in **Section 13.27** to understand the implications of the project not proceeding, taking into consideration the findings of the specialist studies and the outcomes of public participation (amongst others).).

11 PROFILE OF THE RECEIVING ENVIRONMENT

11.1 Introduction

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 EIA was conducted. It also allows for an appreciation of sensitive environmental features and possible receptors of the effects of the proposed Project and provides a baseline against which impacts can be determined. The study area includes the entire footprint of the Project, including the proposed Solar Plant and the powerline.

Where necessary, the regional context of the environmental features is also explained, with an ensuing focus on the local surrounding environment. The reader is referred to **Section 12** 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 in **Section 13** below.

11.2 Land Use

The Project is located approximately 20km to the north west of the central business district of Ventersdorp and falls within Ward 28 of the JB Marks Local Municipality (JBMLM), in the North West Province. The areas affected by the proposed Project footprint are rural in nature. The Project's PV Site is vacant and was historically used for agricultural purposes. Grazing is the dominant land use in the Project area. The following land uses are encountered around the Project's PV Site:

- Livestock production and cultivated land on the surrounding properties;
- The Schoonspruit Nature Reserve is located approximately 18km south east of the site; and
- The National Road (N14) is located approximately 15km south of the site which provides regional access to the area.

11.3 Climate

The project site is located in a sub-tropical highland climate area (Cwb), according to the Köppen-Geiger classification. The area is characterised as a warm-temperate, summer-rainfall region with an overall Mean Annual Precipitation (MAP) of 593 mm. Summer temperatures are high and severe frequent frost occurs in the winter (Mucina & Rutherford, 2006).

The warm season lasts for 5.6 months, from September 29 to March 17, with an average daily high temperature above 26°C. The hottest month of the year in Ventersdorp is January, with an average high of 28°C and low of 16°C. The cool season lasts for 2.3 months, from May 27 to August 5, with an average daily high temperature below 20°C. The coldest month of the year in Ventersdorp is July, with an average low of 3°C and high of 19°C.

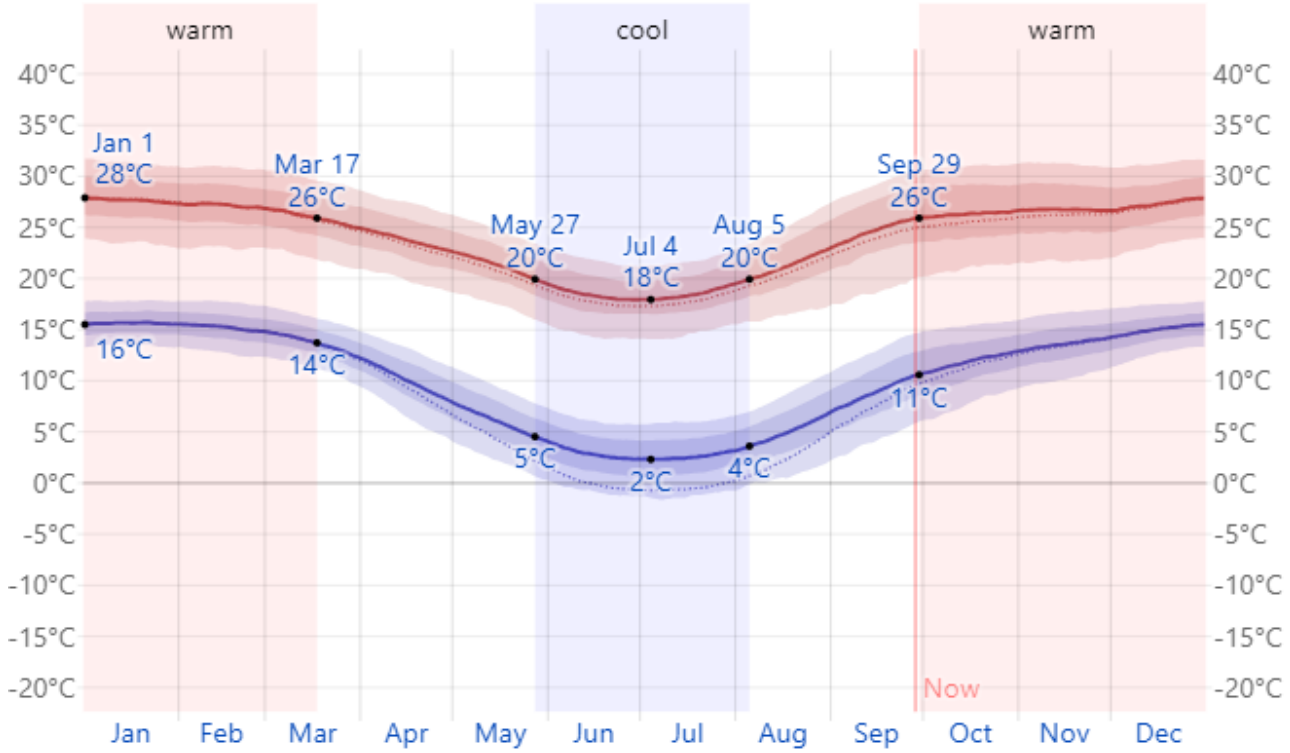

Figure 23: **Average minimum and maximum temperatures (Weatherspark, 2023).**

The rainy period of the year lasts for 8.3 months, from September 10 to May 18, with a sliding 31-day rainfall of at least 13 millimeters. The month with the most rain in Ventersdorp is January, with an average rainfall of 91 millimeters. The rainless period of the year lasts for 3.7 months, from May 18 to September 10. The month with the least rain in Ventersdorp is July, with an average rainfall of 2 millimeters. The mean monthly precipitation of the year is shown in **Figure 24** below. The average annual precipitation is 593 mm.

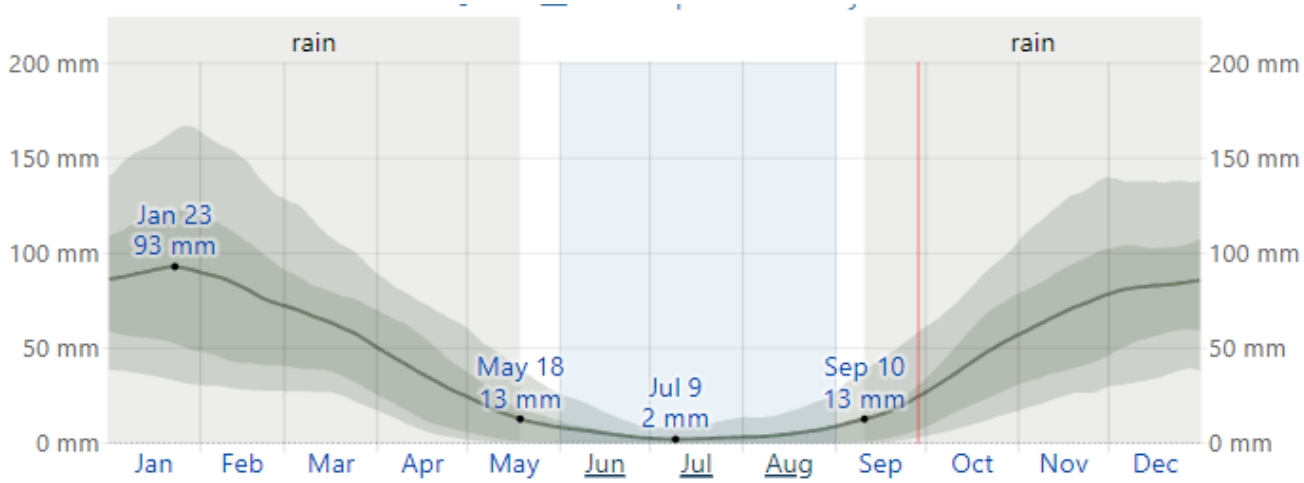

Figure 24: **Average monthly precipitation (Weatherspark, 2023).**

11.4 Geology and Soil

According to the 2626 West Rand – 1:250 000 Geological map series the study area is underlain by the Precambrian dolomites and associated marine sedimentary rocks of the Monte Christo Formation of the Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup) (refer to **Figure 25** below).

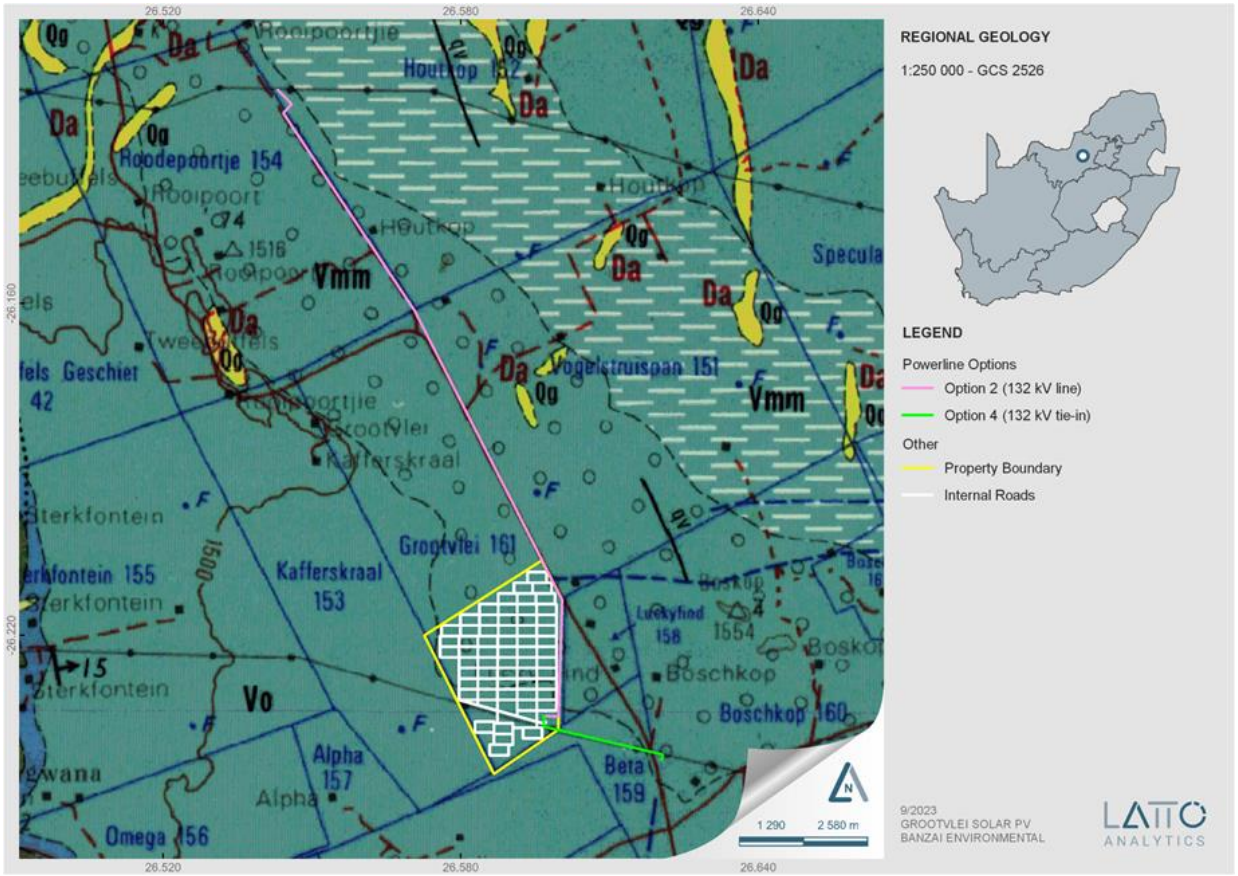

Figure 25: **Extract of the 1:250 000 West Rand 2626 (1986) Geological Map indicating that the proposed development site is underlain by the Malmani Subgroup (Butler, 2023).**

As a result of the geology, the main soil types dominating the landscape is Mispah and Glenrosa soils and is typical of the Fa land type (Lime rare or absent in the entire landscape) (Mucina & Rutherford, 2006; van der Waals *et al*., 2019). In addition, deeper red to yellow apedal soils in the form of Hutton and Clovelly occurs sporadically and represents the Ab (Red, dystrophic and/or mesotrophic) land type (Mucina & Rutherford, 2006; van der Waals *et al*., 2019). Refer to Figure 26 below for the soil classes associated with the project site.

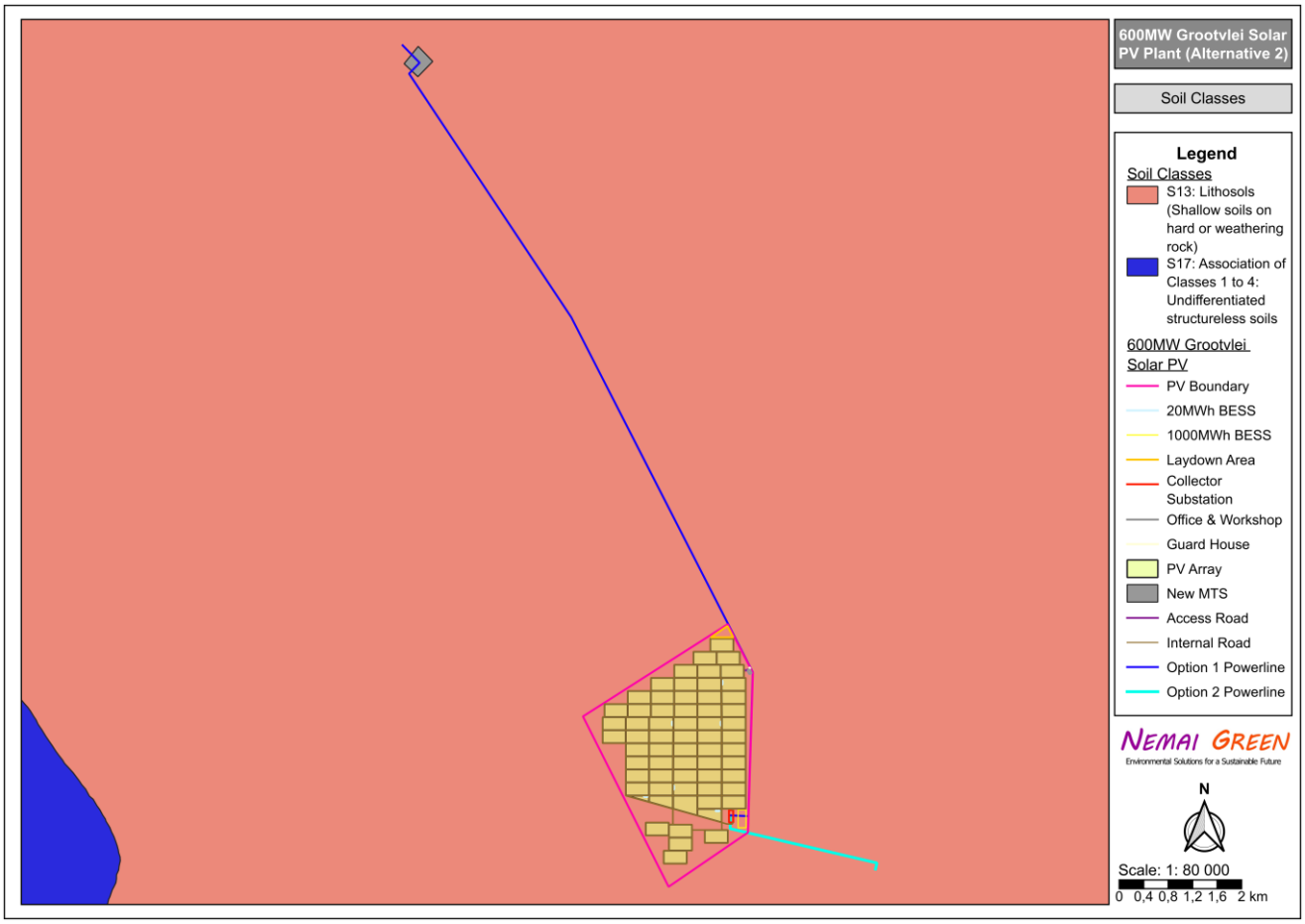

Figure 26: Soil classes.

11.5 Geohydrology

Groundwater is an important source of rural water supply within the JB MLM and in the drier parts of the municipal area groundwater constitutes the main source of water for rural domestic supplies and stock watering (JB MLM, 2022). Existing boreholes may be used as a source of water. If this is not feasible alternative options would be to tanker in the required water.

11.6 Topography

From north to south the elevation increased from 1514 m to 1523 m above sea level over a distance of approximately 3,00 km. From west to east the elevation drops very similarly from 1514 m to 1523 m above sea level over a distance of approximately 3,20 km. The topography or terrain morphology of the region is broadly described as plains with low relief. The main topographical character can be described as a flat plain, therefore, the topography is considered to have a moderate value (Buys, 2023). Refer to **Figure 27** below for the landform encountered over the PV site.

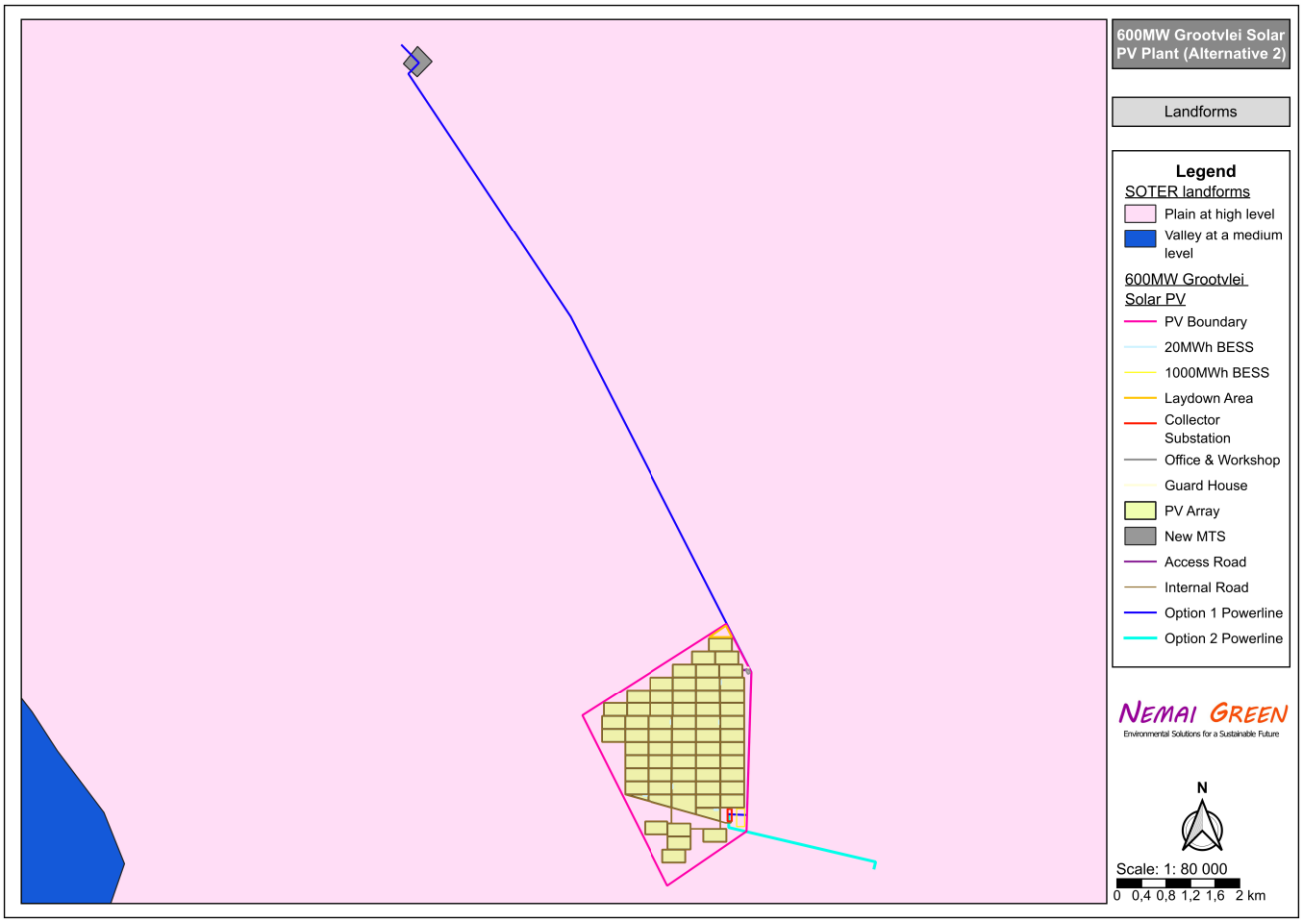

Figure 27: SOTER Landforms

11.7 Surface Water

The information contained in the sub-sections to follow was extracted from the Freshwater Impact Assessment (Van Rooyen, 2023).

11.7.1 Water Management Areas and Quaternary Catchment

Previously, the Vaal Water Management Area (WMA) was divided into three categories, namely the Lower Vaal, Middle Vaal and the Upper Vaal WMA's (DWAF, 2004a). However, under the most recent GN 1056 No. 40279 of 16 September 2016, the WMA's has been refined into Limpopo,

Olifants, Inkomati-Usuthu, Pongola-Mtamvuna, Vaal, Orange, Mzimvubu-Tsitsikamma, Breede-Gouritz and Berg-Olifants. The study area is located within one WMA. The proposed study area is situated within the middle region of the Vaal WMA (refer to **Figure 28** below). The middle region is part of a large water supply system which includes adjacent WMA's. It is situated downstream of the confluence of the Vaal and Rietspruit rivers and upstream of Bloemhof Dam. The region extends to the headwaters of the Schoonspruit River in the north and the Vet River in the south (DWAF, 2002). The land use within the middle region is characterized by agriculture (irrigation crops – wheat, groundnuts, sorghum and sunflowers). In addition, extensive gold mining activities are located within the Middle Vaal region (DWAF, 2004b).

The major rivers within this region are the Schoonspruit, Rhenoster, Vals, Vet and Vaal rivers and the Middle Vaal comprises of C24, C25, C41, C43, C60 and C70 quaternary catchments (DWAF, 2004b). The Middle Vaal is very much dependent on the water releases from the Upper Vaal region to meet its bulk water requirements for urban, mining, and industrial sectors. In addition, local resources are mainly being used for irrigation and smaller towns (DWAF, 2004b). Within the Vaal WMA, mining activities (gold mines) threatens water quality while large volumes of water are returned via treated effluent to the river systems from the urban areas and mine dewatering which further places stress on the water quality of this sub-catchment (DWAF, 2004b).

Majority of the study area is located within the C24F Quaternary Catchment while a small section of the Option 2 Powerline is within C24E Quaternary Catchment (refer to **Figure 29** below). The DWS has determined PES and EIS scores for each Quaternary Catchment area in Southern Africa back in 2014 (DWS, 2014). As such, for the Quaternary Catchments C24F, DWS has determined a PES as C (Moderately modified). In addition, the EIS was determined as C (Moderate Importance and Sensitivity) (DWS, 2014). Furthermore, the PES and EIS scores was determined for the C24E as D (Largely Modified) and C (Moderate Importance and Sensitivity) (DWS, 2014).

11.7.2 National Freshwater Ecosystem Priority (NFEPA) rivers

The watercourses map in **Figure 30** below highlights the NFEPA rivers, non-perennial rivers and dams associated with the study area. No perennial or non-perennial river is located within the study area as well as within the 500 m regulated area. Also, no agricultural dams are found within the footprint and the surrounding environment.

11.7.3 National Biodiversity Assessment (NBA) 2018 National Wetland Map (NWM) 5

A South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was established in 2018 during the National Biodiversity Assessment (Van Deventer et al., 2018). This inventory highlights a collection of data layers pertaining to ecosystem types and pressures for rivers and inland wetland types. This includes the different wetland HGM units (CVB, UCVB, S, Dep, F and FL) as well its protection level (Well protected, Moderately protected, Poorly protected and Not protected) and threat status (Critical, Endangered, Vulnerable and Least Concern).

Within the footprint of the study area, there are no HGM units according to the NBA 2018 NWM 5 spatial data, however, within the 500 m regulated area, there is one HGM unit (Dep) located just south of the PV site (Figure 18). In South Africa, rivers and inland wetlands have the highest percentage of being critically endangered; 42% & 61% respectively (Skowno et al., 2019). From the NWM 5 spatial data, all wetlands near the study area are classified as Least Concern (Figure 19). Skowno et al. (2019) has further indicated that inland wetlands have the lowest overall protection in South Africa compared to other ecosystem realms. A total of 60% is classified as not protected while as less as 10% is classified as well protected and moderately protected (Figure 20). This has been attributed to their poor ecological condition (Skowno et al., 2019).

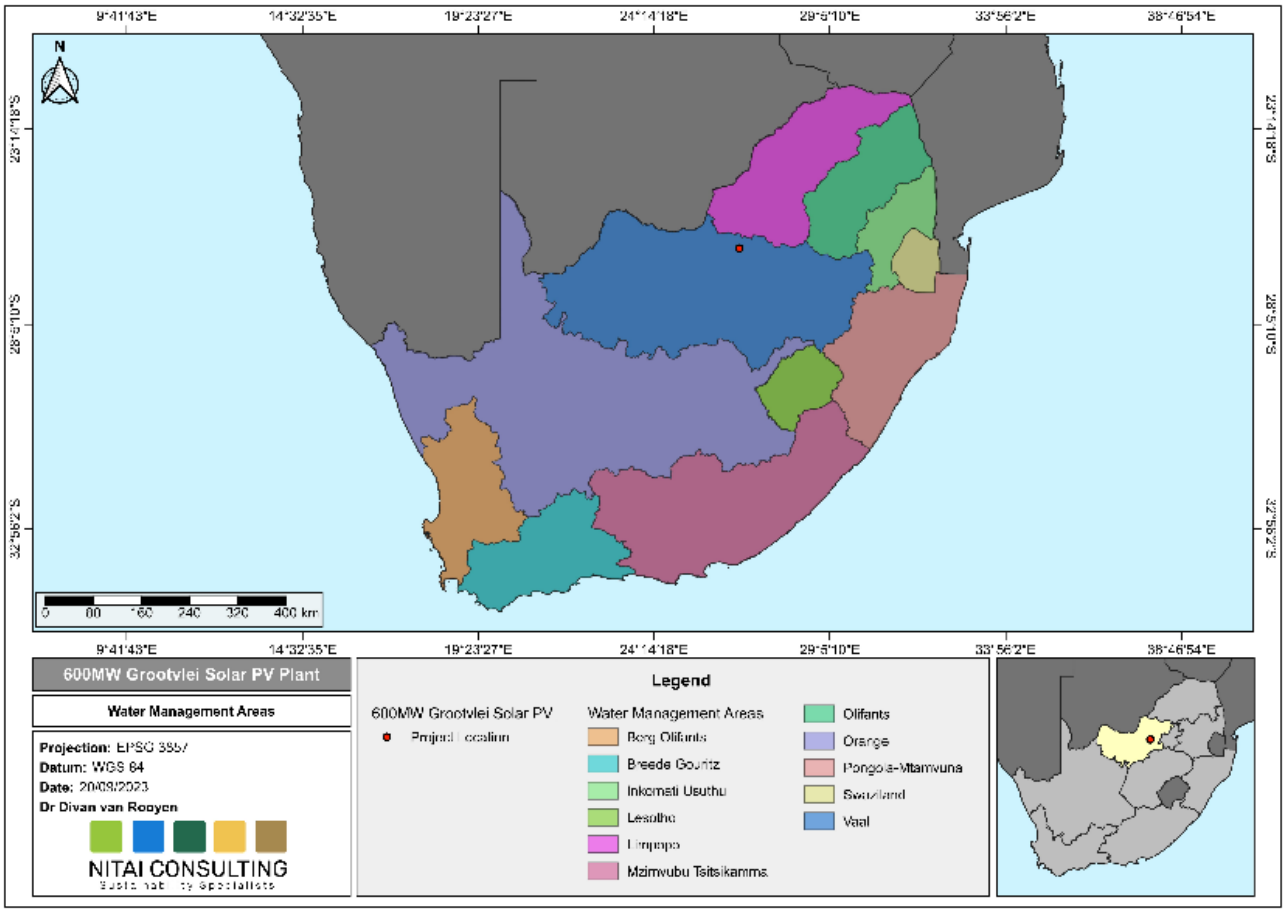

Figure 28: Water Management Area associated with the study area (Van Rooyen, 2023).

11.7.4 Critical Biodiversity Areas (CBA's)

On a regional scale, terrestrial and aquatic biodiversity conservation priorities are highlighted in the North West (NW) Biodiversity Sector Plan (Schaller et al., 2015). The sector plan identifies Critical Biodiversity Areas (CBA's) which refers to terrestrial and aquatic sites that are required to meet each ecosystem's biodiversity target while being maintained in an appropriate ecological condition for their category, referred to as the land management objective (Schaller et al., 2015).

Critical Biodiversity Areas within the NW are areas of the landscape that needs to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and

ecosystems and the delivery of ecosystem services (Schaller et al., 2015). The NW Biodiversity Sector Plan distinguishes between the terrestrial CBA's and aquatic CBA's. The aquatic CBA's are classified under two level:

- Aquatic CBA level 1: This includes FEPA Rivers (fish sanctuaries and free-flowing rivers) buffered by 100 m identified in NFEPA and modified by DWS National River Ecostatus Monitoring Program (REMP) and experts and Important Habitats such as Peat Wetlands and Dolomitic Eyes; and
- Aquatic CBA level 2: This include Modelled Wetlands such as pans, instream wetlands and riparian areas.

The spatial dataset from Desmet & Schaller (2015) highlights that the study area does not fall within either CBA 1 or CBA 2 (refer to **Figure 34** below).

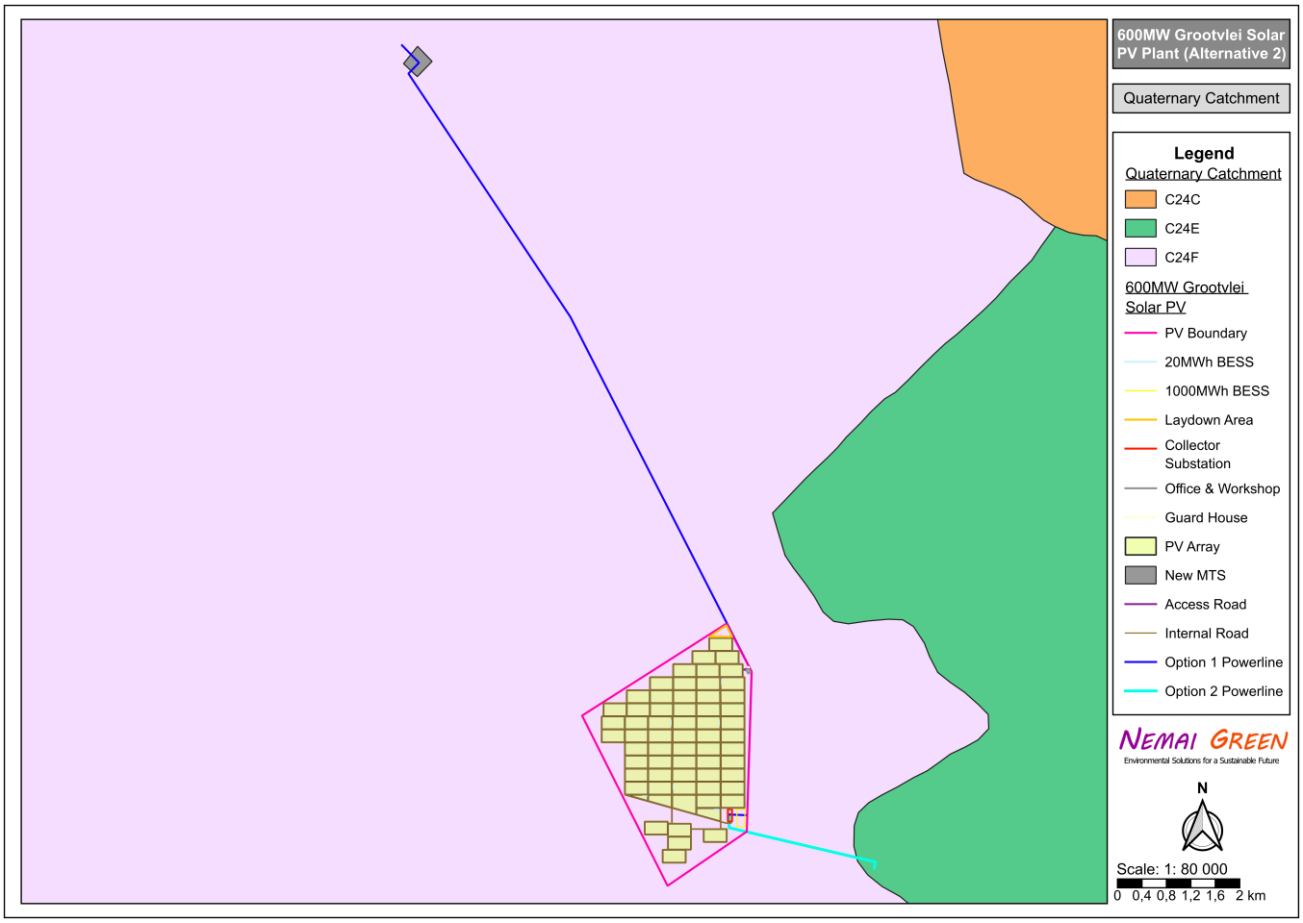

Figure 29: Quaternary catchment map.

11.7.5 Ecological Support Areas (ESA's)

Ecological Support Areas (ESA's) are terrestrial and aquatic areas that are not essential for meeting biodiversity representation targets (thresholds), but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration (Schaller *et al.*, 2015). Furthermore, the degree or extent of restriction on any

land use and resource within the ESA's may be lower than the CBA's restrictions (Schaller *et al*., 2015).

According to the NW Biodiversity Sector Plan, ESA's are categorised into two groups namely: Ecological Support Area Level 1 and 2. Both ESA levels are areas such as FEPA Fish Catchments, Wetland Clusters, Peat Wetland Buffers and Dolomite Recharge Areas (Schaller *et al*., 2015).

From the NW Biodiversity spatial data, the northern and parts of the eastern and southern and portions of the study areas is situated within either ESA 1 and/or ESA 2 (refer to **Figure 34** below). The other remaining footprint of the study is in unclassified land.

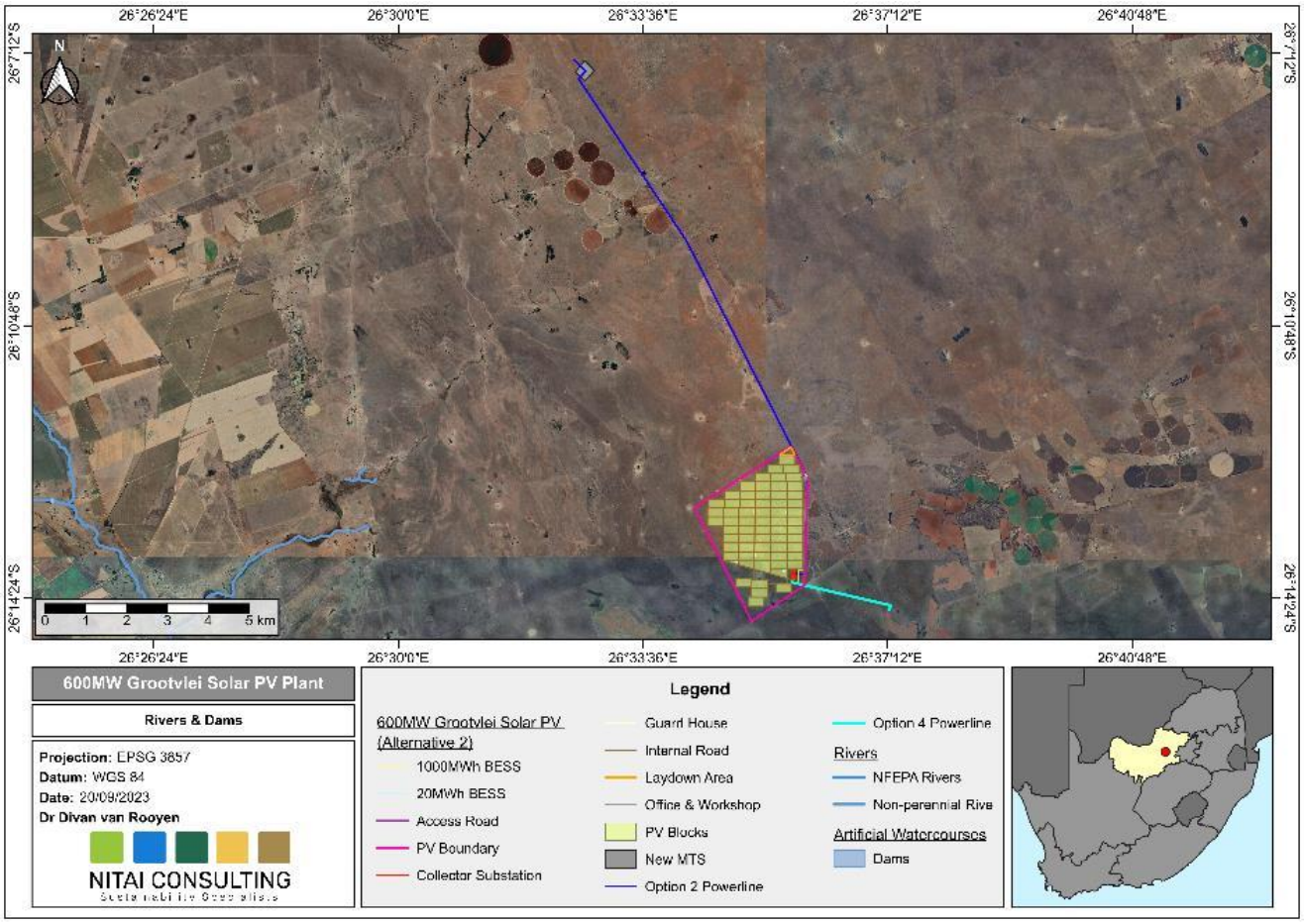

Figure 30: Map showing watercourses (NFEPA rivers, non-perennial rivers and Dams) associated with the study area (Alternative 2 and Preferred Layout) (Van Rooyen, 2023).

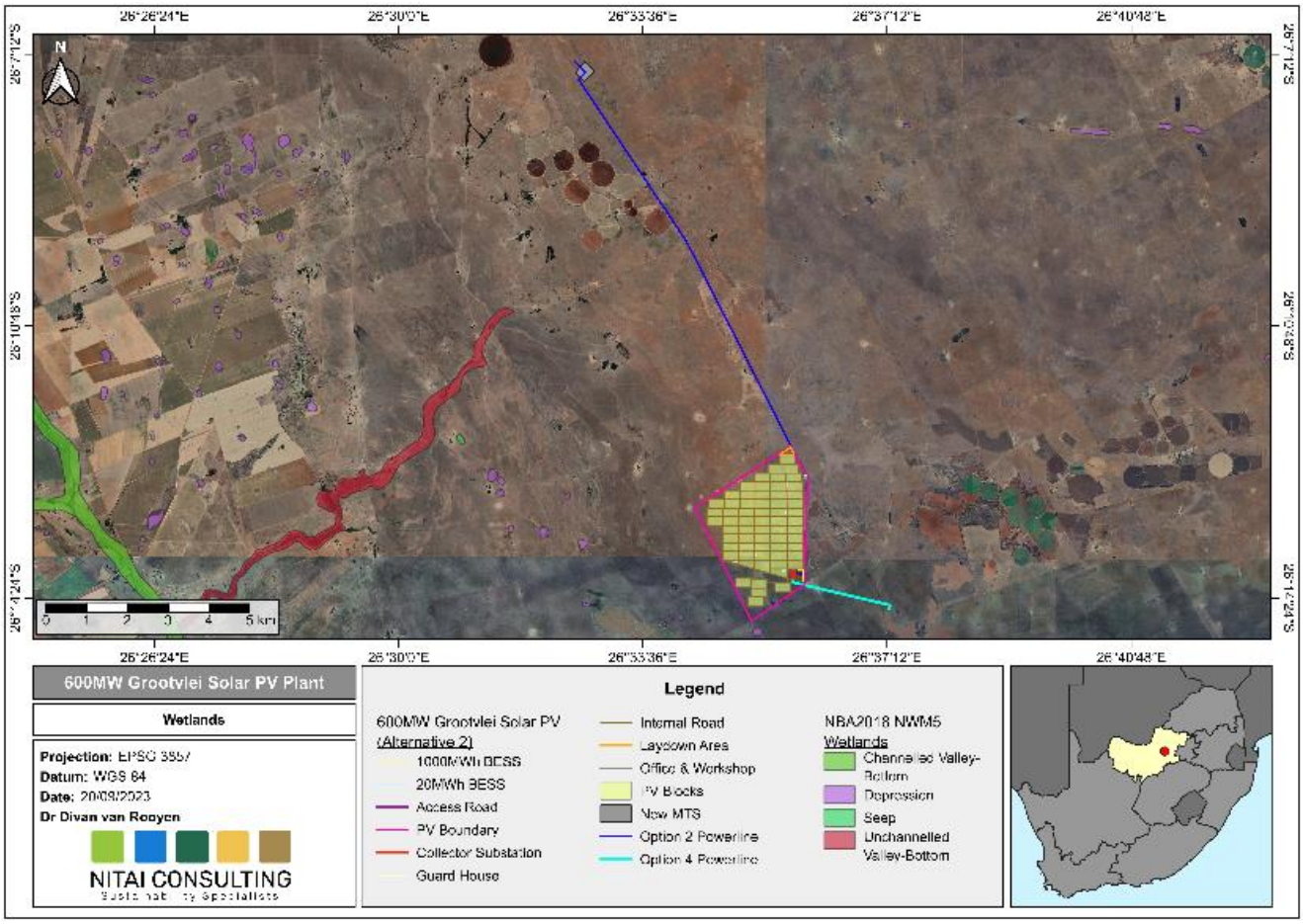

Figure 31: **Map indicating the wetland hydrogeomorphic units associated with the study area (Alternative 2 and Preferred Layout) (Van Rooyen, 2023)**

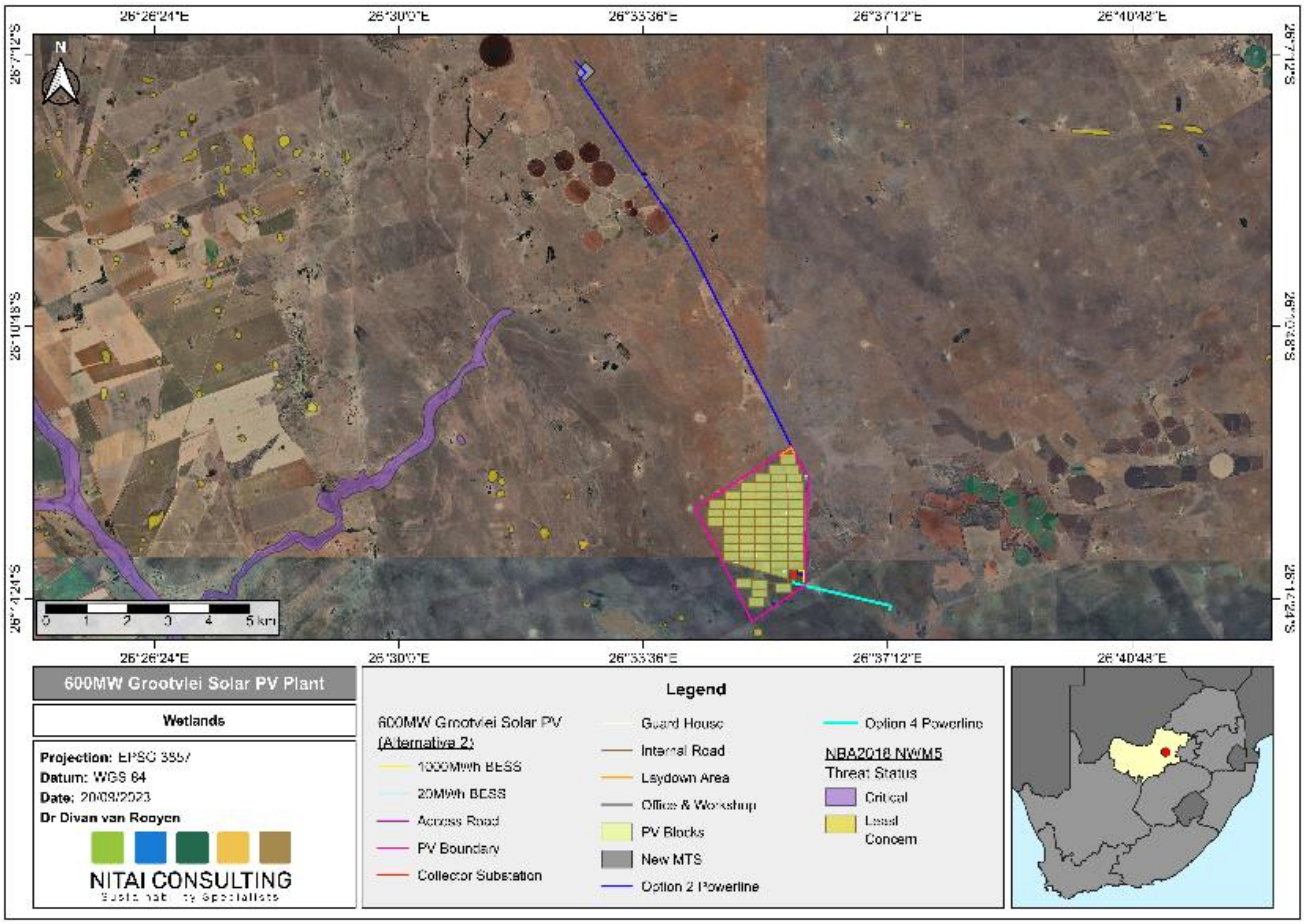

Figure 32: **Map indicating the threat status of all the wetlands surrounding the study area (Alternative 2 and Preferred Layout) (Van Rooyen, 2023)**

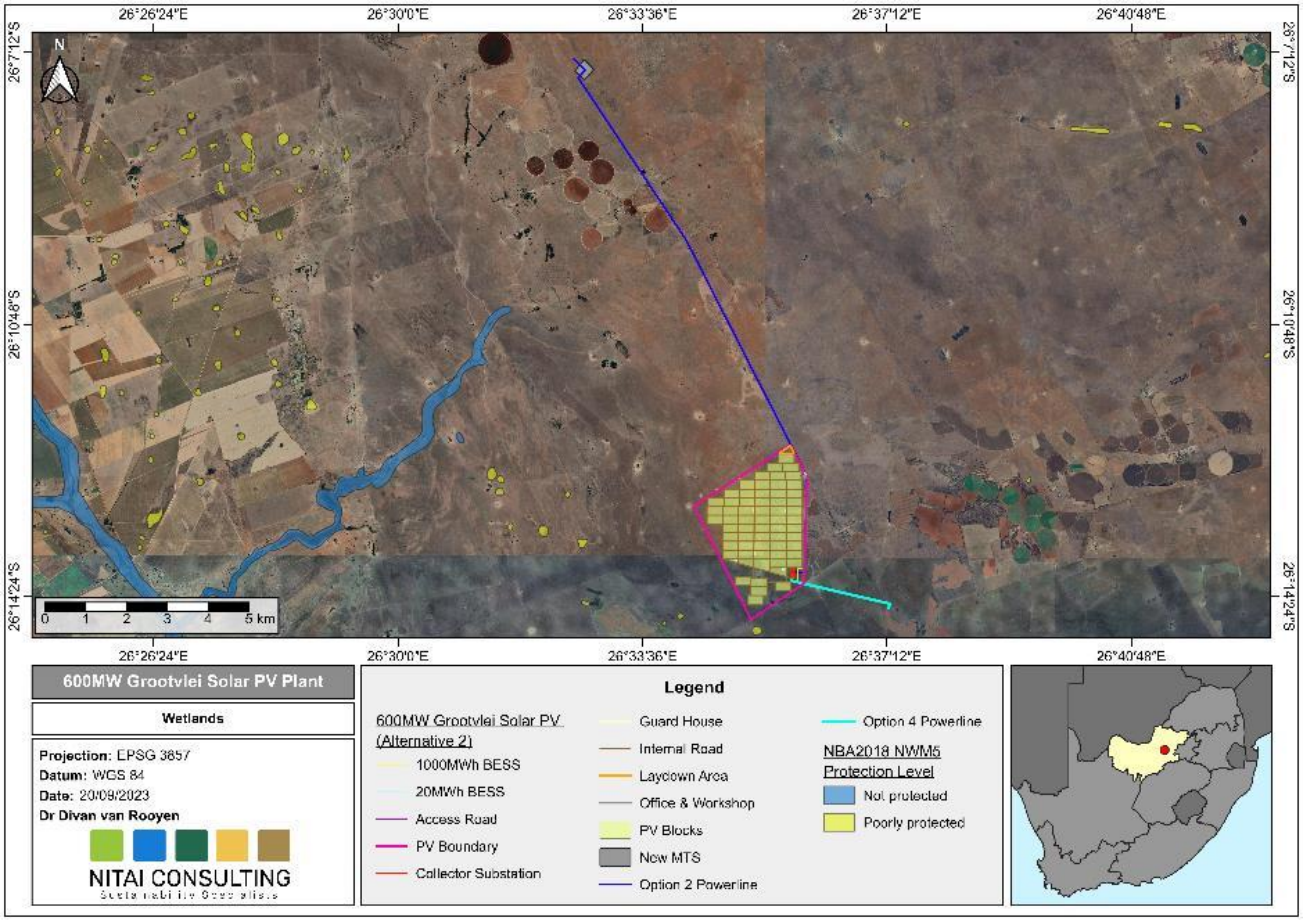

Figure 33: **Map indicating the protection level of all the wetlands surrounding the study area (Alternative 2 and Preferred Layout) (Van Rooyen, 2023).**

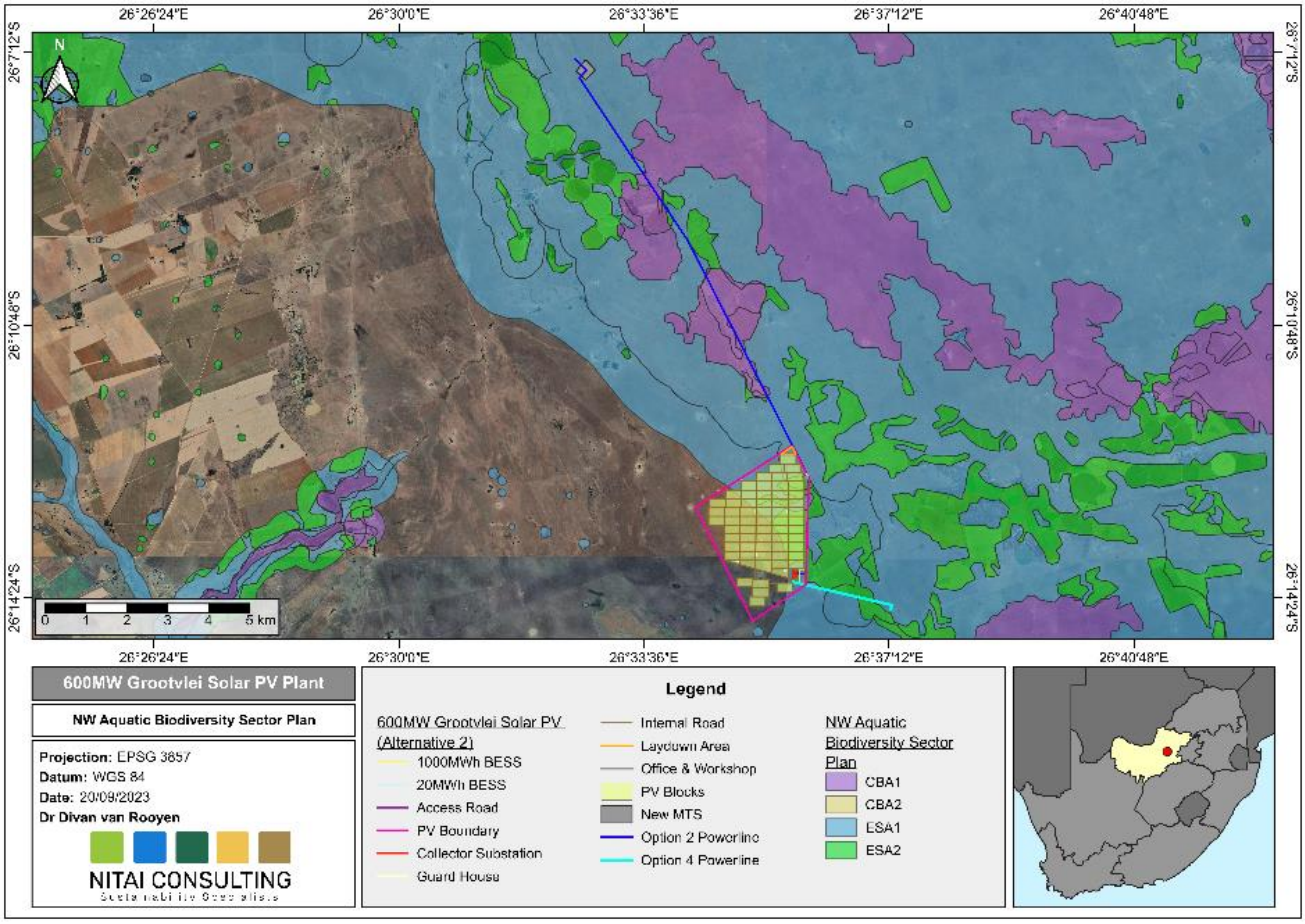

Figure 34: **Map indicating the Aquatic Critical Biodiversity Areas Levels 1 and 2 in relation to the study area (Alternative 2 and Preferred Layout) (Van Rooyen, 2023).**

11.8 Terrestrial Ecology

The information contained in the sub-sections to follow was extracted from the Terrestrial Biodiversity Compliance Statement (Human, 2023).

11.8.1 North West Biodiversity Sector Plan

The North West Biodiversity Sector Plan (NWBSP) strives to improve landscape level conservation and management of biodiversity and ecosystems in the province. This is achieved by providing information on biodiversity in a standardised format that can be used to inform forward planning (e.g., Spatial Development Frameworks) and reactive management (e.g., environmental impact assessment) processes.

The purpose of a Biodiversity Sector Plan is to inform land use planning, environmental assessments, land and water use authorisations, as well as natural resource management, undertaken by a range of sectors whose policies and decisions impact on biodiversity. This is done by providing a map of biodiversity priority areas, referred to as Critical Biodiversity Areas (CBAs)

and Ecological Support Areas (ESAs), with accompanying land use planning and decision-making guidelines.

- Critical Biodiversity Areas (CBAs) are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near natural state then biodiversity targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses; and
- Ecological Support Areas (ESAs) are terrestrial and aquatic areas that are not essential for meeting biodiversity representation targets (thresholds), but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The degree or extent of restriction on land use and resource use in these areas may be lower than that recommended for CBAs.

The project area overlaps with CBAs and ESAs (refer to **Figure 35** below).

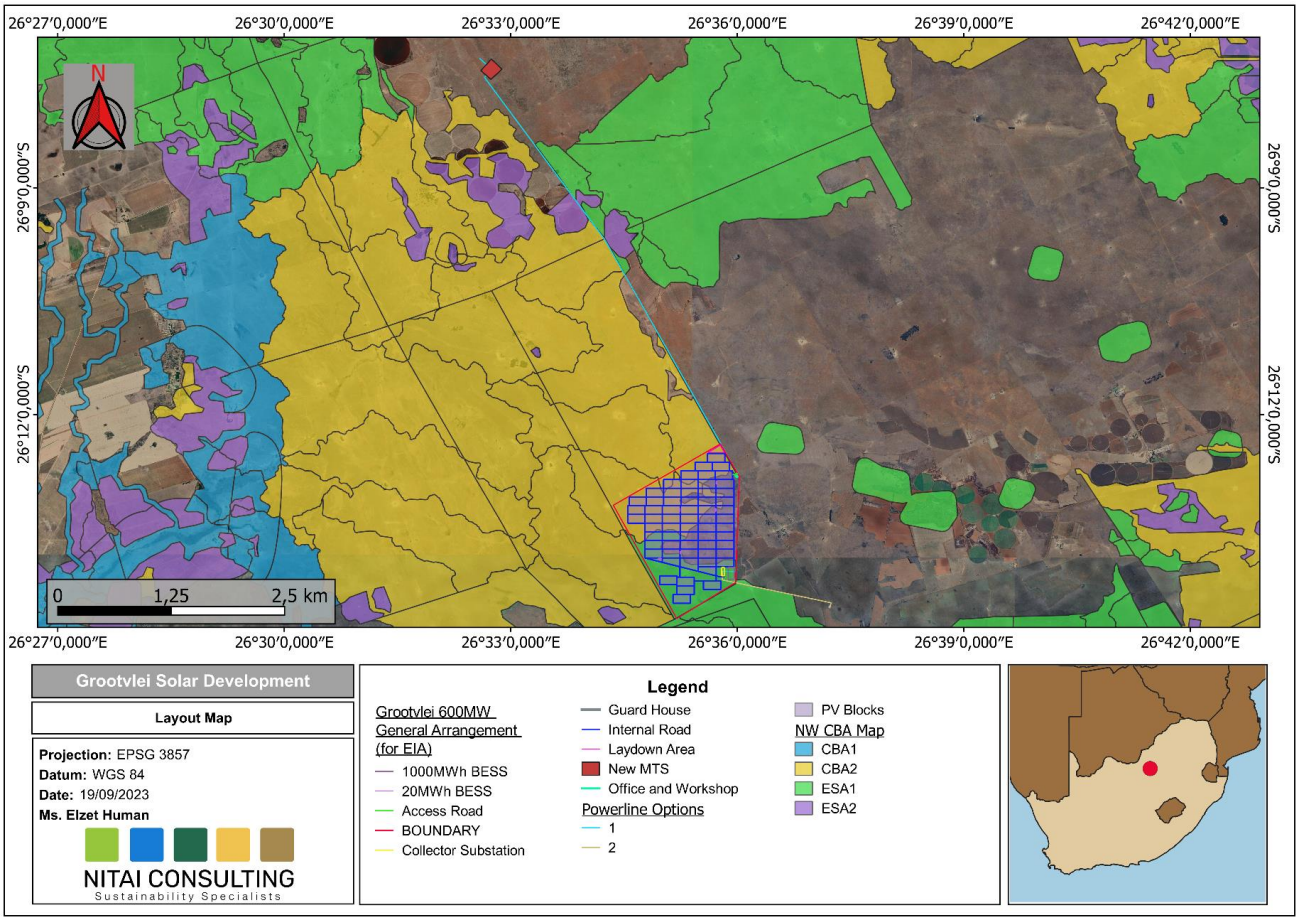

Figure 35: **Map illustrating the locations of CBAs in the project area (Human, 2023).**

11.8.2 Threatened Terrestrial Ecosystems

In terms of Section 52(1)(a) of NEM:BA, a national list of ecosystems that are threatened and in need of protection was gazetted on 9 December 2011. The list classified all threatened or protected ecosystems in South Africa in terms of four categories; Critically Endangered (CR), Endangered (EN), Vulnerable (VU), or Protected. The purpose of categorising these ecosystems is to prioritise conservation areas in order to reduce the rates of ecosystem and species extinction, as well as preventing further degradation and loss of structure, function, and composition of these ecosystems.

The 2011 list has also been used throughout South Africa as a decision-making support tool, especially in environmental authorisation application processes and to inform bioregional planning. The revised list, known as the 2022 Red List of Ecosystems, was developed between 2016 and 2021, incorporating the best available information on terrestrial ecosystem extent, condition, pressures, and drivers of change.

The revised list is based on assessments that followed the International Union for Conservation of Nature (IUCN) Red List of Ecosystems Framework (version 1.1) and covers all 456 terrestrial ecosystem types described in South Africa. The updated input data and alignment with global methods provides for a substantially improved list but also limits direct comparison between 2011 and 2022 because some ecosystem types have changed threat status category due to the change in methods, and others have changed due to land cover change or other pressures in the landscape. Going forward, comparisons between versions of the list will be possible, facilitating trend analysis and monitoring. The 2022 Red List of Ecosystems identifies 120 threatened terrestrial ecosystem types (55 Critically Endangered, 51 Endangered and 14 Vulnerable types).

The Project Area does not fall within a threatened ecosystem and is rated as Least Concern (LC) (refer to **Figure 36** below).

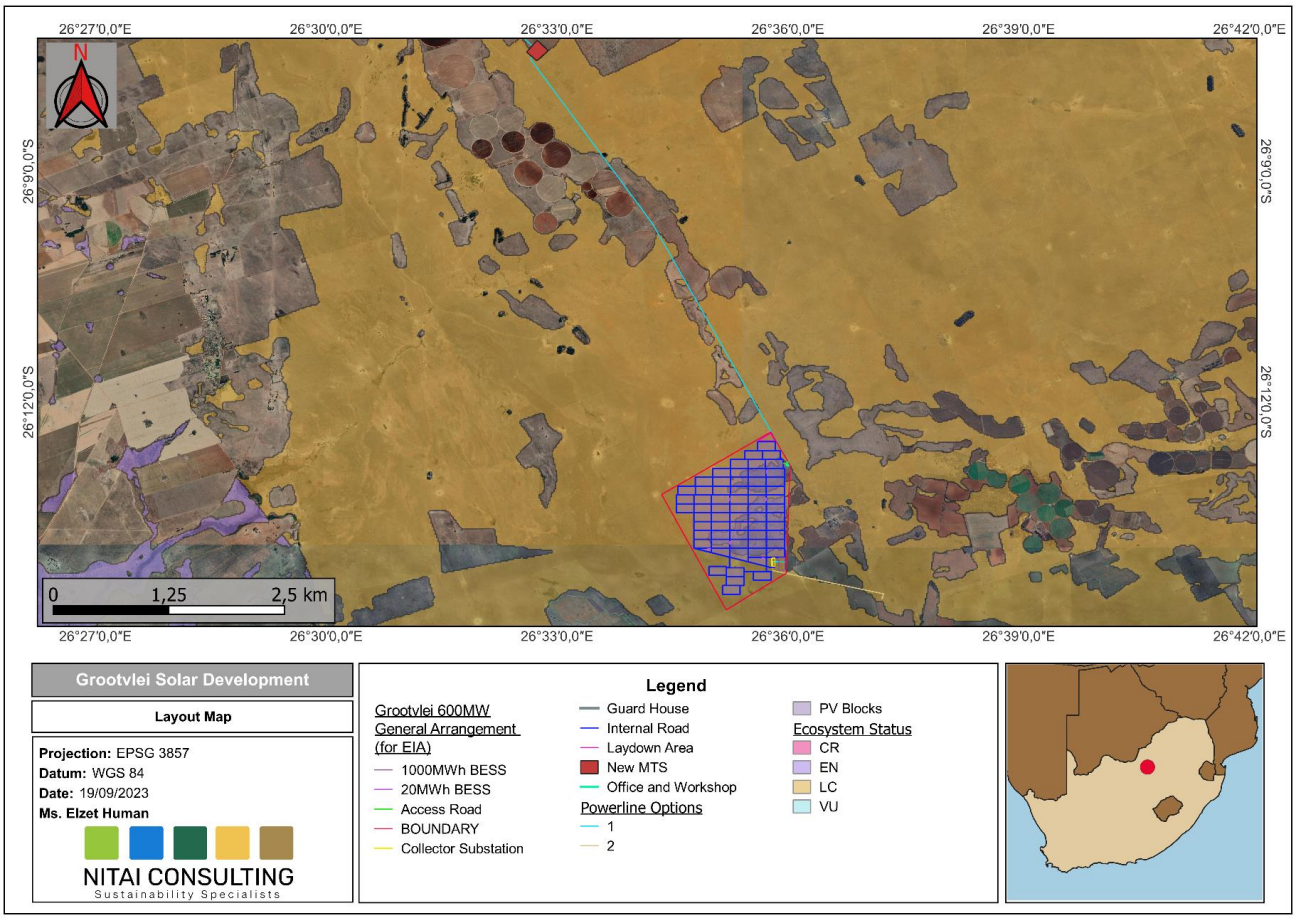

Figure 36: **Ecosystem threat status associated with the Project Area (Human, 2023).**

11.8.3 Ecosystem Protection Level

'Ecosystem protection level' is an indicator of how adequately an ecosystem is protected or not. Ecosystems can be classified as not protected, poorly protected, moderately protected or well protected depending on the proportion of each ecosystem that is under conservation management within a protected area, as recognized in the National Environmental Management: Protected Areas Act (Act No. 57 of 2003) (NEM:PAA). These protected areas include state or privately-owned protected areas as well a land under biodiversity stewardship agreements. According to the National Biodiversity Assessment (2018), the project area falls within the area listed as Poorly Protected on a national scale (refer to **Figure 37** below).

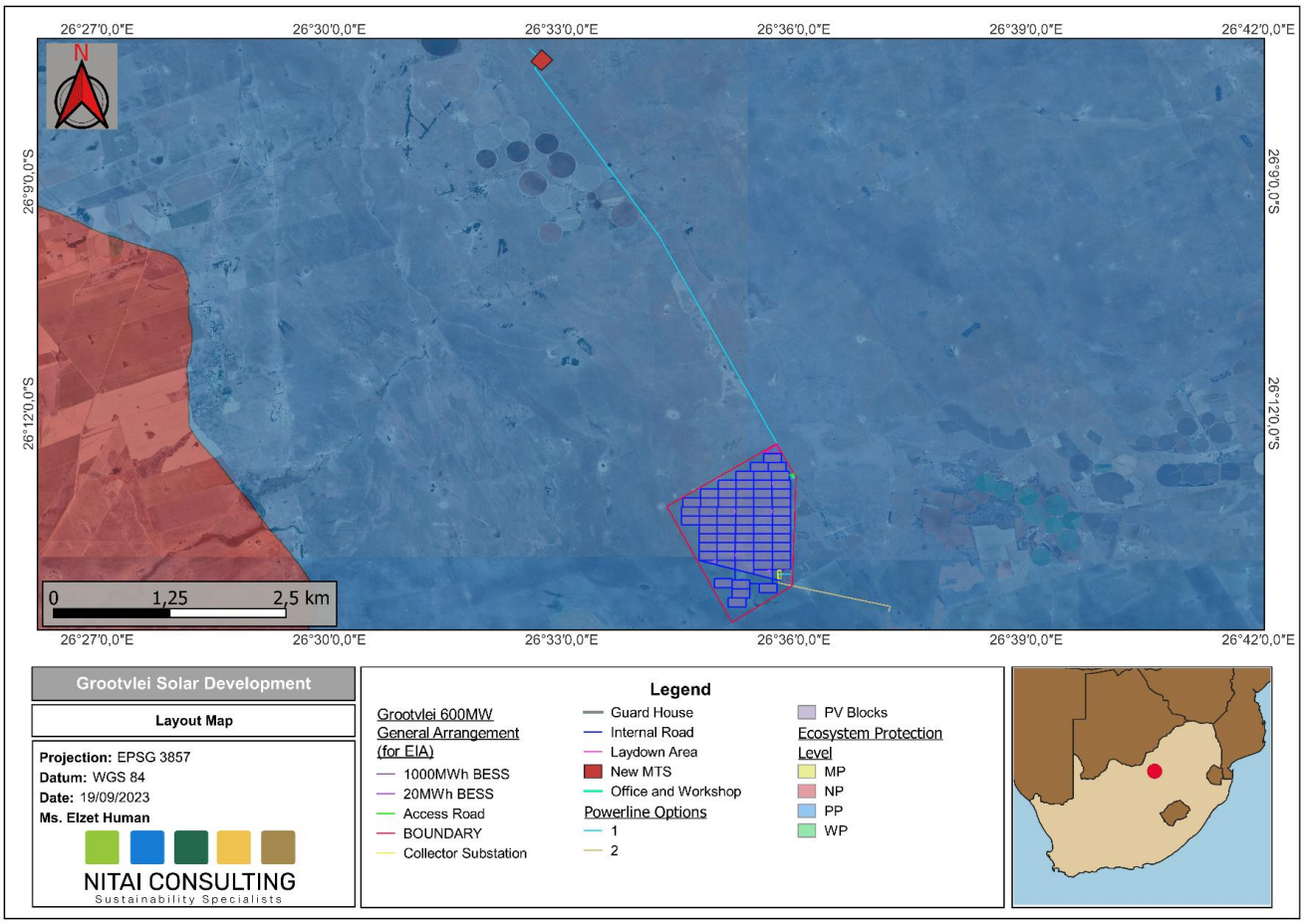

Figure 37: Ecosystem protection status of the Project Area (Human, 2023).

11.8.4 Protected and Conservation Areas

11.8.4.1 SAPAD and SACAD

According to the protected area spatial datasets from the South African Protected Areas Database (SAPAD) (2022) and the South African Conservation Areas Database (SACAD) (2022), the main project area lies outside the 5 km buffer for Klipstraat Private Nature Reserve but a small portion of the powerline route option to the south of the project is found within the regulated area (refer to **Figure 38** below).

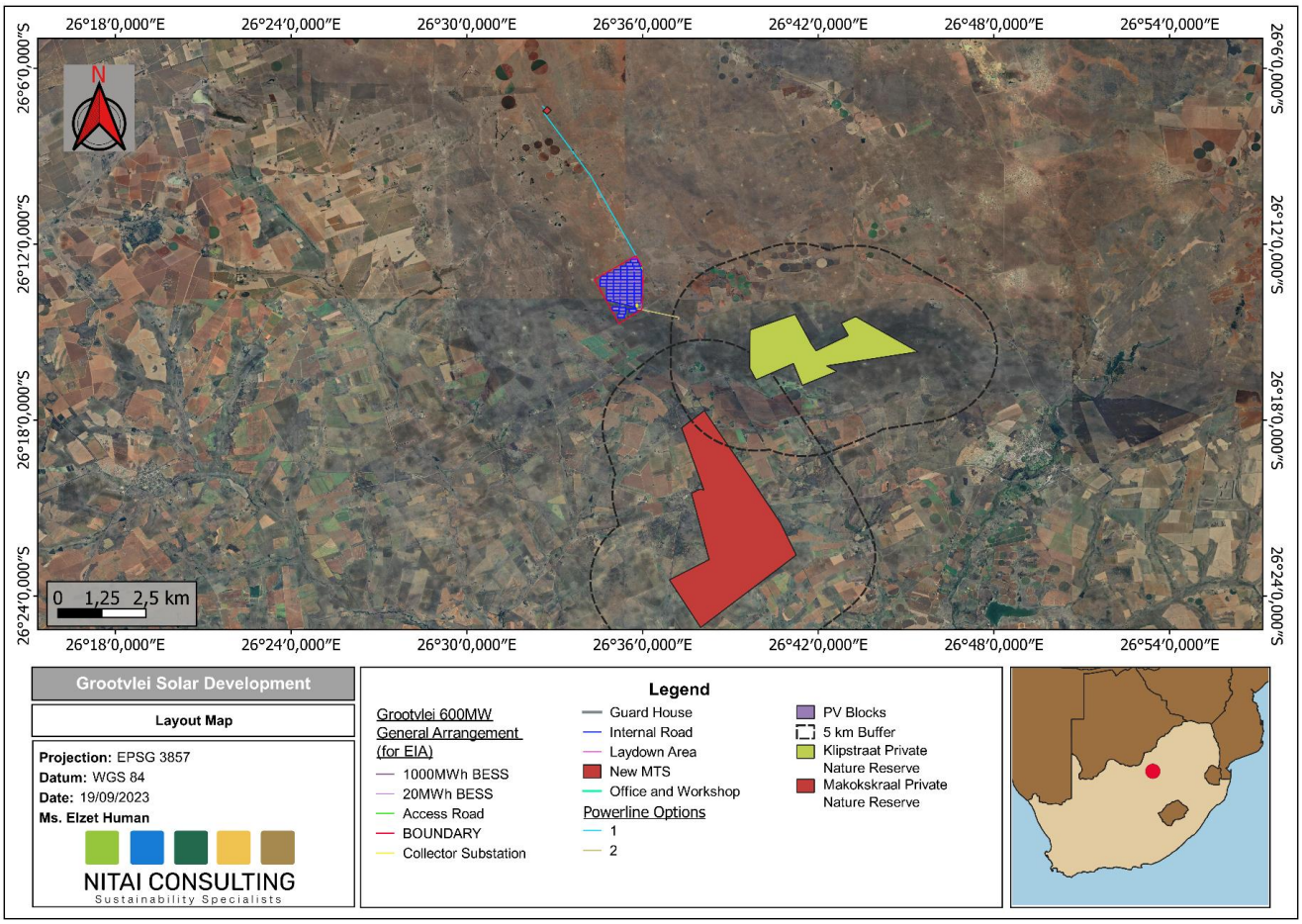

Figure 38: **Map illustrating the project area in relation to the nearest protected areas (Human, 2023).**

11.8.4.2 National Protected Area Expansion Strategy

National Protected Area Expansion Strategy 2017 (NPAES) were identified through a systematic biodiversity planning process. They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for fine scale planning which may identify a range of different priority sites based on local requirements, constraints, and opportunities (NPAES, 2017). The project area does overlap with the Priority Focus Areas, as per the NPAES (refer to **Figure 39** below).

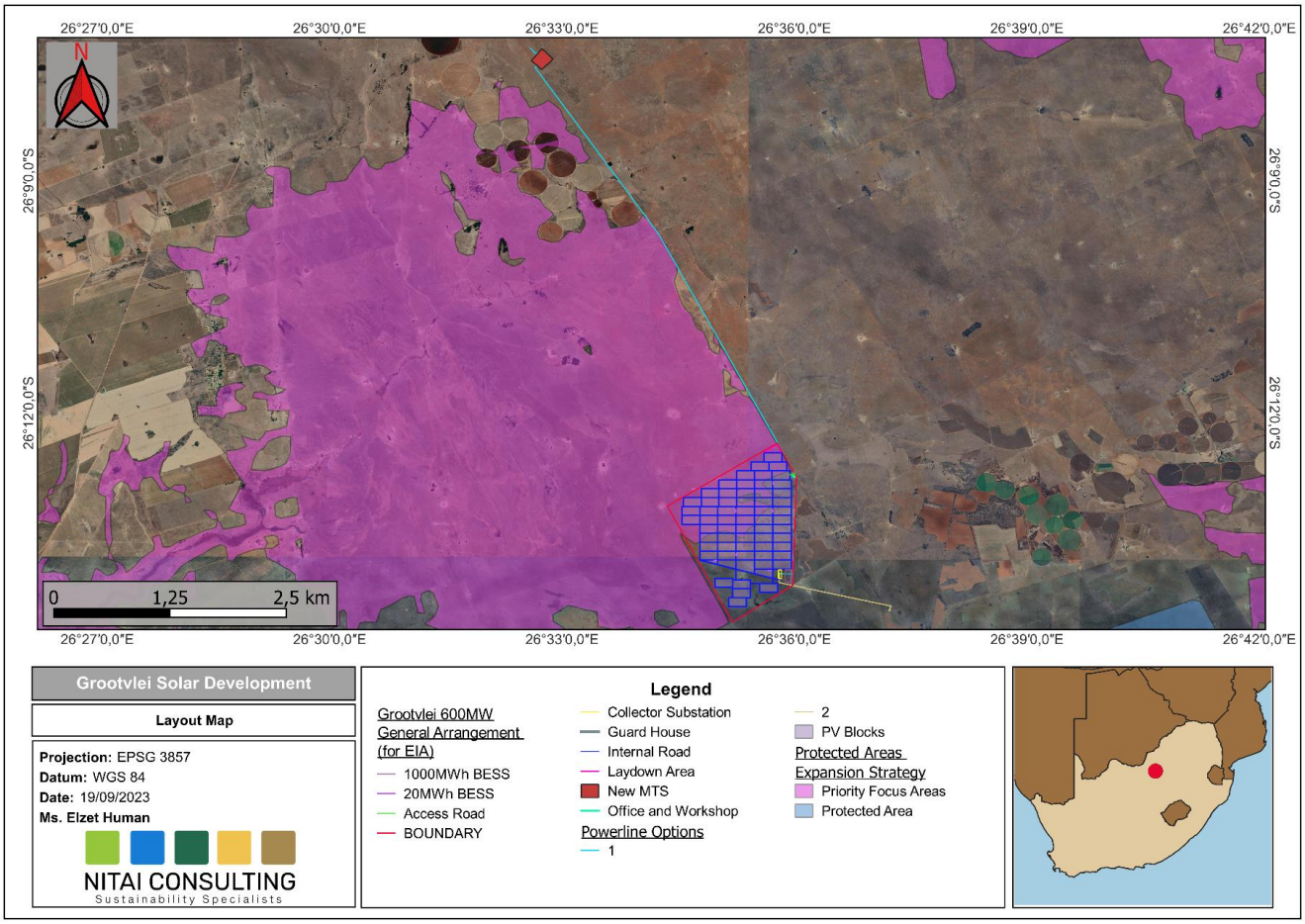

Figure 39: The project area in relation to the National Protected Area Expansion Strategy (Human, 2023).

11.8.5 Desktop Baseline Flora Assessment

This section is divided into a description of the vegetation type and the expected flora species in the Project Area.

11.8.5.1 Biomes and Vegetation Types

The Project Area is situated within the Grassland Biome. The Grassland Biome in South Africa occurs mainly on the Highveld, the inland areas of the eastern seaboard, the mountainous areas of KwaZulu-Natal and the central parts of the Eastern Cape. The topography is mainly flat to rolling, but also includes mountainous regions and the Escarpment (Mucina & Rutherford, 2006). Grasslands characteristically contain herbaceous vegetation of a relatively short and simple structure that is dominated by graminoids, usually of the family Poaceae. Woody plants are rare (usually made up of low or medium-sized shrubs), absent, or confined to specific habitats such as smaller escarpments or koppies. Core grassland areas usually have deep, fertile soils although a wide spectrum of soil types occurs (Mucina & Rutherford, 2006).

The grassland Biome is comprised of 4 parent bioregions and a total of 72 different vegetation types. The Project Area is situated within the Carletonville Dolomite Grassland vegetation type

(refer to **Figure 40** below). The Carletonville Dolomite Grassland occurs in terms of its distribution in the Gauteng and North West Provinces and marginally into the Free State Province. The Carletonville Dolomite Grassland is characterised by slightly undulating plains dissected by prominent rocky chert ridges and are species-rich grasslands forming a complex mosaic pattern dominated by many species. In terms of its conservation status, the vegetation type is classified as Least Concern (LC) with 6.1% of its distribution currently formally protected.

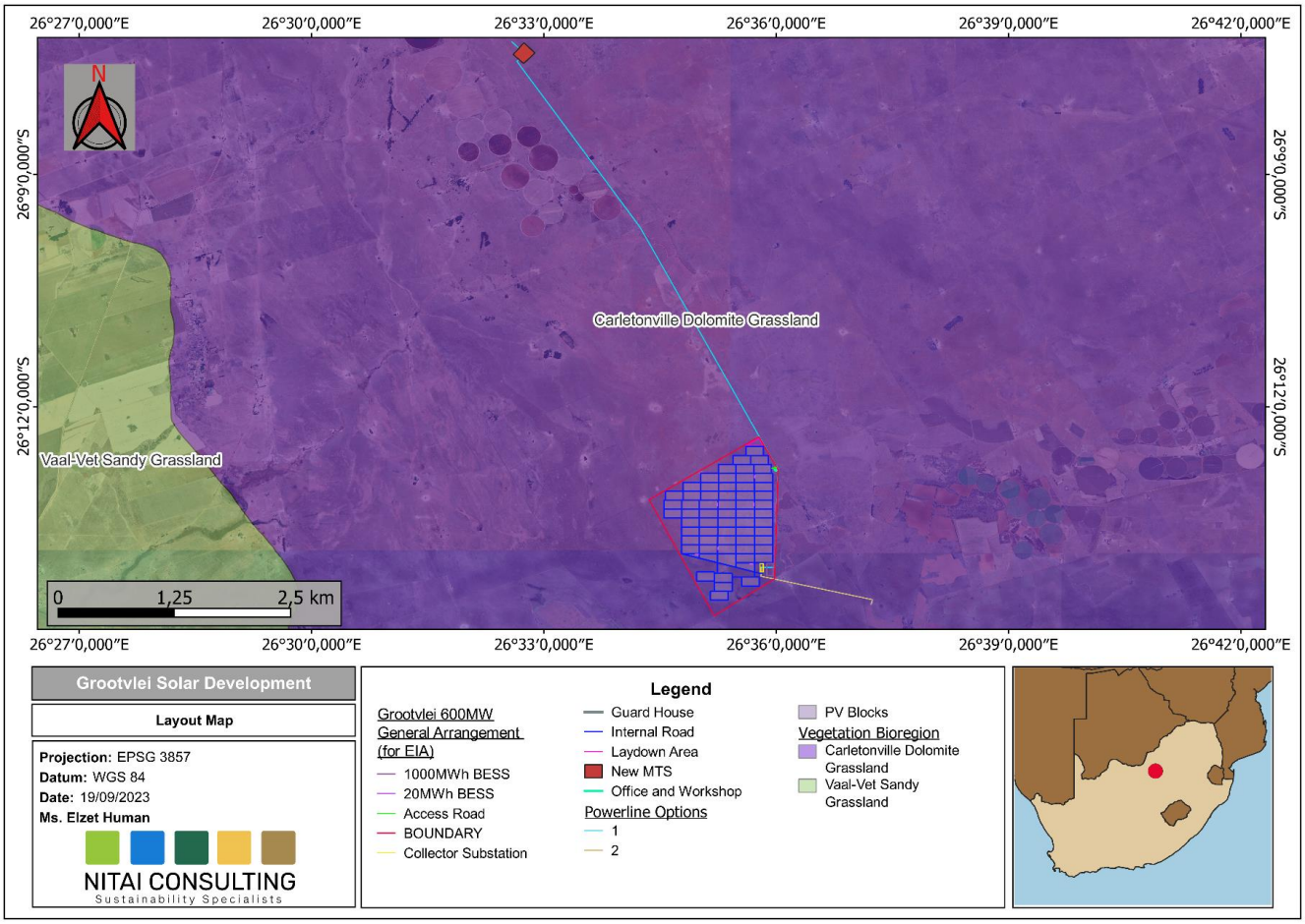

Figure 40: Vegetation region of the Project Area (Human, 2023).

11.8.5.2 Expected Flora Species

Based on the Plants of Southern Africa (BODATSA-POSA, 2019) and the IUCN spatial database, 40 plant species could potentially occur on the study site. There are no Species of Conservation Concern (SCC) in this potential occurrence list. The National Web-Based Screening Tool identified no potential SCC.

11.8.6 Desktop Baseline Faunal Assessment

Based on the IUCN Red List Spatial Data, 18 amphibian species and 27 reptile species are expected to occur within the area. None are regarded as threatened. Further to this, the IUCN Red List Spatial Data lists 71 mammal species that could be expected to occur within the area. This list

excludes large mammal species that are limited to protected areas. Two of these expected species are regarded as vulnerable and two are considered near threatened (refer to **Table 17** below).

Table 17: Threatened mammal species that are expected to occur within the project area (Human, 2023).

Family	Taxon	Common name	Status
Felidae	*Felis nigripes*	Black footed cat	Vulnerable (2016)
Nesomyidae	*Mystromys albicaudatus*	South African Vlei-rat	Vulnerable (2016)
Hyaenidae	*Parahyaena brunnea*	Brown Hyena	Near Threatened (2016)
Muridae	*Otomys auratus*	Southern Vlei-rat	Near Threatened (2016)

11.8.7 Desktop Baseline Avifaunal Assessment

A separate Avifaunal Impact Assessment (Kemp, 2023) was undertaken for the Project. The information below was extracted from this study.

11.8.7.1 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 South Africa, 2017). There are no IBA's within a 20km radius of the Project Area. The closest IBA is the Magaliesberg, which is located 37km north east from the site (refer to **Figure 41** below).

11.8.7.2 Expected Species of Conservation Concern

The South African Bird Atlas Project Version 2 (SABAP2) data lists 138 indigenous avifauna species that could be expected to occur within the Project Area of Influence (PAOI) and surrounding landscape. One (1) of these expected species are regarded SCC (refer to **Table 18** below).

Table 18: Avifauna Species of Conservation Concern that are expected to occur within the PAOI (Kemp, 2023)

Scientific Name	Common Name	Conservation Status		Likelihood of Occurrence
		Regional	Global (IUCN)	
Sagittarius serpentarius	Secretarybird	VU	EN	Moderate

Notes:
CR: Critically Endangered
EN: Endangered
LC: Least Concern
NT: Near Threatened
VU: Vulnerable

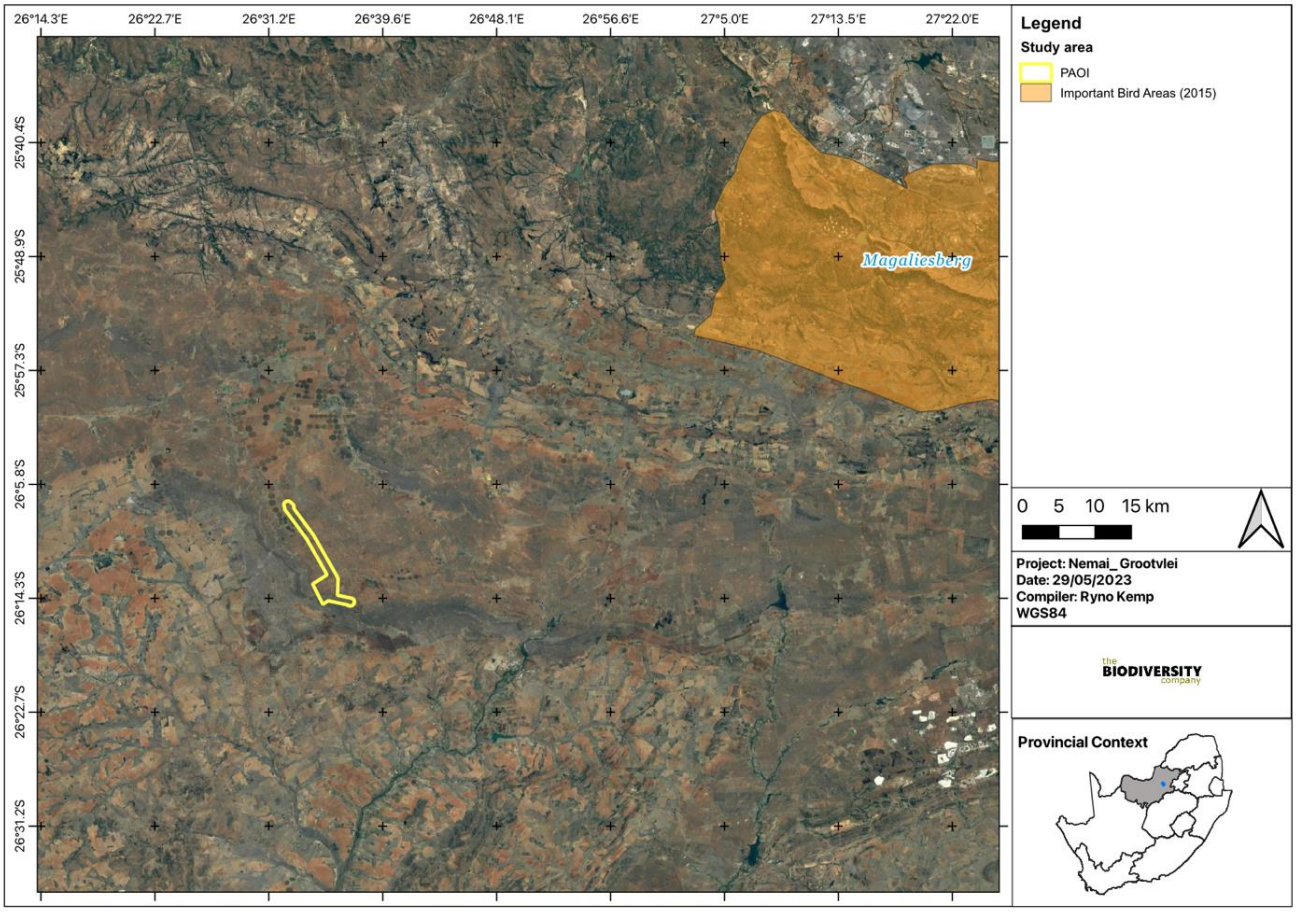

Figure 41: **Map illustrating the locations of Important Bird and Biodiversity Areas in relation to the Project Area (Kemp, 2023).**

11.9 Socio-Economic Environment

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

11.9.1 Population by Age

The population pyramid (refer to **Figure 42**) indicates that there were more people in younger ages, particularly in age groups 0–4 and 5–9, and less people in older ages, particularly from the ages 65 and older. A new cycle of the pyramid is being developed from the lower ages, barring some significant changes in the mortality rates. The graph explicitly indicates that between about ten (10) to twenty (20) years ago, infant motality was high, hence the indentation in the pyramid. This is attributed to the high death rate experienced in the early 2000 due to the prevalence of HIV/AIDS. The death rate affected the mainly young children and teens. The ages of 20 and upwards followed a normal pyramid and is still following the same trend.

The population distribution has, however, followed a normal distribution for the past ten years. This may be attributed to the increasing quality of health care which contained the epidemic successfully.

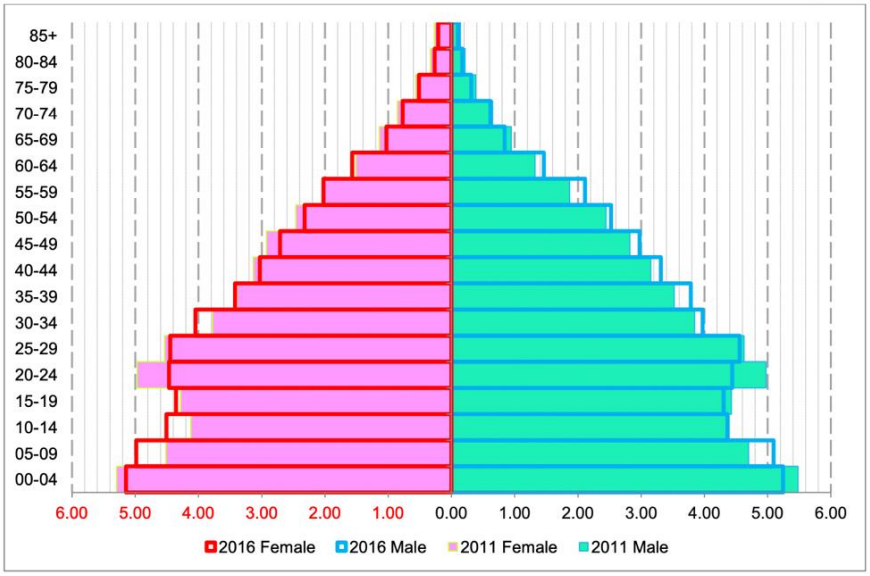

Figure 42: Population Pyramids in Percentage: 2011 and 2016

11.9.2 Main Economic Sectors

The main economic sectors include the following: Agriculture, community services, manufacturing, trade, finance, transport, mining.

11.10 Agriculture

11.10.1 Present Land Uses

The Project's PV Site is currently used for livestock farming (grazing). Pastures were established decades ago but which has reverted to natural veld on large portions. Weeds have encroached on some of the natural vegetation (refer to **Figure 43** below). The land uses along the powerline route are outlined in **Table 19** and depicted in **Figure 44** below).

Table 19: Land uses along the proposed powerline routes in meters (Gouws, 2023)

Land uses	Option 1	Option 2	Total
Grazing	10 192	1 052	11 244
Grazing/cultivated	1 085	-	1 085
Irrigated/grazing	1 012	-	1 012
Pastures	163	307	470
Pastures/cultivated	888	-	888
Pastures/grazing	1 227	1 087	2 314
Total	**14 567**	**2 446**	**17 013**

Figure 43: Vegetation encroached with weeds (Gouws, 2023).

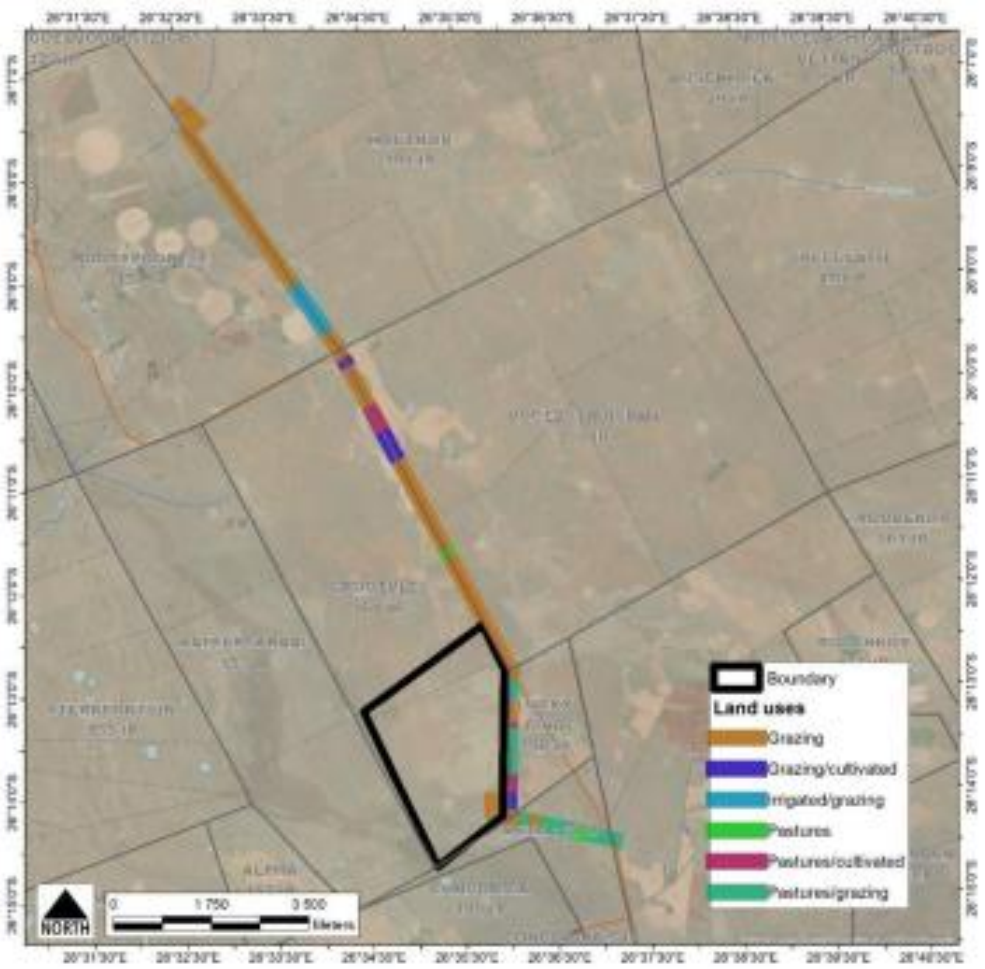

Figure 44: Land uses along the powerline routes (Gouws, 2023).

11.10.2 Soil Types

The entire PV site is located on dolomite and chert with many rock outcrops and loose rock and stones. Concretions of iron and manganese are common. Soil types identified are Mispah, Glenrosa and Hutton. The Hutton varies in depth between 300mm to more than a metre over very short distances. This is very common on soil that developed on dolomite. In general, the soils are not arable and only suitable for grazing. Mostly rocky soils occur along the powerline routes. However, because the powerline routes are linear structures with only the pylons taking up a very small area of land, a soil survey for these areas were not undertaken.

11.11 Air quality

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

- Fugitive dust emissions from agricultural activities;
- Vehicle exhaust emissions from vehicles traveling on paved and unpaved roads, including on the N12 and R53 and other surrounding roads as well as on roads inside Ventersdorp.
- Biomass burning (veld fires);
- Domestic fuel burning;
- Industrial operations;
- Waste treatment and disposal; and
- Other fugitive dust sources such as wind erosion from exposed areas.

11.12 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 farming operations (e.g., use of farming equipment), vehicles on the surrounding road network, human activities in surrounding settlements and trains passing on the railway.

11.13 Cultural Heritage & Palaeontological Features

11.13.1 Cultural Heritage

The information to follow was extracted from the Heritage Impact Assessment (Kitto, 2023).

An assessment of available historical topographical maps was undertaken to establish a historic layering for the study area. Overlays of the maps were made on Google Earth. These historic maps are valuable resources in identifying possible heritage sites and features located within the study area. It should be noted that the earliest edition of the map sheets for this area dates to the 1960s. As the first edition of this sheet dates to 1966, it was not considered necessary to examine the later edition map sheets. Any heritage resources that are 57 years or older would be depicted on the 1966 edition sheet.

The topographical maps were obtained from the Department of Agriculture, Land Reform and Rural Development (DALRRD) in Cape Town.

The 2626BA Zwartrand Edition 1 1966 map sheet was assessed for the Grootvlei 600MW PV footprint. As can be seen from **Figure 45** and **Figure 46** below the 1966 edition map depicts one heritage feature (Kraal) located within the Grootvlei 600MW project footprint, while three heritage features are depicted adjacent to the powerline options (structures with or without kraals).

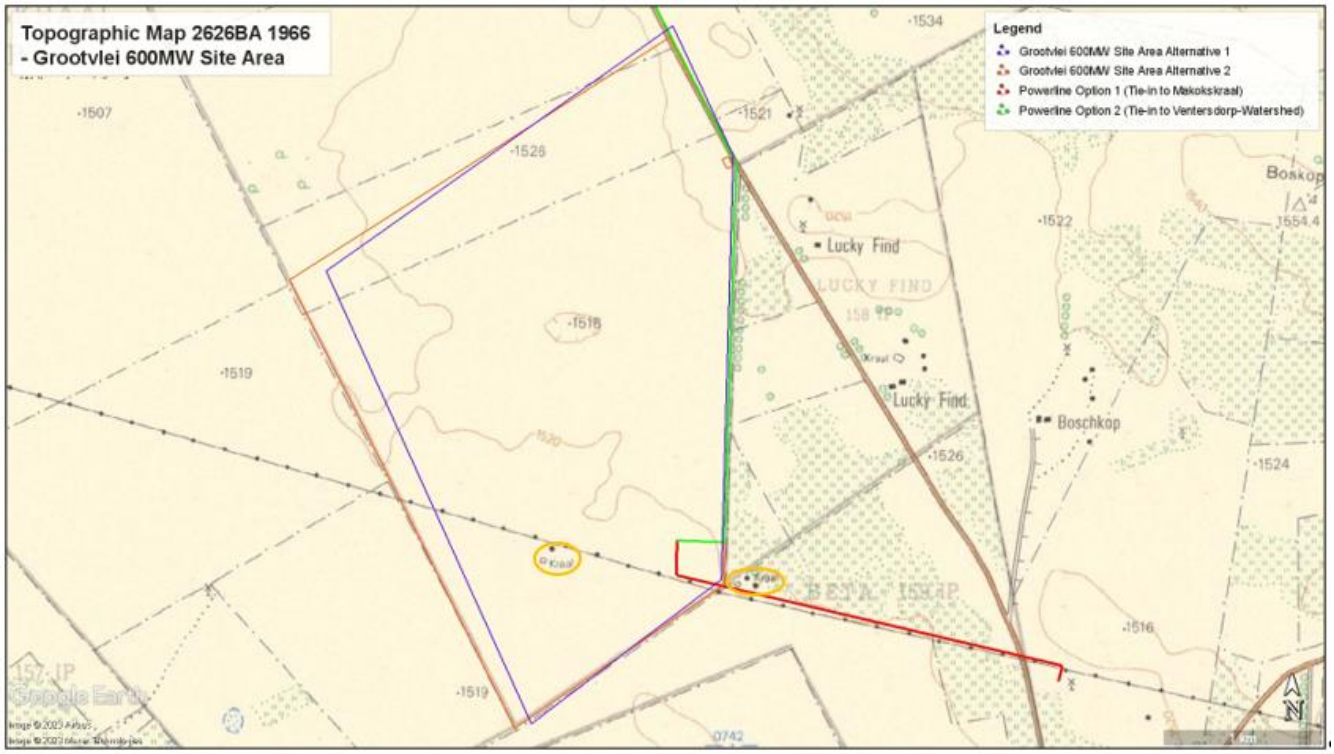

Figure 45: Enlarged view of Ed 1 topographic map sheets 2626BA 1966, depicting one heritage feature (Kraal) within the Solar PV footprint and one Kraal and structures close to the two powerlines (yellow circles) (Kitto, 2023).

The general overview from the historical desktop study has shown that various archaeological and historical resources can be expected to occur in the project area. Furthermore, the examination of the earliest edition (1966) of the 1:50 000 topographical map, produced by overlying the map with satellite Imagery (Google Earth) has shown that four heritage features dating to c1966 are depicted either within or adjacent to the Solar project footprint and two powerline options.

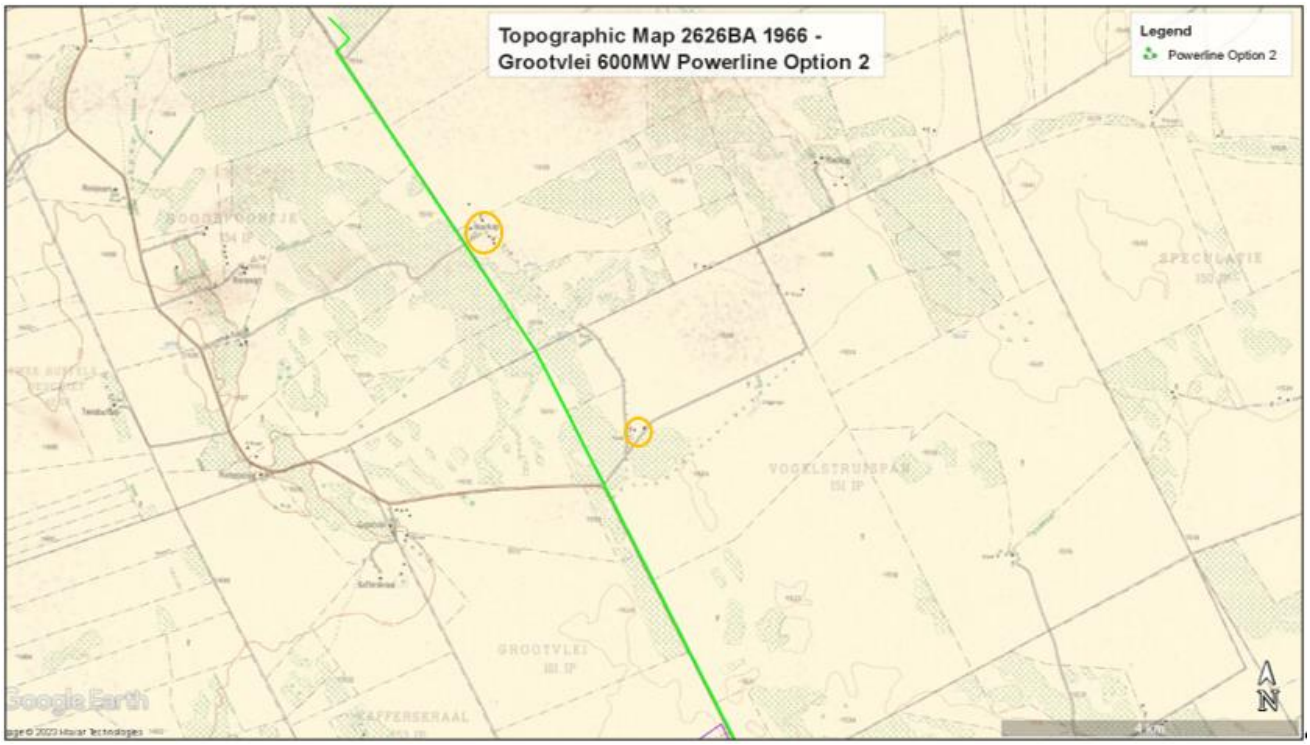

Figure 46: Enlarged view of Ed 1 topographic map sheets 2626BA 1966, depicting two farmsteads (yellow circles) adjacent to the powerline route Option 2 (green line)) (Kitto, 2023).

11.13.2 Palaeontological Features

The information to follow was extracted from the Palaeontological Impact Assessment (Butler, 2023).

This study area is underlain by the Precambrian dolomites and associated marine sedimentary rocks of the Monte Christo Formation of the Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup). According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) the Palaeontological Sensitivity of the Malmani Subgroup is Very High (refer to **Figure 47** below). The Palaeotechnical report of the North West Province further indicates that the Malmani Subgroup has a High Palaeontological Sensitivity.

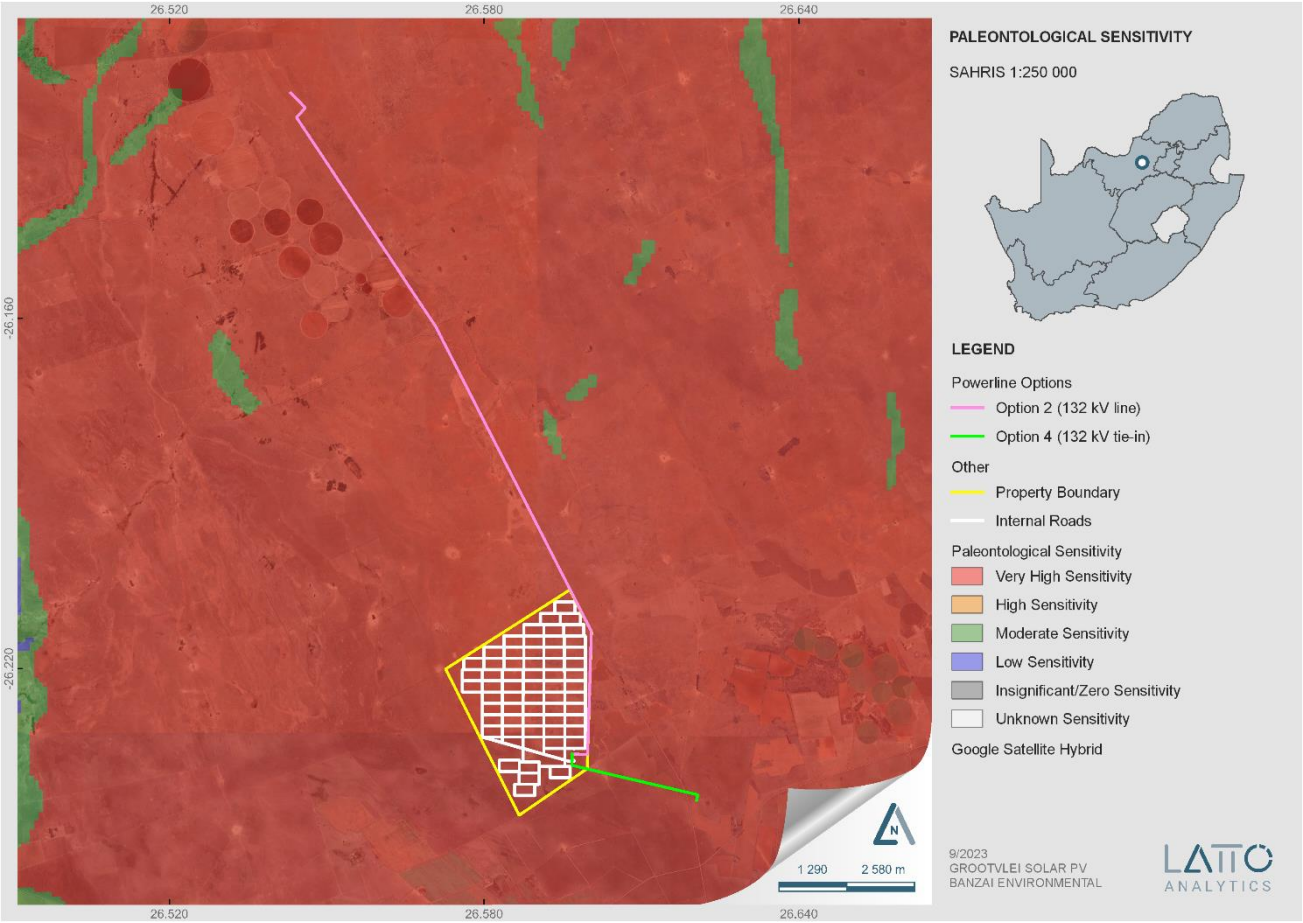

Figure 47: Extract of the 1 in 250 000 SAHRIS PalaeoMap (Council of Geosciences) indicating the proposed Grootvlei Solar Project in the North West Province. (Butler, 2023).

11.14 Planning

The following is noted from a planning perspective:

- The proposed power line follows property boundaries for most of its route;
- The proposed Solar Site and power line are located outside of the urban edge and should not impact on future urban expansion;
- In the event that the Solar PV Plant must be decommissioned, the decommissioning 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 a future desirable use; and
- Other renewable energy applications that have been made within a 30km radius of the PV Site, according to DFFE's REEA Database (refer to **Section 6.6** above).

11.15 Existing Structures and Infrastructure

Existing structures and infrastructure at the PV site include narrow unsurfaced roads and fencing which is associated with the current farming operations. An existing high voltage powerline and substation infrastructure is located within the surrounding area. The setbacks / conditions required by the custodians of infrastructure on the PV Site will need to be adhered to.

11.16 Transportation

The Project area is rural in nature. The municipality has a comprehensive road network comprising a number of national, provincial secondary roads, and railway lines. The N14 and R53 will be used to access the Project Site.

11.17 Health

All health care services are located within the municipal urban nodes of the surrounding areas, most predominantly in Ventersdorp. The nearest hospital is the Ventersdorp Hospital which is located south-east of the Project Area. The site is largely unserviced, and provision would need to be made for sanitation and water supply.

12 SUMMARY OF SPECIALIST STUDIES

12.1 Specialist Studies undertaken as part of the EIA

A crucial element of the Plan of Study for the EIA prepared during the Scoping phase was to provide the Terms of Reference for the requisite specialist studies triggered during Scoping. 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 findings of the Scoping process, aimed at addressing the key issues and compliance with legal obligations, include the following:

1. Freshwater Impact Assessment;
2. Terrestrial Biodiversity Compliance Statement;
3. Avifaunal Impact Assessment;
4. Agricultural Impact Assessment;
5. Heritage Impact Assessment;
6. Paleontological Desktop Assessment;
7. Visual Impact Assessment; and
8. Social Impact Assessment.

12.2 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 EIA Report. Key considerations included the following:

- Ensuring that the specialists have adequately addressed I&APs' 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 EIA Report in the following manner:

- The assumptions and limitations identified in each study were included in **Section 7** above;
- The information was used to complete the description of the receiving environment (**Section 11**) in a more detailed and site-specific manner;
- A summary of each specialist study is contained in the sub-sections to follow (**Sections 12.3 – 12.10** below), focusing on the approach to each study, key findings and conclusions drawn;

- The specialists' impacts assessment, and the identified mitigation measures, were included in the overall project impact assessment contained in **Section 13** below;
- The evaluations performed by the specialists on the alternatives were included in **Section 14** below to identify the most favourable option;
- Specialist input was obtained to address comments made by I&APs that related to specific environmental features pertaining to each specialist discipline; and
- Salient recommendations made by the specialists were taken forward to the draft EIA Conclusions in **Section 16** below.

12.3 Freshwater Impact Assessment

A summary of the Freshwater Impact Assessment (Van Rooyen, 2023) follows. The specialist report is contained in **Appendix D1.**

12.3.1 Details of the Specialist

Organisation:	Nitai Consulting (Pty) Ltd	
Name:	Dr D. Van Rooyen	A Bootsma
Qualifications:	Ph.D. Environmental Science (Aquatic Ecosystem Heath)	M.Sc Environmental Science
Affiliation (if applicable):	SACNASP Candidate Natural Scientist (Registration No.: 151272)	SACNASP Professional Natural Scientist (Registration No.: 400222)

12.3.2 Key Findings of the Study

12.3.2.1 Wetlands Delineated

One HGM unit was identified during two site visits to the study area. A large Dep wetland was recorded near and along the southern boundary of the PV Plant. The revised Alternative 2 layout of the PV Plant has accommodated the presence of the Dep wetland located near and along the southern boundary of the PV Plant (refer to **Figure 48**).

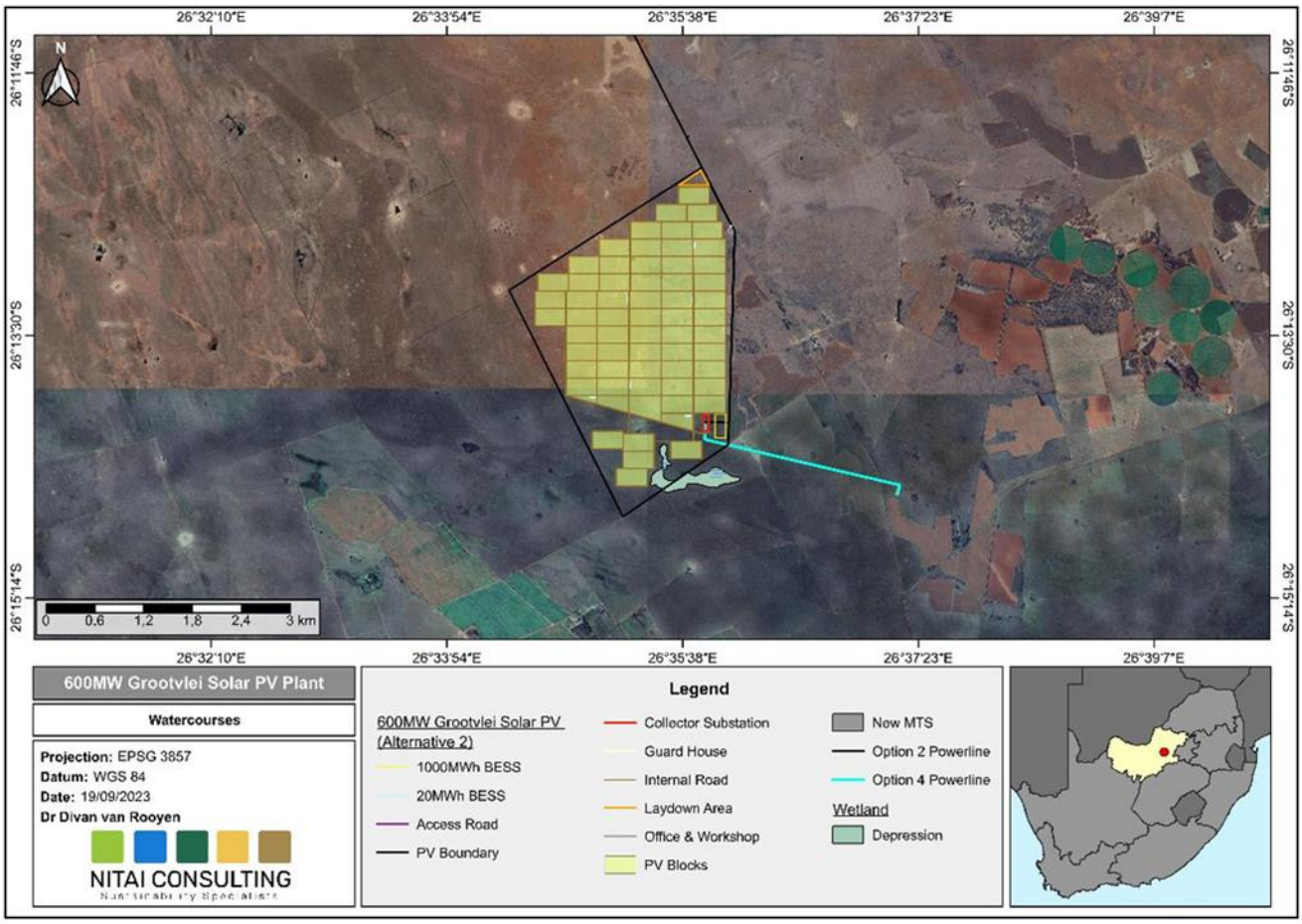

Figure 48: **The large Depression associated with the Alternative 2 and Preferred layout of the 600MW Grootvlei Solar PV Plant (Van Rooyen, 2023).**

12.3.2.2 Environmental Sensitivity: Aquatic Biodiversity Theme

National Web-based Environmental Screening Tool Report identified that Aquatic Biodiversity Theme for the proposed study area is of very high sensitivity (refer to **Figure 49** below). The very high sensitivity is due to the proposed development being situated within the Groundwater SWSA of Southern Africa as well as Aquatic CBA's.

Ground truthing the Alternative 1 layout with site visits, the study area could be classified as Medium sensitivity due to the PV site encroaching into the large Dep wetland located in the southern portion of the PV site. In addition, majority of the Alternative 1 layout was classified as Low sensitivity whereas the wetland and its associated buffer zone was classified as High and Medium sensitivity, respectively (refer to **Figure 50 below**). Moreover, as a result, the PV site layout has been revised and the Alternative 2 layout (preferred layout) is outside the Dep wetland as well as its buffer zones (discussed below) (refer to **Figure 51 below**). Therefore, the Alternative 2 layout has an overall Low sensitivity to freshwater features. Importantly, based on these sensitivity classifications, the Preferred Alternative for the proposed development is Alternative 2.

Figure 49: **Aquatic Biodiversity Sensitivity Theme from the National Web-Based Environmental Screening Tool.**

12.3.2.3 Buffer Zone Determination

Buffer zones for the Dep wetland was determined based on the current condition of these watercourses. These buffer zones and the wetland itself indicate “no-go” areas. The buffer zones determined for the wetland was based on the Macfarlane and Bredin (2017) guidelines and includes the 32 m NEMA Zone of Regulation. The buffer zone determined using the above-mentioned guidelines is 20 m.

Between the two alternatives of the 600MW Grootvlei Solar PV Plant and associated infrastructure, Alternative 1 encroaches into both the 20 m and the 32 m buffer zones. Also, the layout not only encroaches into the buffer zones but the wetland as well (refer to **Figure 52** below). Alternative 2 has made provision for the Dep wetland and its associated buffer zones and is therefore outside of High and Medium sensitive areas (refer to **Figure 53** below).

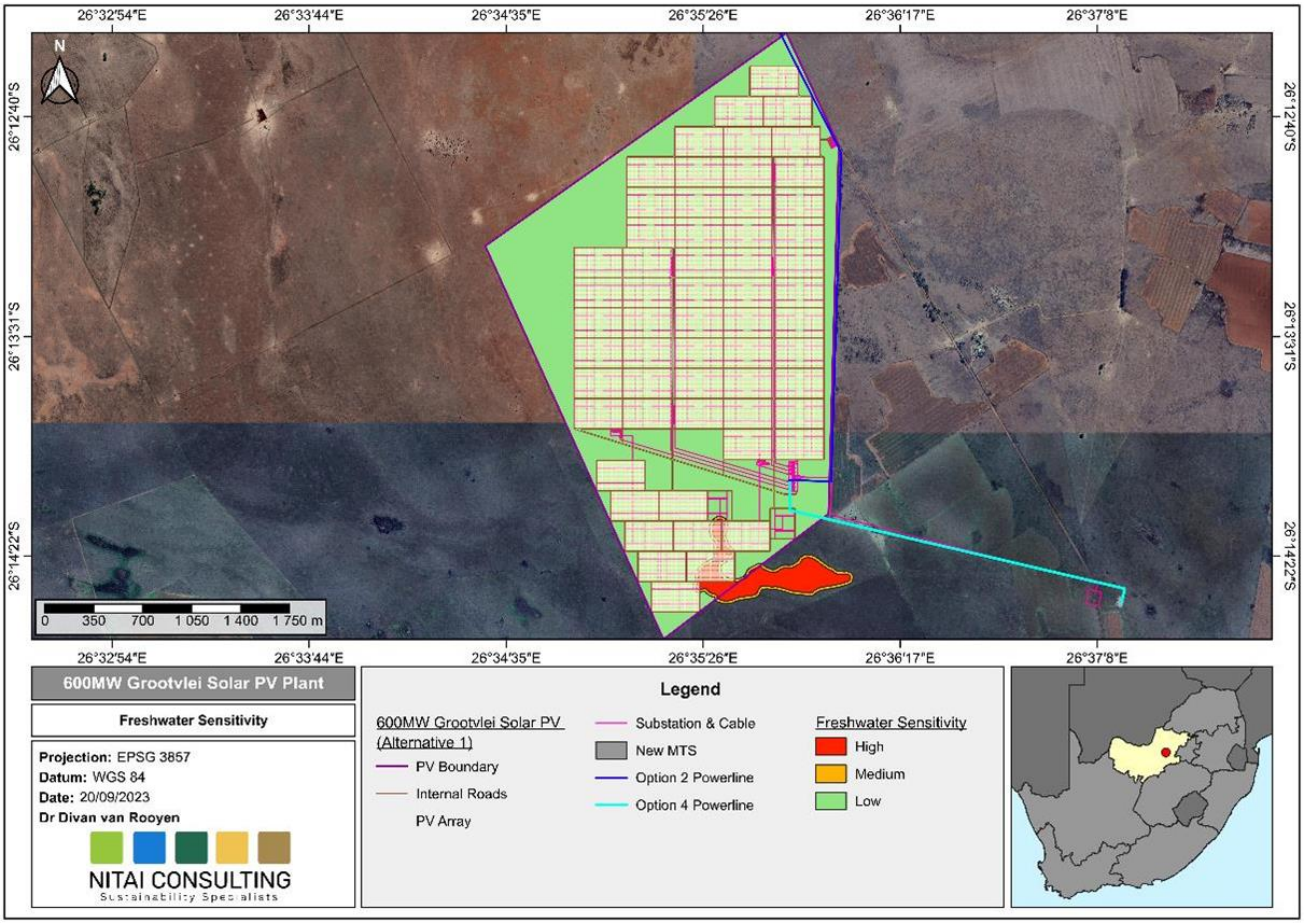

Figure 50: **Freshwater Sensitivity surrounding the proposed Alternative 1 Layout of the 600MW Grootvlei Solar PV Plant (Van Rooyen, 2023).**

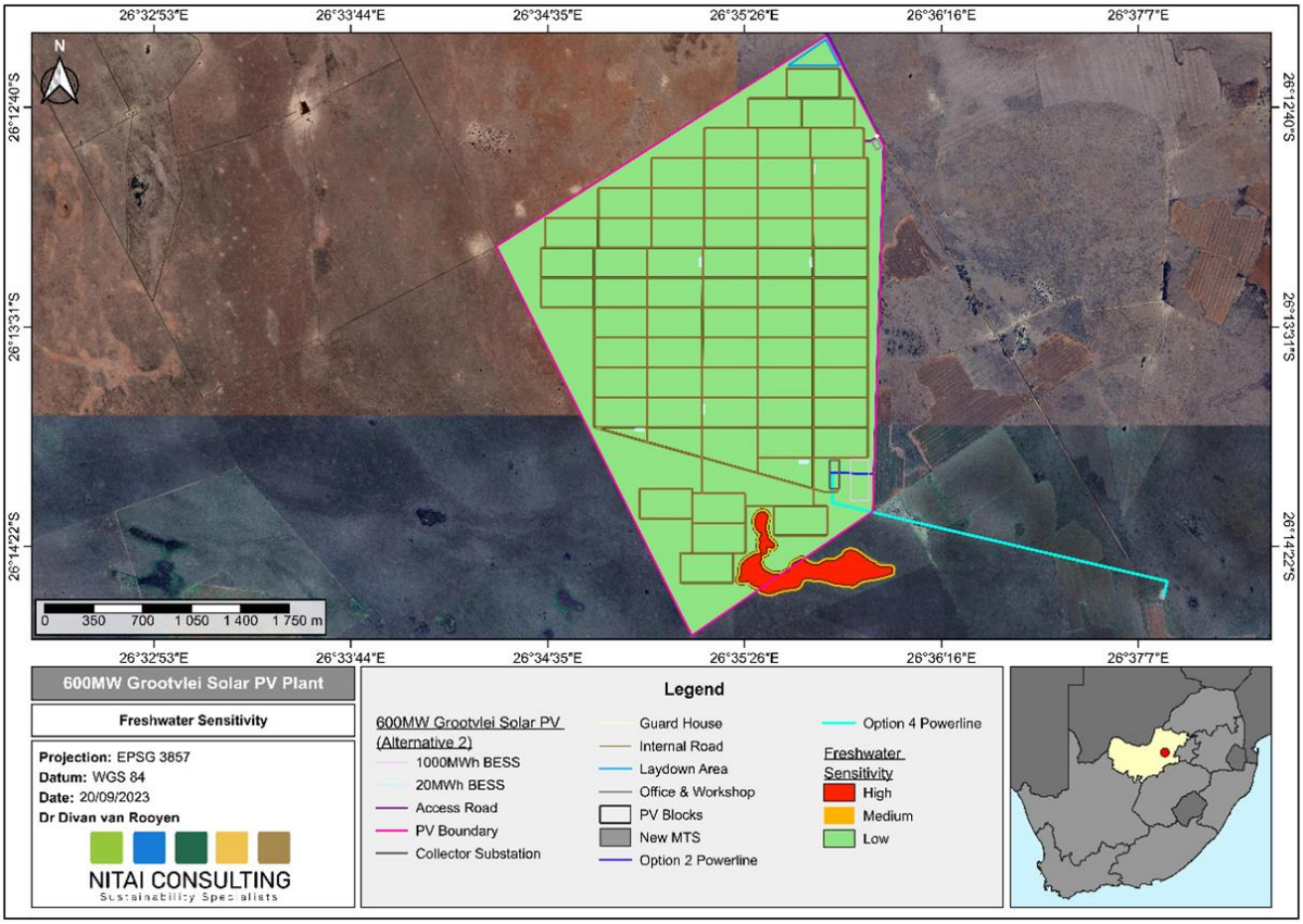

Figure 51: **Freshwater Sensitivity surrounding the proposed Alternative 2 and Preferred Layout of the 600MW Grootvlei Solar PV Plant.**

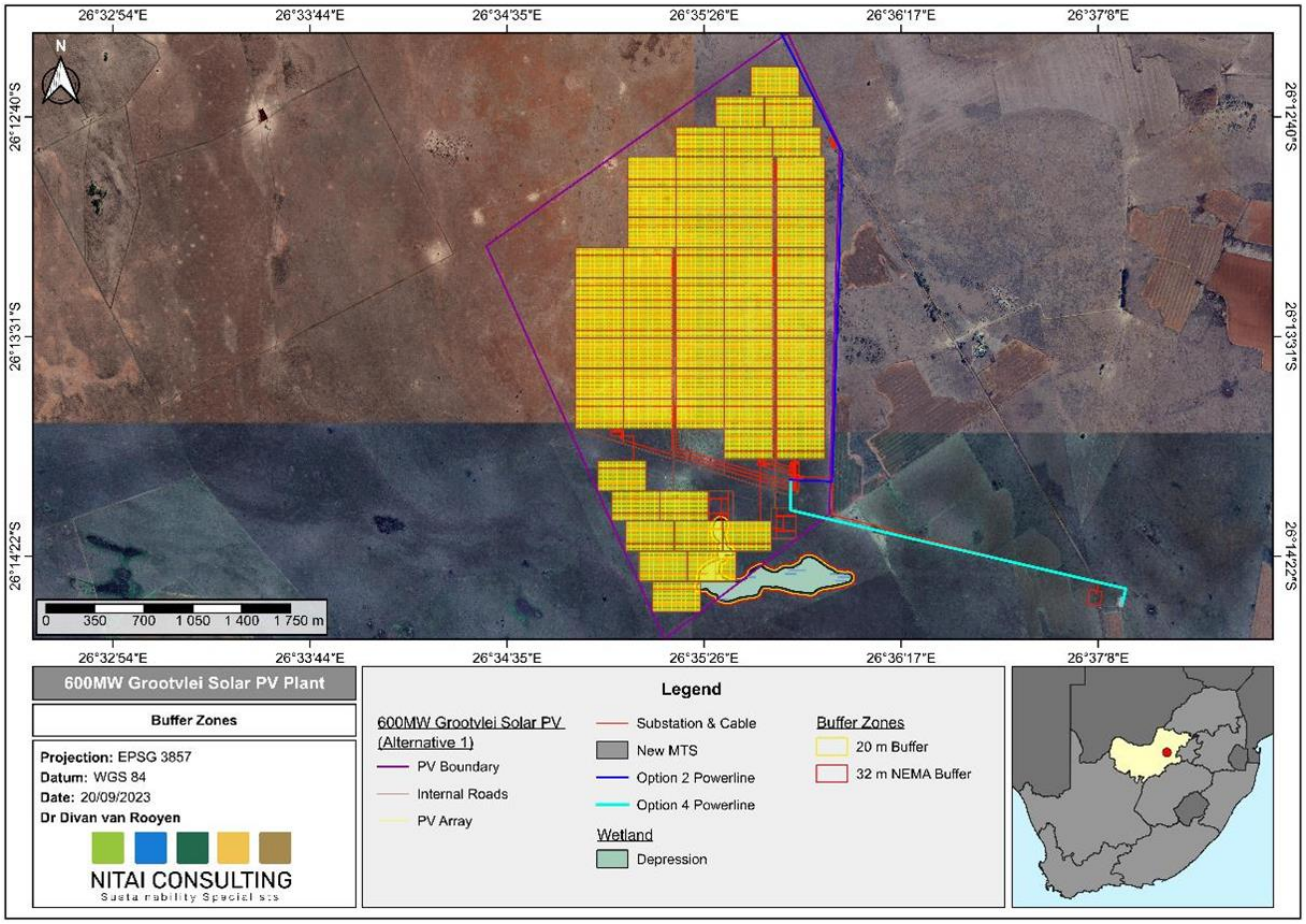

Figure 52: **Buffer zones determined for all watercourses associated with the Alternative 1 layout of the study area.**

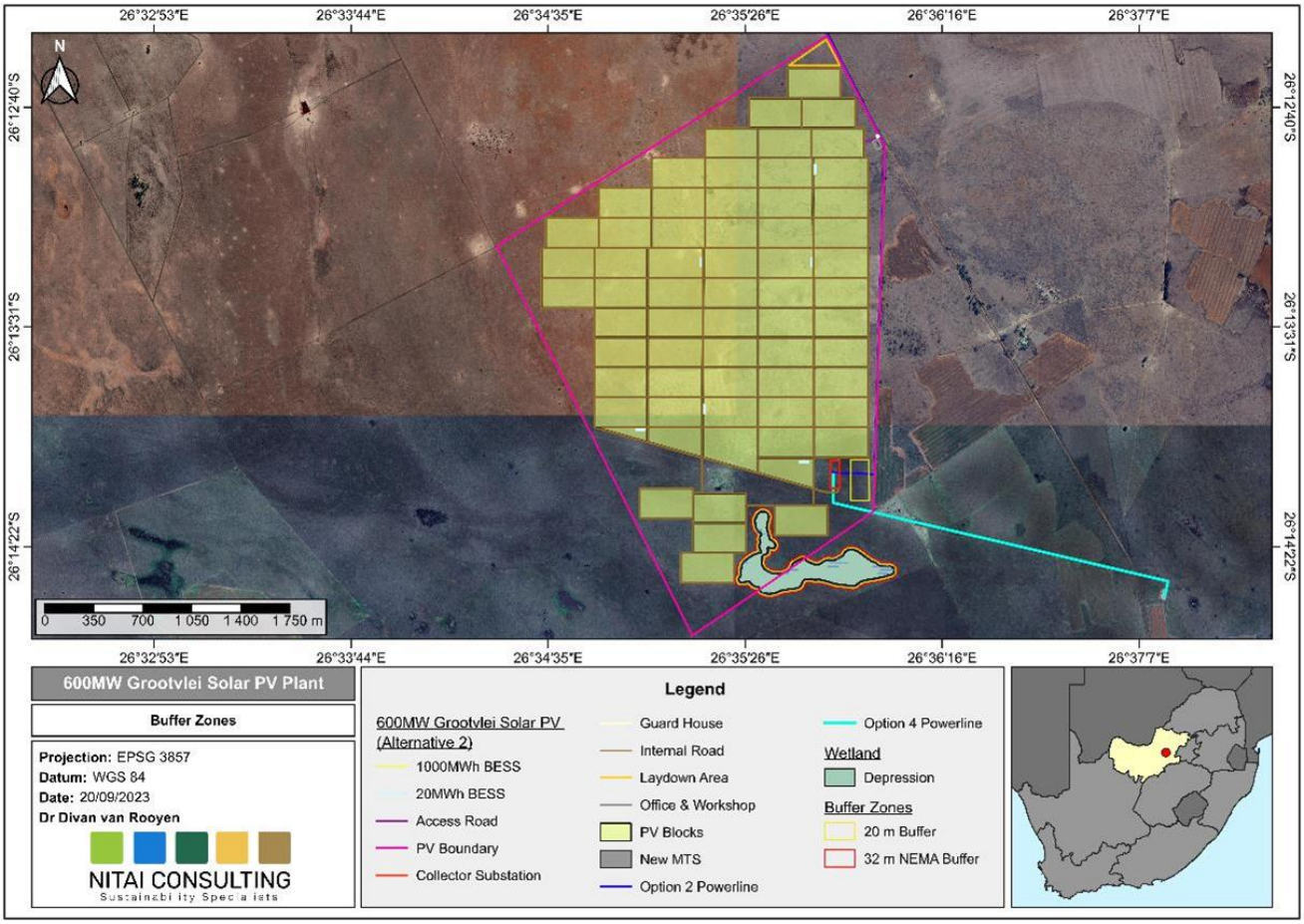

Figure 53: **Buffer zones determined for all watercourses associated with the Alternative 2 and Preferred layout of the study area.**

12.3.3 Conclusions

The following main conclusions are made:

- During site visits to the study area, one large HGM unit (Dep) was identified in the southern portion of the study area;
- No watercourse was identified along the proposed two powerline routes as well as the new MTS;
- The Alternative 1 layout of the 600MW Grootvlei Solar Plant encroaches into the large Dep;
- Alternative 2 has accommodated the presence of the wetland and its subsequent 32 m buffer zone. Therefore, it is of the opinion that the proposed works will have a low impact on all associated freshwater features given that the mitigation measures in this report are followed and best practise pollution control;
- The National Web-Based Environmental Screening Tool has identified the area as a High sensitivity from an Aquatic Biodiversity Theme perspective. This is due to the study area being in the Groundwater SWSA of South Africa as well as Aquatic CBA's. However, a wetland was identified within the footprint of the Alternative 1 layout. Therefore, the High sensitivity was confirmed (by the specialist), however, if Alternative 2 layout is used then the site sensitivity is Low; and
- The specialist recommends that the development of the PV facility with the use of Alternative 2 as layout may proceed with low impacts on the freshwater features.

12.4 Terrestrial Biodiversity Compliance Statement

A summary of the Terrestrial Biodiversity Compliance Statement (Human, 2023) follows. The specialist report is contained in **Appendix D2.**

12.4.1 Details of the Specialist

Organisation:	Nitai Consulting
Name:	E. Human
Qualifications:	M-Tech Nature Conservation (TUT)
Affiliation (if applicable):	SACNASP Professional Natural Scientist (Registration No.: 147031)

12.4.2 Key Findings of the Study

12.4.2.1 Field Survey and Results

- ❑ Terrestrial Flora and Fauna:
  - Indigenous Flora –

The vegetation assessment was conducted throughout the extent of the project area. A total of 70 tree, shrub, herbaceous and graminoid plant species were recorded in the project area during the field assessment (refer to **Table 20** below).

Table 20: Trees, shrub and herbaceous plant species recorded in the project area (Human, 2023)

Family	Taxon	Common name	Protection Status	Endemism	Invasive/ Protected
Acanthaceae	*Barleria macrostegia*			Indigenous	
Amaranthaceae	*Gomphrena celosioides*	Batchelor's button		Not indigenous; Naturalised	
Amaryllidaceae	*Boophone disticha*	Poison bulb		Indigenous	
Asclepiadaceae	*Gomphocarpus fruticosus*	Milkweed		Indigenous	
Asphodelaceae	*Bulbine narcissifolia*	Strap-leaved Bulbine		Indigenous	
Asteraceae	*Berkheya radula*	Boesmansrietjie		Indigenous	
Asteraceae	*Bidens formosa*	Kosmos		Not indigenous; Naturalised	
Asteraceae	*Dicoma anomala*	Grassveld Karmedik		Indigenous	
Asteraceae	*Geigeria burkei*	Vermeerbossie		Indigenous	
Asteraceae	*Helichrysum nudifolium*	Hottentot's tea		Indigenous	
Asteraceae	*Lasiosiphon sericocephalus*	Hairy curry flower		Indigenous	

Family	Taxon	Common name	Protection Status	Endemism	Invasive/ Protected
Asteraceae	*Schkuhria pinnata*	Spanish blackjack		Not indigenous; Naturalised	
Asteraceae	*Seriphium plumosum*	Bankrupt bush		Indigenous	
Asteraceae	*Tagetes minuta*	Khaki bush		Not indigenous; Naturalised	
Asteraceae	*Vernonia oligocephala*	Bicoloured vernonia		Indigenous	
Asteraceae	*Zinia peruviana*	Peruvian zinnia		Not indigenous; Naturalised	
Campanulaceae	*Wahlenbergia undulata*	African Bluebell		Indigenous	
Caryophyllaceae	*Pollichia campestris*	Waxberry		Indigenous	
Colchicaceae	*Ornithoglossum vulgare*	Common Slangkop		Indigenous	
Commelinaceae	*Commelina africana*	Common yellow dayflower		Indigenous	
Commelinaceae	*Commelina benghalensis*	Benghal dayflower		Indigenous	
Convolvulaceae	*Ipomoea obscura*	Obscure Morning Glory		Indigenous	
Convolvulaceae	*Ipomoea ommanneyi*	Ox Morning Glory		Indigenous	
Crassulaceae	*Crassula lanceolata transvaalensis*	Spear Stonecrop		Indigenous	
Cucurbitaceae	*Cucumis zeyheri*	Spiny cucumber		Indigenous	
Cyperaceae	*Bulbostylis hispidula*	Slender sedge		Indigenous	
Fabacea	*Vachelia karroo*	Sweet thorn		Indigenous	
Hyacinthaceae	*Albuca suaveolens*	Striped tamarak		Indigenous	
Hyacinthaceae	*Ledebouria ovatifolia*	Flat leaved African hyacinth		Indigenous; Endemic	
Hypoxidaceae	*Hypoxis rigidula*	Silverleaf Stargrass		Indigenous	
Iridaceae	*Babiana hypogea*	Bushmanland Bobbejaantjie		Indigenous	
Juncaceae	*Juncus effusus*	Soft Rush		Indigenous	
Lamiaceae	*Leucas sexdentata*	Bushveld Tumbleweed		Indigenous	
Myrtaceae	*Eucalyptus grandis*	Flooded Gum		Not indigenous; Cultivated; Naturalised; Invasive	Nemba 1b
Orobanchaceae	*Striga elegans*	Witchweed		Indigenous	
Poaceae	*Andropogon schirensis*	Stab grass		Indigenous	
Poaceae	*Aristida congesta congesta*	Tassel Three-awn		Indigenous	
Poaceae	*Brachiaria serrata*	Velvet Signal grass		Indigenous	
Poaceae	*Cymbopogon caesius*	Broadleaved Turpentine grass		Indigenous	
Poaceae	*Cynodon dactylon*	Couch grass		Indigenous	
Poaceae	*Digitaria eriantha*	Finger grass		Indigenous	
Poaceae	*Elionurus muticus*	Copper wire Grass		Indigenous	

Family	Taxon	Common name	Protection Status	Endemism	Invasive/ Protected
Poaceae	*Eragrostis chloromelas*	Curly leaf		Indigenous	
Poaceae	*Loudetia simplex*	Common Russet grass		Indigenous	
Poaceae	*Melinis repens*	Natal red Top		Indigenous	
Poaceae	*Sporobolus africanus*	Rat's tail dropseed		Indigenous	
Poaceae	*Themeda triandra*	Red Grass		Indigenous	
Poaceae	*Urochloa mossambicensis*	Bushveld signal grass		Indigenous	
Ranunculaceae	*Clematis brachiata*	Traveller's joy		Indigenous	
Rhamnaceae	*Ziziphus zeyheriana*	Dwarf buffalo thorn		Indigenous	
Rubiaceae	*Pygmaeothamnus zeyheri*	Sand Apple		Indigenous	
Solanaceae	*Datura ferox*	White stinkweed		Not indigenous; Naturalised; Invasive	Nemba 1b
Solanaceae	*Solanum elaeagnifolium*	Silverleaf Nightshade		Not indigenous; Naturalised; Invasive	Nemba 1b
Verbenaceae	*Lippia javanica*	Fever tea		Indigenous	
Verbenaceae	*Verbena bonariensis*	Purple top Vervain		Not indigenous; Naturalised; Invasive	Nemba 1b

- Faunal Assessment –

No reptile species was recorded in the project area during survey period. However, there is the possibility of several species being present, as certain reptile species are secretive and longer-term surveys are required to ensure adequate sampling. No amphibian species were recorded during the survey period. However, due to the presence of a wetland in the project area providing suitable habitat there is a possibility of more amphibian species being present.

Three (3) mammal species were observed during this survey of the project area (refer to **Table 21** below) based on either direct observation or the presence of visual tracks and signs. None of the species recorded are regarded as a SCC. Five mammal species are provincially protected.

Table 21: Summary of mammal species recorded within the project area (Human, 2023)

Family	Taxon	Common name	Status	North West Biodiversity Management Act
Sciuridae	*Xerus inauris*	Ground Squirrel	Least Concern (2016)	Schedule 3 (Ordinary species)
Bovidae	*Oryx gazella*	Gemsbuck	Least Concern (2016)	Schedule 2 (Specially Protected)
Bovidae	*Damaliscus dorcas pygargus*	Blesbok	Least Concern (2016)	Schedule 2 (Specially Protected)

Family	Taxon	Common name	Status	North West Biodiversity Management Act
Bovidae	*Antidorcas marsupialis*	Springbuck	Least Concern (2016)	Schedule 3 (Ordinary species

❑ Habitat Survey and Site Ecological Importance:

The main habitat types identified across the project area were initially identified largely based on aerial imagery. These main habitat types were refined based on the field coverage and data collected during the survey; the delineated habitats can be seen in **Figure 54** below. Six habitat units are delineated for the Project Area, namely:

- Natural habitat;
- Disturbed grassland;
- Old lands;
- Wetlands/aquatic habitats;
- Alien species; and
- Transformed areas.

A general view over the site is given in **Figure 55** below.

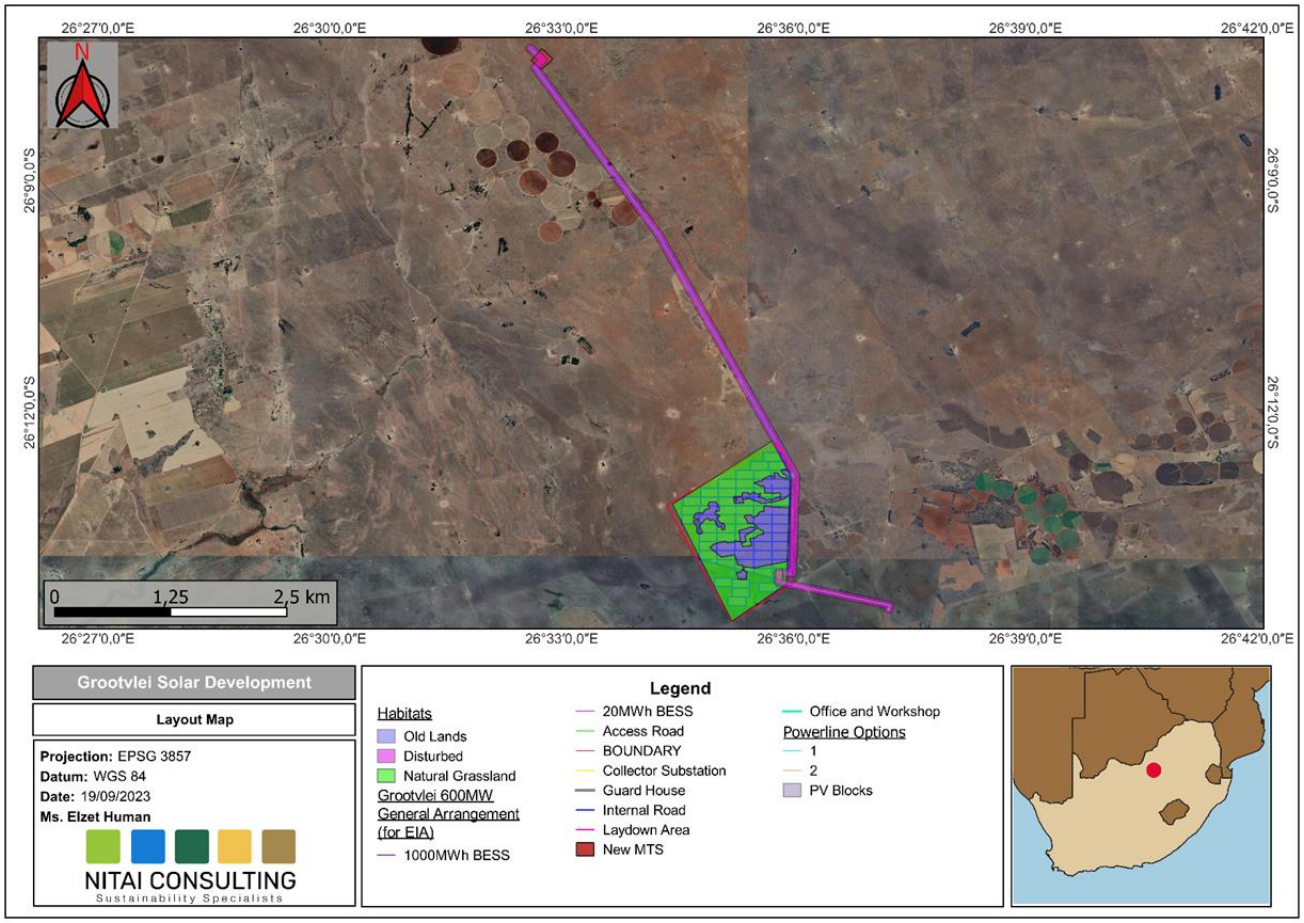

Figure 54: Habitat Units found on site (Human, 2023).

Figure 55: General view of the dominant features (Human, 2023)

The six habitat types were allocated a sensitivity category, or Site Ecological Importance (SEI), which is shown in **Table 22** below.

Table 22: SEI Summary of habitat types delineated (Human, 2023).

	Receptor resilience	Biodiversity Importance	Site Ecological Importance
Natural Habitat	Medium	Medium	Medium
Disturbed Grassland	Low	Low	Medium
Old lands	Low	Low	Low
Wetlands/ Aquatic Habitats	Medium	Medium	Medium
Alien species	Medium	Low	Low
Transformed areas	Medium	Low	Low

The following guidelines apply when interpreting the SEI:

- Very High – Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/ not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/ unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.

- High – Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
- Medium – Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
- Low - Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities

The sensitivity scores identified during the field survey for each terrestrial habitat are mapped. All habitats within the assessment area of the proposed project were allocated a sensitivity category. The sensitivities of the habitat types delineated are illustrated in **Figure 56** below.

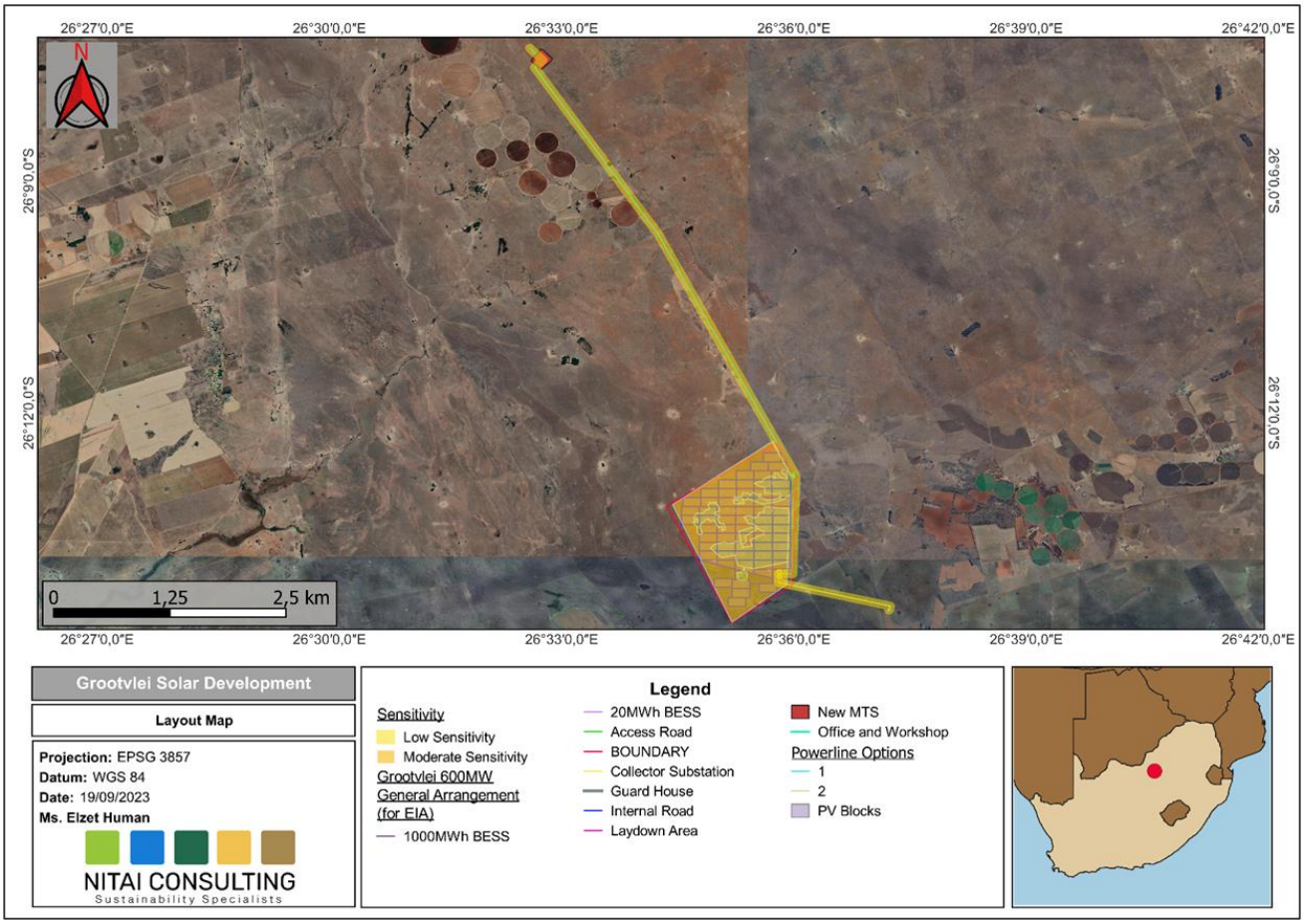

Figure 56: Sensitivity of the Project Area – Layout Alternative 2 (Human, 2023).

12.4.2.2 Environmental Sensitivity: Terrestrial Biodiversity, Animal and Plant Species Themes

The terrestrial biodiversity theme sensitivity as indicated in the screening report (compiled in terms of the National Web-based Environmental Screening Tool) was derived to be 'very high' due the fact it forms part of Critical Biodiversity areas (CBA 2), Ecological support area 1 & 2 (ESA 1&2), and Protected Areas Expansion Strategy. The National Web-Based Screening Tool classified both the animal and plant theme sensitivity as medium.

The completion of the terrestrial biodiversity assessment found that the Disturbed Grassland, Old lands, Alien Invasives and Transformed habitats does not corroborate the screening tool's 'Very High' sensitivity of the biodiversity theme and should rather be considered of low sensitivity since the area has evidence of degradation and disturbance. The natural habitat does not contain any SCC species but is in a healthy condition albeit slightly disturbed and should be considered medium. The plant sensitivity was found to be low and does not corroborate the screening tool's results. No SCC plant species were found at all. The animal sensitivity theme is disputed since there were no suitable habitat found for SCC animal species to be resident and consequently the sensitivity should be low and not medium as the screening tool suggests.

12.4.3 Conclusions

The following main conclusions are made:

- Six habitat units were identified during the assessment and included Natural Habitats, Disturbed Grassland, Old Lands, Wetland and Riparian areas, Alien invaded habitats, and Transformed areas;
- Natural habitats and Wetland areas are of medium terrestrial sensitivity, as the area still provides habitat to various fauna and flora species;
- Old lands, disturbed areas, alien invaded areas and transformed habitat is considered to have a low sensitivity;
- No SCC species were observed during the site survey;
- Layout alternative 1 is considered to have high to low impact and layout alternative 2 is considered to have a moderate to low negative impact on the terrestrial ecosystem associated with the project area after implementation of mitigation measures;
- Layout alternative 2 is the preferred layout; and
- It is the opinion of the specialist that the project location, may be favourably considered on condition that all prescribed mitigation measures and recommendations are implemented.

12.5 Avifauna Impact Assessment

A summary of the Avifauna Impact Assessment (Kemp, 2023) follows. The specialist report is contained in **Appendix D3.**

12.5.1 Details of the Specialist

Organisation:	The Biodiversity Company
Name:	R. Kemp
Qualifications:	M.Sc Zoology
Affiliation (if applicable):	SACNASP Professional Natural Scientist (Registration No.: 117462/17)

12.5.2 Key Findings of the Study

12.5.2.1 Species of Conservation Concern

No SCC was recorded within the PAOI during the survey period within point counts and no SCC were observed during the surveying period of the other studies.

12.5.2.2 Flight and Nest Analysis

Observing and monitoring flight paths and nesting sites of SCC and/or priority species are important in ascertaining habitat sensitivity and evaluating the impact risk significance of any proposed development. Flight analysis is also important for species that exhibit diel movement between roosting and foraging sites to prevent the risk of collision with infrastructure. A very condensed version of flight path analysis was done, the aim of this was to determine if there is a general direction of most birds on site.

No specific flight paths were noted. No confirmed nest sites were recorded during the second assessment; this is mainly attributed to the point count analysis protocol, which allows for accurate sampling of the avifauna but does not exhaustively cover the site locating nests.

12.5.2.3 Habitat Types

The main avifaunal habitat types identified include grasslands, degraded grassland and transformed areas (old lands, agricultural and modified) (refer to **Figure 57** below).

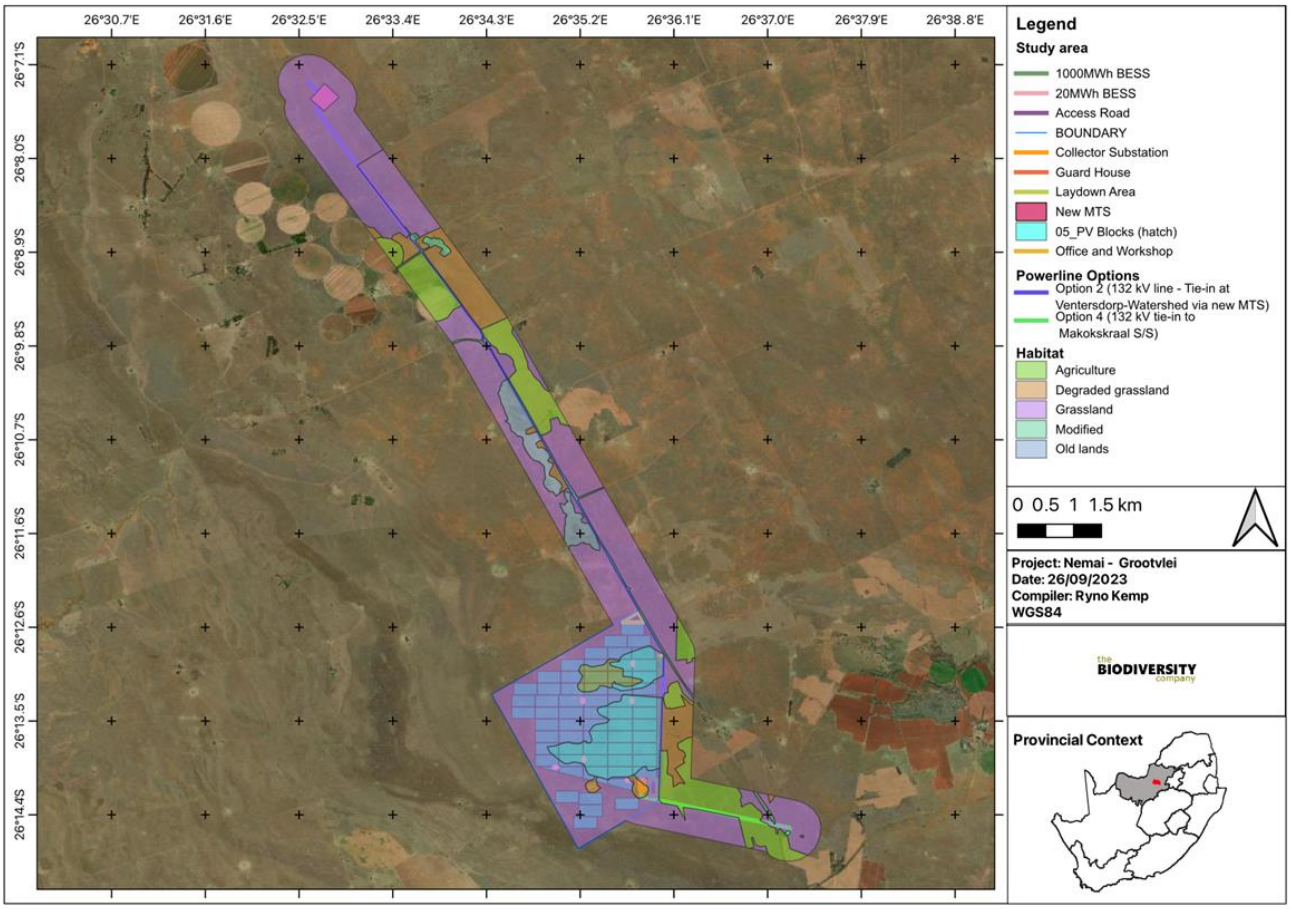

Figure 57: **Avifauna habitat types delineated within the proposed development (Kemp, 2023).**

12.5.2.4 Sensitivity Assessment

- National Web-based Environmental Screening Tool:

According to the National Web-based Environmental Screening Tool, the site has a medium sensitivity for the animal species theme. The medium sensitivity for a portion of the project area was due to the likely presence of *Eupodotis senegalensis* (White-bellied Korhaan).

- Site Ecological Importance:

All habitats within the assessment area of the proposed project were allocated a sensitivity or SEI category (refer to **Table 23** below). The SEI of the PAOI within an avifauna context was based on both the field results and desktop information. The SEI of the habitat types delineated is illustrated in **Figure 58.** The degraded grassland was given a medium rating based on the high likelihood of supporting SCCs. Only three SCC was recorded close to the PAOI, but a medium diversity of species in the Degraded Grasslands and Grasslands was assigned a medium SEI and the modified area a very low SEI.

Table 23: SEI Summary of habitat types delineated within field assessment area of project area (Kemp, 2023).

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance	Site Ecological Importance (SEI) Guidelines for interpreting SEI in the context of the proposed development activities
Grasslands	Medium > 50% of receptor contains natural habitat with potential to support SCC.	High Only minor current negative ecological impacts with no signs of major past disturbance and good rehabilitation potential.	**Medium**	Medium Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality	**Medium**	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Degraded Grassland	Medium > 50% of receptor contains natural habitat with potential to support SCC.	Medium Mostly minor current negative ecological impacts with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.	**Medium**	Medium Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality	**Medium**	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Old Lands	Medium > 50% of receptor contains natural habitat with potential to support SCC.	Low Several minor and major current negative ecological impacts.	**Medium**	High Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor	**Low**	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Agriculture	Low < 50% of receptor contains natural habitat with limited potential to support SCC.	Low Several minor and major current negative ecological impacts.	**Low**	High Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and	**Low**	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance	Site Ecological Importance (SEI) Guidelines for interpreting SEI in the context of the proposed development activities
				functionality of the receptor		
Modified	Very Low No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.	Very Low Several major current negative ecological impacts.	**Very Low**	Very High Habitat that can recover rapidly	**Very Low**	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

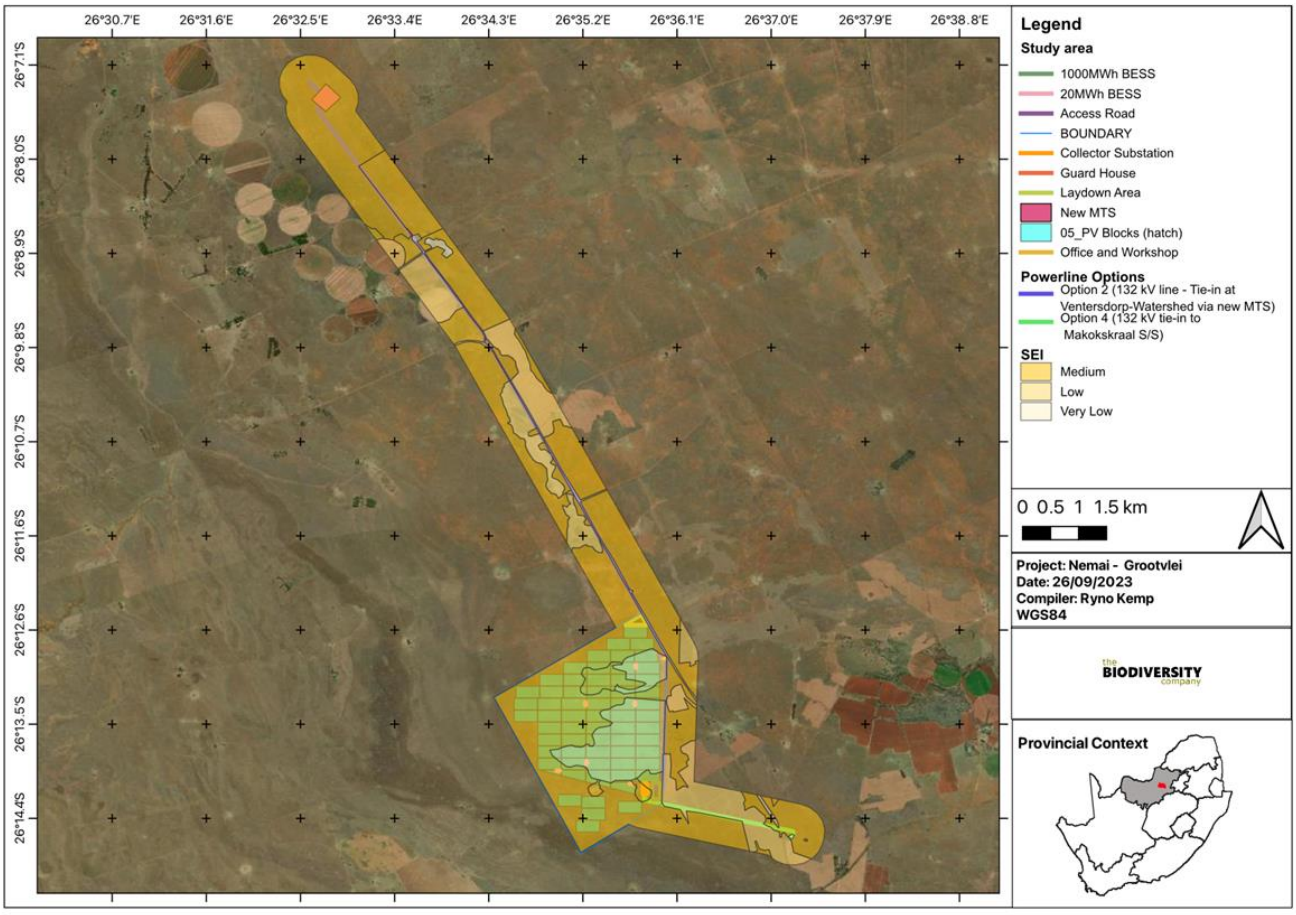

Figure 58: **Site Ecological Importance of the proposed development within avifauna context (Kemp, 2023).**

12.5.3 Conclusions

The following main conclusions are made:

- It is the opinion of the specialist that the project should be considered favourably from an avifaunal perspective, provided that all the mitigation and recommendations are implemented.

12.6 Agricultural Compliance Statement

A summary of the Agricultural Compliance Statement (Gouws, 2023) follows. The specialist report is contained in **Appendix D4.**

12.6.1 Details of the Specialist

Organisation:	Index (Pty) Ltd
Name:	Dr A. Gouws
Qualifications:	PhD. Integrated Agricultural Development
Affiliation (if applicable):	SACNASP Professional Natural Scientist (Registration No.: 400140/06)

12.6.2 Key Findings of the Study

12.6.2.1 Land Capability

In 2002 the Directorate: Land Use and Soil Management within DALRRD developed a national spatial land capability data set to indicate the spatial delineation of the then defined eight land capability classes. The approach followed was based on the approach of Klingebiel and Montgomery (1961) but adapted for South Africa. The aim was to develop a system for soil and land capability classification. It further aimed to incorporate the parameters within a Geographic Information System (GIS). The resulted spatial data set was derived at from a 1:250 000 land type data set being the main input data set for the derived land capability classes together with climatic and terrain parameters.

This dataset is used within the screening tool. While the new dataset is more complex than that of Klingebiel et al, the latter has clear guidelines and is generally still followed when assigning capability to land. A comparison between the two systems is provided in **Table 14** below.

Table 24: Relationship between grading of the Screening tool and that of Klingebiel et al. (Gouws, 2023).

DALRRD (2016)	Klingebiel	Capability	Arability
1-2	viii	Very low	Not arable
3-4	vii	Very low to low	
5-6	vi	Low	
7	v	Low to moderate	
8	iv	Moderate	Arable
9-10	iii	Moderate to high	
11-12	ii	High	
13-14	i	High to very high	
15	i	Very high	

Land capability classes are interpretive groupings of land with similar potential and limitations or similar hazards. Land capability involves consideration of difficultiesin land useowing to physical land characteristics, climate and the risks of land damage from erosion and other causes. The classic eight-class land capability system (Klingebiel & Montgomery, 1961) was adapted for use by the South African Department of Agriculture in their Agriculture Geographic Information System (AGIS).

According to the criteria in AGIS, the arable portions are Class 7 or poorer with only small isolated portions in the south that has moderate potential. According to Klingebiel et al, the soil capability is Class v and lower, mainly because of depth and mechanical limitations to root development and cultivation. According to the soil capability classification, the soils have low capability (or sensitivity as related to the Screening Tool).

12.6.2.2 Grazing Capacity

The land in its natural state is Carletonville Dolomite Grassland with highly palatable grass species. The grazing capacity according to DALRRD is estimated at 7ha/large livestock unit (LSU). The carrying capacity for the PV site is approximately 100 LSU.

12.6.2.3 Environmental Sensitivity: Agricultural Theme

According to the National Web-Based Environmental Screening Tool the PV Site has a medium sensitivity in general and high sensitivity on small portions towards the south of the site. In terms of the powerline routes, only high or very high sensitive land occurs on the northern part of Route Option 1 (refer to **Figure 59** below).

A site sensitivity verification was undertaken by desktop analysis using satellite imagery and a site visit. The outcome of the site sensitivity verification is outlined below:

- PV Site:
  - According to guidelines in AGIS (DALRRD), the land has low and low/moderate arable potential. This is because of the shallow soils and rock outcrops. According to the criteria in AGIS the land is not arable and more suitable for livestock grazing;
  - The site visit found very little deep arable soils that is without rock outcrops; and
  - No land can be regarded as high potential for cropping and which should be protected because it is highly sensitive for farming purposes.

- Powerline Route Options:

The footprint of the pylon is the only permanent feature that will lead to land loss.

- Line Option 1: The only sensitive portions are cultivated land and land under irrigation on the farm Roodepoortjie; and
- Line Option 2: The route consists of mainly veld grazing and pastures.

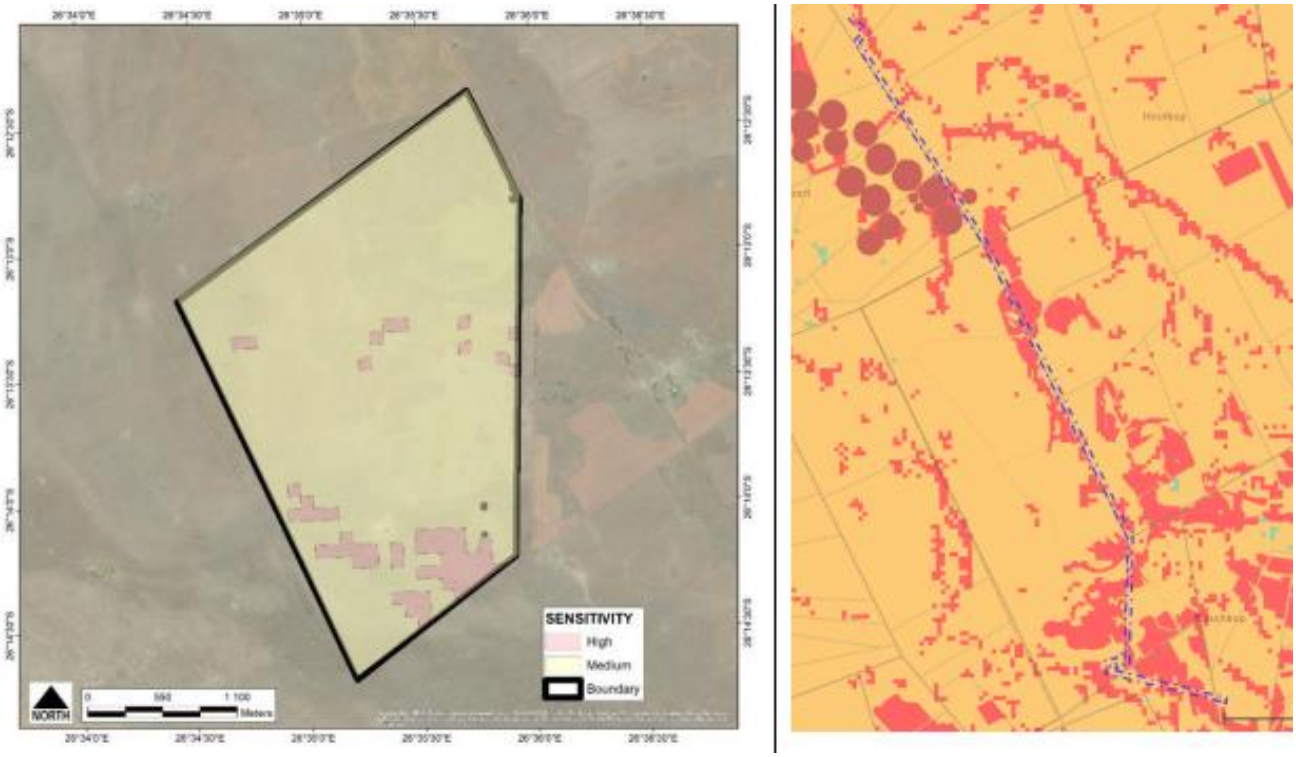

Figure 59: Agricultural Sensitivity as per the National Web-Based Environmental Screening Tool (Gouws, 2023).

12.6.3 Conclusions

The following main conclusions are made:

- No key issues or triggers were identified;
- There is no high potential sensitive land on the PV Site. Although Route Option 1 is preferred, negative impacts on Option 2 can be mitigated; and
- It is recommended by the specialist that construction be approved.

12.7 Heritage Impact Assessment

A summary of the Heritage Impact Assessment (Kitto, 2023) follows. The specialist report is contained in **Appendix D5.**

12.7.1 Details of the Specialist

Organisation:	Nitai Consulting (Pty) Ltd
Name:	J. Kitto
Qualifications:	BA (Hons) Social Anthropology
Affiliation (if applicable):	Association of Southern African Professional Archaeologists (444); International Association for Impact Assessment South Africa (7151)

12.7.2 Key Findings of the Study

12.7.2.1 Field Survey and Results

The inspection of the area that was surveyed identified the following visible heritage resources within or close to the project footprint (refer to **Figure 64** and **Figure 65** below for the locations of the finds).

- Historical buildings and structures:
  - Site Name: Groot 01 - The site comprises three historical structures namely a house, outbuilding and a kraal which are more than 60 years old (refer to **Figure 60** below); and
  - Site Name: Groot 04 - The site comprises a large historical stone kraal with an associated long trough which are more than 60 years old (refer to **Figure 61** below).

Figure 60: Land View of the three historical structures located at Groot 01 (Kitto, 2023).

Figure 61: View of historical stone kraal, showing cattle race at one corner (Kitto, 2023).

- Stone Age:
  - Site Name: Groot 02 - A single (possible) stone tool fragment was found at this location (refer to **Figure 62** below);
  - Site Name: Groot 03 – The site comprises a find spot for several stone tools (refer to **Figure 63** below);

Figure 62: View of the stone tool fragment at Groot 02 (Kitto, 2023).

Figure 63: View of stone tool ventral surface (Kitto, 2023).

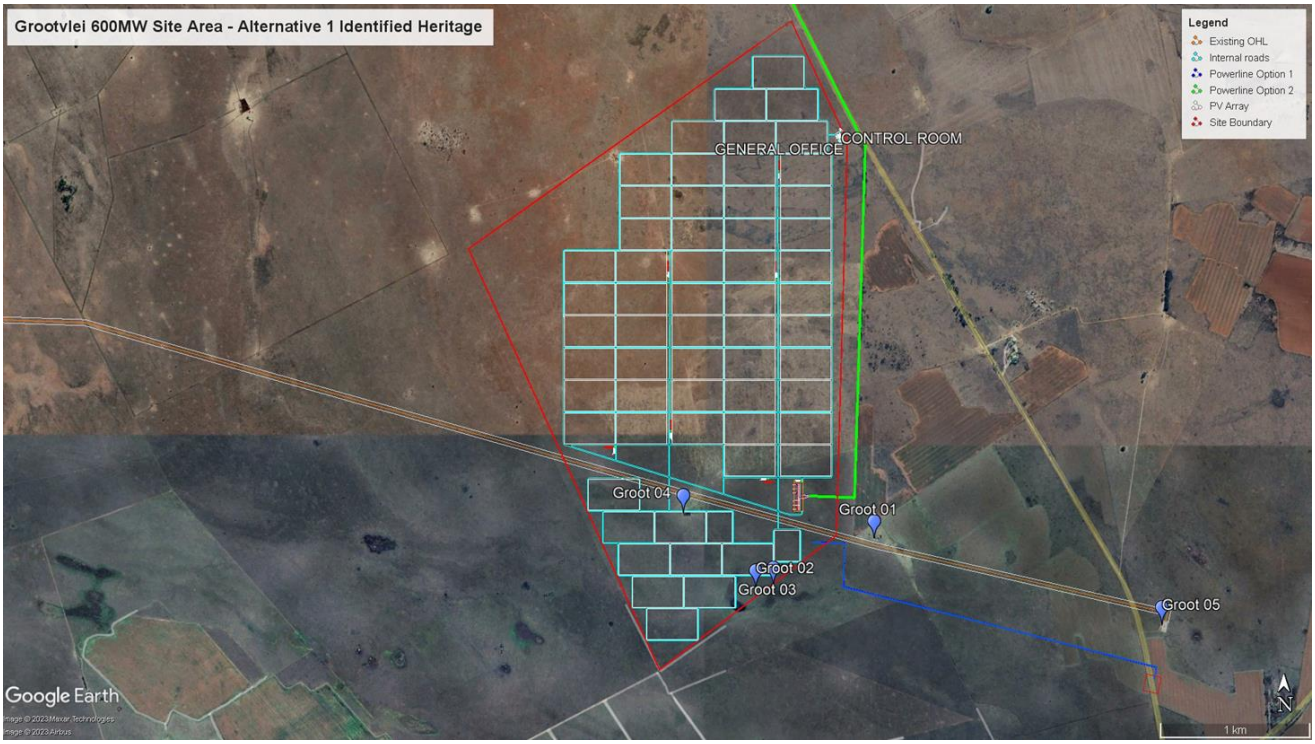

Figure 64: Enlarged view of Grootvlei 600MW site Area and Powerline Options, showing identified heritage resources (Alternative 1 Layout) (Kitto, 2023).

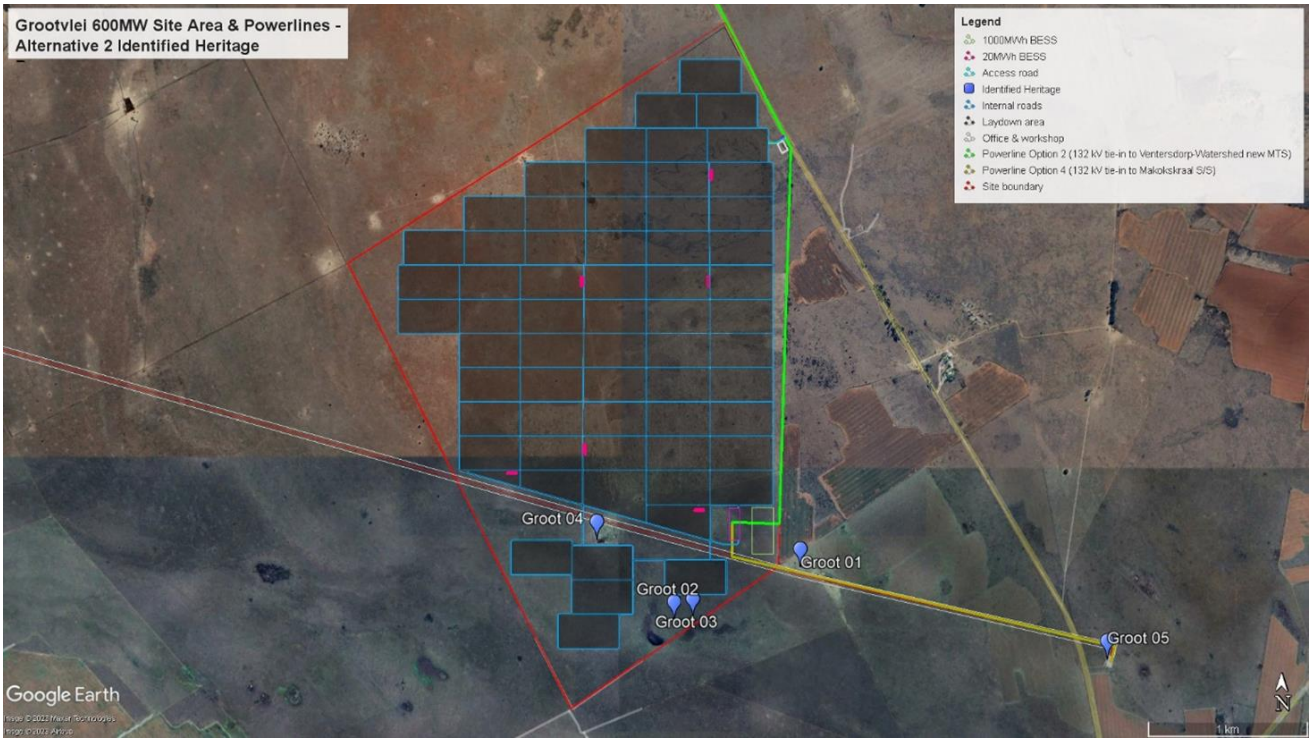

Figure 65: Enlarged view of Grootvlei 600MW site Area and Powerline Options, showing identified heritage resources (Alternative 2 Layout) (Kitto, 2023).

12.7.2.2 Environmental Sensitivity: Archaeological and Cultural Heritage Theme

According to the National Web-Based Environmental Screening Tool, the Project Area has a low sensitivity for archaeological and cultural heritage themes (refer to **Figure 66** below). The Historical Desktop study showed that four heritage features dating to c1966 are depicted either within or adjacent to the Solar project PV Site area footprint and two powerline options. The results from the fieldwork survey identified five visible heritage resources within or close to the project footprint which included two sites comprising historical structures and two archaeological sites comprising a very low density scatter of stone tools. This confirmed the sensitivity from the initial Site screening results that the Archaeological Cultural Heritage sensitivity is low for both the Alternative 1 and Alternative 2 layouts.

Figure 66: **Archaeological Cultural Sensitivity map indicating that the project footprint is located within a region of low heritage sensitivity (Kitto, 2023).**

12.7.3 Conclusions

The following main conclusions are made:

- The proposed Grootvlei Solar PV project could impact on heritage resources as four heritage resources were identified within or adjacent to the project footprint area: two historical structure sites (Groot 01, Groot 04) and two archaeological sites (Groot 02, Groot 03). However, the Alternative 2 layout has been adjusted to specifically avoid these heritage resources;
- No fatal flaws were identified during this study, therefore, it is the considered opinion of the heritage specialist that the construction of the proposed Solar PV project within the footprint can proceed;
- There are no objections from a heritage perspective provided the recommendations and mitigation measures are implemented; and
- Layout alternative 2 avoids the identified heritage resources and therefore this layout is preferred from a heritage perspective.

12.8 Palaeontological Impact Assessment

A summary of the Palaeontological Impact Assessment (Butler, 2023) follows. The specialist report is contained in **Appendix D6.**

12.8.1 Details of the Specialist

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

12.8.2 Key Findings of the Study

12.8.2.1 Field Survey and Results

A site-specific field survey of the development footprint was conducted on foot and by motor vehicle. A stockpile of weathered stromatolites removed during site clearance for agricultural activities was identified during the site visit (refer to **Figure 67** below). Stromatolites may be better preserved elsewhere in the area and thus mitigation is not suggested. Based on the site investigation it is concluded that fossil heritage of scientific and conservational interest in the development footprint is rare. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area.

12.8.2.2 Environmental Sensitivity: Palaeontology Theme

According to the National Web-based Environmental Screening Tool, the Project Area has a very high sensitivity for the Palaeontology theme. As the field survey did not detect any fossiliferous outcrops, the sensitivity designated in terms of the screening tool is thus contested based on the actual conditions recorded.

Figure 67: **Outcrops of weathered stromatolites were identified during the site visit piled to create clearance for agriculture activities (Butler, 2023).**

12.8.3 Conclusions

The following main conclusions are made:

- The construction of the development may be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

12.9 Visual Impact Assessment

A summary of the Visual Impact Assessment (Buys, 2023) follows. The specialist report is contained in **Appendix D7.**

12.9.1 Details of the Specialist

Organisation:	Environmental Assurance (Pty) Ltd
Name:	A. Buys
Qualifications:	BSc (Hons) (specializing in Geology, Geography and Hydrology)
Affiliation (if applicable):	SACNASP Professional Natural Scientist (Registration No.: 119183

12.9.2 Key Findings of the Study

12.9.2.1 Visual Resource Value of the study area

The visual resource value refers to the visual quality of an environment and how the environment appeal to our senses. Landscape quality increases when:

- Prominent topographical features and rugged horizon lines exist;
- Water bodies such as streams or dams are present;
- Untransformed indigenous vegetation cover dominates;
- Limited presence of human activity, or land uses that are not visually intrusive or dominant prevail.

The landscape is rated either high, moderate or low depending on factors such as sense of place, current views and aesthetic appeal. A resource value is subjectively applied, based on the specialist's expertise and experience in assessing visual impacts. A value is applied to the visual resources with each resource able to receive a maximum score of three (3) and counted to reach a final score out of twelve (12). The total is counted, and final score rated as:

- Low, equal to 4 – 6;
- Moderate, equal to 7 – 9, and
- High, equal to 10 - 12.

The values applied to the study area is detailed in **Table 25** below. Based on the score ranges, the overall visual resource value of the study area is rated as low.

Table 25: Visual resource value determination (Buys, 2023).

Visual baseline attributes	Topography	Hydrology	Vegetation	Land uses
Visual resource value score	2	1	2	2
			Total	**7**

12.9.2.2 Visual Absorption Capacity

Visual Absorption Capacity (VAC) was determined by considering the nature and occurrence of vegetation cover, topographical characteristics, and human structures. A further major factor is the degree of visual contrast between the proposed new project and the existing elements in the landscape. The majority of vegetation cover is predominately dominated by grasses, shrubs and scattered trees, while the topographical characteristics (flat to gentle), which can conceivably result in a low VAC.

12.9.2.3 Theoretical Visibility

Theoretical visibility was determined by conducting a Viewshed analysis and using Geographic Information System software with three-dimensional topographical modelling capabilities:

- The Digital Elevation Model (DEM) for the Viewshed analysis was acquired; and
- A 10 km area surrounding the site was used due the topography of the area.

The Viewshed was modelled on the above-mentioned DEM and the layout plan supplied using Esri ArcGIS for Desktop software, 3D Analyst Extension. A viewshed was modelled to account for the PV facility and its associated infrastructure, that will be constructed. The rating of level of visibility is provided in **Table 26** below. When considering the viewshed analysis, the visibility rating is high.

Table 26: Rating of level of visibility (Buys, 2023).

Level of theoretical visibility of project elements	Visibility rating
More than half of the study area	High
Between a quarter and half of the study area	Moderate
Less than a quarter of the total project study area	Low

12.9.2.4 Visual Intrusion

Visual intrusion deals with how well the project components fit into the ecological and cultural aesthetic of the landscape. An object will have a greater negative impact on scenes considered to have a high visual quality than on scenes of low quality.

Given that the study area has a low VAC (due to vegetation and the flat to gentle landscape) and low visual resource value, the proposed project will have a moderate (without mitigation measures) visual intrusion on surrounding sensitive receptors. Ensuring that vegetation is retained on the periphery of these areas, and wherever possible, lights be directed downwards as to avoid illuminating the sky and limit the reflection from the solar panels, the visual impact on the surrounding environment will be moderate depending on the proximity to the sensitive receptors.

The altered visual environment during the construction and operational phases will lead to moderate (without mitigation measures) levels of visual intrusion, with moderate levels of compatibility with

the surrounding land uses as well as moderate visual contrast. The level of visual intrusion because of the proposed project, with specific mention of vegetation clearing, removal of topsoil and solar PV infrastructure, is considered to be moderate (without mitigation measures) during the construction and operational phases, in line with the low VAC. The perceived visual impacts associated with the construction and operational phases are moderately (without mitigation measures) intrusive to the receiving environment.

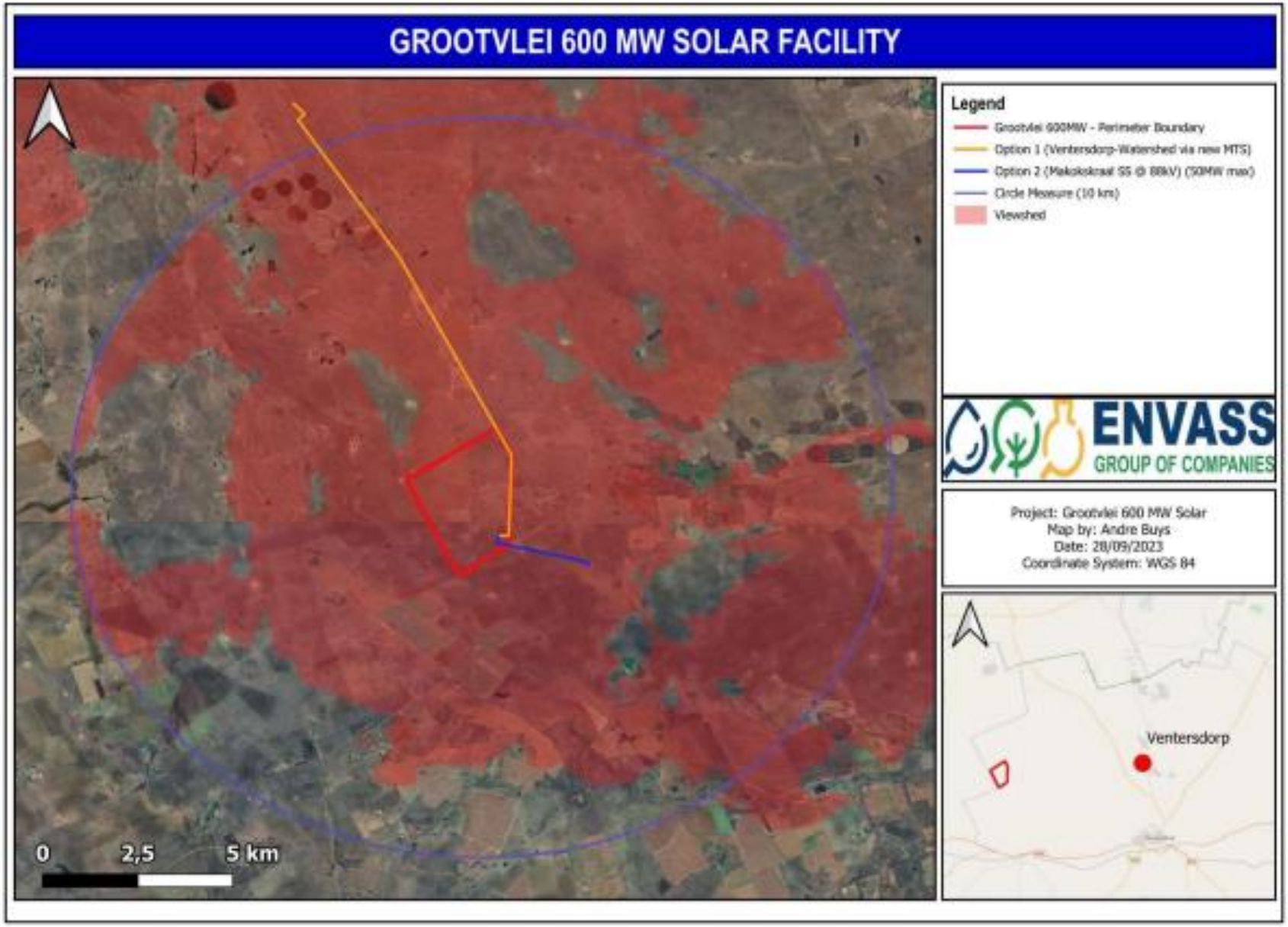

Figure 68: Viewshed analysis for the proposed Grootvlei Solar (10 km Radius) (Buys, 2023).

12.9.2.5 Visual Exposure

The visual impact of a development diminishes at an exponential rate as the distance between the observer and the object increases. The impact at 1 000 m would be 25% of the impact as viewed from 500 m. At 2 000 m, it would be 10 % of the impact at 500 m.

For the purposes of this assessment, close-range views (equating to a high level of visual exposure) are views over a distance of 500 m or less, medium-range views (equating to a moderate level of visual exposure) are views of 500 m to 2 km, and long-range views are over distances greater than 2 km (low levels of visual exposure). Limited sensitive receptors are located within 2 km of the site and are limited to people working in the area, residents and the number of farms surrounding the site.

For the purposes of this assessment, visual exposure in terms of all identified impacts has therefore been rated as moderate as the majority of the high sensitivity, sensitive receptors, are located more than 5 km from the project site.

12.9.3 Conclusions

- The proposed activities should have a moderate to low visual impact on the receiving environment and is thus not fatally flawed from a visual impact perspective;
- Both layout alternatives have been assessed and a similar finding and recommendation is reasonable for both alternatives; and
- Considering the project, it is the specialist's opinion that the proposed activities be allowed, provided that the findings within this report are considered along with the recommendations made towards the management of the proposed activity.

12.10 Social Impact Assessment

A summary of the Social Impact Assessment (Tanhuke, 2023) follows. The specialist report is contained in **Appendix D8.**

12.10.1 Details of the Specialist

Organisation:	Nemai Consulting (Pty) Ltd
Name:	C. Tanhuke
Qualifications:	BA Environmental Management (Geography)

12.10.2 Key Findings of the Study

- The project site has few social receptors surrounding the site, and the project has a low footprint on the social environment;
- The social and economic impacts of the project are expected to be positive in the sense that the local economy will be stimulated and broadened;
- The difference between the two layout alternatives do not have any impact on the social assessment for the project. Layout Alternative 1 and Layout Alternative 2 is equally acceptable from a social perspective;
- The negative impacts are limited in nature and scope and can be successfully mitigated to an acceptable level; and
- It is therefore found that the project, once the recommended mitigation measures have been implemented, has a nett positive impact on the social environment of the regional study area.

13 IMPACT ASSESSMENT

13.1 General

This section focuses on the pertinent environmental impacts that could potentially be caused during the pre-construction, construction and operational phases of the Project.

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. In accordance with the NEMA EIA Regulation, 2014 (as amended), 'activity' is defined in this report as an activity listed in GN No. R 983, GN No. 984 and GN No. 985 of 04 December 2014 (as amend).

Impacts were identified as follows:

- ❑ Impacts associated with listed activities contained in the EIA Regulations' Listing Notices;
- ❑ Impacts identified during the Scoping phase;
- ❑ 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.

13.2 Impacts associated with Listed Activities

As mentioned, the Project requires Environmental Authorisation for certain activities listed in the NEMA EIA Regulations, 2014 (as amended), which serve as triggers for the EIA. The potential impacts associated with the key listed activities are broadly stated in **Table 27** below.

Table 27: 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 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;	• Impacts associated with the footprint of the physical infrastructure (proposed power line). • Potential loss of sensitive environmental features (e.g. heritage resources, sensitive fauna and flora species, ecosystems, cultivated land) along the proposed power lines. • Visual impact associated with the proposed power line. • Impacts to agricultural land. • Cumulative impacts associated with aligning the proposed power line alongside linear developments (including existing roads and power lines).

Listed Activities	Potential Impact Overview
(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.	
GN No. R.983 – Activity no. 24(ii): *The development of a road -* *(i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or* *(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;* *but excluding a road -* *(a) which is identified and included in activity 27 in Listing Notice 2 of 2014;* *(b) where the entire road falls within an urban area; or* *(c) which is 1 kilometre or shorter.*	• Impacts associated with access roads. • Potential loss of sensitive environmental features (e.g. heritage resources, sensitive fauna and flora species). • Traffic disruptions during construction.
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 PV Site and associated infrastructure. • Loss of agricultural land. • Socio-economic impacts associated with construction activities.
GN No. R.983 – Activity 56 (i) & (ii): *The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre-* *(i) where the existing reserve is wider than 13,5 meters; or* *(ii) where no reserve exists, where the existing road is wider than 8 metres;* *excluding where widening or lengthening occur inside urban areas.*	• Impacts associated with access roads. • Potential loss of sensitive environmental features (e.g. heritage resources, sensitive fauna and flora species). • Traffic disruptions during construction.
GN No. R. 984 of 4 December 2014 (as amended) (Listing Notice 2)	
GN No. R.984 – Activity no. 1: *The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs -* *(a) within an urban area; or* *(b) on existing infrastructure.*	• Impacts associated with generating electricity from the Solar PV Plant. • Impacts associated with the footprint of the physical infrastructure. • Impacts to land use. • Potential loss of sensitive environmental features (e.g. heritage resources, sensitive fauna and flora species). • Visual impacts. • Soil destabilisation and subsequent erosion. • Proliferation of alien and invasive species. • Socio-economic impacts. • Traffic impacts.

Listed Activities	Potential Impact Overview
GN No. R.984 – Activity 4: *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 more than 500 cubic metres.*	• Potential contamination of soil, surface water and groundwater due to spillages from the BESS. • Fire hazards.
GN No. R.984 – Activity 9: *The development of facilities or infrastructure for the transmission and distribution of* *electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex* *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.*	• Impacts associated with the footprint of the physical infrastructure (proposed power line). • Potential loss of sensitive environmental features (e.g. heritage resources, sensitive fauna and flora species, ecosystems, cultivated land) along the proposed power lines. • Visual impact associated with the proposed power line. • Impacts to agricultural land. • Cumulative impacts associated with aligning the proposed power line alongside linear developments (including existing roads and power lines).
GN No. R.984 – Activity no. 15: *The clearance of an area of 20 hectares or more of indigenous vegetation, excluding 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 large areas of indigenous vegetation associated with the construction footprint of the PV Site and associated infrastructure. • 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. • Socio-economic impacts associated with construction activities.
GN No. R. 985 of 4 December 2014 (as amended) (Listing Notice 3)	
GN No. R.985 – Activity 4 - (h)(iv): *The development of a road wider than 4 metres with a reserve less than 13,5 metres.* *h. North West* *i. A protected area including municipal or provincial nature reserves as contemplated by NEMPAA or other legislation;* *ii. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *iii. Sites or areas identified in terms of an international convention;* *iv. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority;* *v. Core areas in biosphere reserves;* *vi. Areas within 5 kilometres from protected areas identified in terms of NEMPAA or from a biosphere reserve;* *vii. Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; or* *viii. All Heritage Sites proclaimed in terms of National Heritage Resources Act, 1999 (Act No. 25 of 1999).*	Impacts associated with building an access road within CBA2, including loss of biodiversity.
GN No. R.985 – Activity 12 - (h)(iv) & (vi)	The clearance of large tracts of indigenous vegetation and potential loss of sensitive fauna and flora species within areas

Listed Activities	Potential Impact Overview
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. *h. North West* *i. World Heritage Sites; core of biosphere reserve; or sites or areas identified in terms of an international convention;* *ii A protected area including municipal or provincial nature reserves as contemplated by NEMPAA or other legislation;* *iii. All Heritage Sites proclaimed in terms of National Heritage Resources Act, 1999 (Act No. 25 of 1999);* *iv. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority;* *v. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; or* *vi. Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.*	consisting of CBA2 and within 100 m from the edge of a wetland.
GN No. R.985 – Activity 18(h)(v) *The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.* *h. North West* *i. A protected area including municipal or provincial nature reserves as contemplated by NEMPAA or other legislation;* *ii. Areas within 5 kilometres from protected areas identified in terms of NEMPAA or from a biosphere reserve;* *iii. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *iv. Sites or areas identified in terms of an international convention;* *v. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority;* *vi. Core areas in biosphere reserves;* *vii. Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose;* *viii. All Heritage Sites proclaimed in terms of National Heritage Resources Act, 1999 (Act No. 25 of 1999); or* *ix. Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.*	Impacts associated with building an access road within and area classified as CBA2, including loss of biodiversity.

13.3 Project Activities

To understand the impacts related to the Project it is necessary to expand on description the activities associated with the project life-cycle, as done in the sub-sections below.

13.3.1 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 28** below.

Table 28: Simplified List of Activities associated with Pre-Construction Phase

Project Phase: Pre-construction
Project Activities
• Negotiations and agreements with the affected landowner, stakeholders and authorities
• Lease Agreement
• Registration of power line servitude
• Detailed engineering design
• Detailed geotechnical investigations, including geophysical 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 on the PV Site
• Determining and documenting the conditions of the roads to be used during construction
• Fencing off PV Site
High Level Environmental Activities
• Diligent compliance monitoring of the EMPr, Environmental Authorisation and other relevant environmental legislation
• Pre-construction environmental survey
• Develop Environmental Monitoring Programme (air quality, water quality, noise, traffic, social)
• Barricading of sensitive environmental features (e.g. wetland buffer)
• Obtain permits for impacts to SCC, if avoidance is not possible (if required)
• Obtain permits if heritage resources are to be impacted on and for the relocation of graves (if required)
• On-going consultation with I&APs
• Other activities as per EMPr

13.3.2 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 29** below.

Table 29: Simplified List of Activities associated with Construction Phase

Project Phase: Construction
Project Activities
• Site establishment
• Relocation of existing structures and infrastructure
• Prepare access roads
• Establish construction laydown area
• Bulk fuel storage
• Delivery of construction material
• Transportation of equipment, materials and personnel
• Storage and handling of material
• Construction employment

Project Phase: Construction
• Site clearing (as necessary)
• Excavation
• Concrete Works
• Mechanical and Electrical Works
• Electrical supply
• Material delivery and offloading
• Construction of PV Plant infrastructure
• Stockpiling
• Stringing of transmission lines
• 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 (as necessary)
• On-going consultation with I&APs
• Other activities as per EMPr

13.3.3 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 30** below.

Table 30: Simplified List of Activities associated with Operational Phase

Project Phase: Operation
Project Activities
• Testing and commissioning the facility's components
• Cleaning of PV modules
• 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
• Monitoring of the facility's performance
High Level Environmental Activities
• On-going consultation with I&APs
• Other activities as per EMPr for Operational Phase

13.4 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 Project, which are linked to the project activities, are provided in **Table 31** below. Note that only high level aspects are provided.

Table 31: Environmental Aspects associated with Project Life-Cycle

Project Phase: Pre-construction
Environmental Aspects
• Inadequate consultation with landowner and other relevant stakeholders
• 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)
• Lack of barricading of sensitive environmental features (e.g., wetland buffer)
• 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
• Poor management of pollution generation potential
• Damage to significant flora (if encountered)
• Damage to significant fauna (if encountered)
• Impact to resource quality of wetland in central part of PV site
• Inadequate stormwater management
• Environmental damage to 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 cleaning of panels
• Impacts caused by fire, explosion or leaks associated with BESS
• Pollution caused by dangerous good (e.g. transformer oils) associated with substation
• Inadequate management of light pollution
• Failure to comply with health, safety and environmental specifications

13.5 Potentially Significant Environmental Impacts

Environmental impacts are the change to the environment resulting from an environmental aspect, whether desirable or undesirable. This section will focus on the potentially significant direct, indirect, residual and cumulative impacts identified during the Scoping phase and any additional issues identified during the EIA phase.

The potentially significant environmental impacts associated with the Project, as listed in Table 29 below, were identified through an appraisal of the following:

- ❑ Project-related components and infrastructure (**see Section 9**);
- ❑ 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 11**);
- ❑ Findings from specialist studies (**see Section 12);**
- ❑ Understanding of direct and indirect effects of the Project as a whole (**see Section 13**);
- ❑ Comments received during public participation (**see Section 15**); and
- ❑ Legal and policy context (**see Section 5**).

It is noted that the potentially significant environmental impacts listed in **Table 32** were evaluated as part of the specialist studies and suitable mitigation measures were identified where it was found that these impacts could possible occur. These impacts are assessed in Sections 13.9 – 13.26 below.

Table 32: Potentially Significant Environmental Impacts associated with the Project

Environmental Factor	Construction Phase Potential Issues / Impacts	Operational Phase Potential Issues / Impacts
Land Use	• Sterilisation of land for other land use types. • Setbacks / conditions associated with surrounding land and infrastructure.	• Sterilisation of land for other land use types up to the decommissioning of the Project (if applicable). • Servitude restrictions.
Geology	• Suitability of geological conditions to support the Solar Plant.	• Suitability of geological conditions to support the Solar Plant.
Geohydrology	• Groundwater pollution due to spillages and poor construction practices. • Utilisation of boreholes, if required.	• Groundwater pollution due to poor operation and maintenance practices. • Utilisation of boreholes, if required.
Topography	• Visual impacts. • Erosion of areas cleared for construction purposes. • Crossing topographic features (watercourses).	• Crossing topographic features (watercourses). • Visual impact caused by proposed Project infrastructure and landscape transformation. • Glint and glare from solar panels.
Soil	• Soil erosion due to clearance and inadequate stormwater management. • Soil compaction. • Soil contamination due to spillages and poor construction practices. • Loss of topsoil.	• Soil erosion due to inadequate stormwater management. • Soil contamination due to poor operation and maintenance practices.
Surface Water	• Alteration of drainage over the Solar Site. • Surface water pollution due to spillages and poor construction practices. • Encroachment of construction activities into watercourses and their buffer zones. • Impacts where access roads and ancillary infrastructure cross / are in close proximity to watercourses (e.g., sedimentation, loss of vegetation, destabilisation of watercourse structure).	• Sedimentation through silt-laden runoff, caused by inadequate stormwater management. • Damage to the Solar facility and towers of the power line from major flood events. • Water resources could be contaminated through inadequate storage and handling of hazardous materials, leaks from the BESS and poor management of waste and wastewater. • Water use requirements of the Project need to be satisfied.
Flora & Fauna	• Habitat loss / fragmentation. • 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.	• Habitat fragmentation (e.g., barriers to animal movement). • Shading out of plants by solar panels. • Reflection of sunlight from the solar panels could adversely affect birds. • Risk to birds from collision with infrastructure and from electrocution. • Electrical faulting from birds. • Chemical pollution associated with cleaning the PV panels. • Proliferation of invasive alien species in disturbed areas.
Socio-economic Environment	• 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).	• Direct and indirect economic opportunities as a result of the Project. • Threats to human and animal health from electromagnetic field (power line and on-site substation).

Environmental Factor	Construction Phase Potential Issues / Impacts	Operational Phase Potential Issues / Impacts
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.	• The efficiency of the solar plant could be reduced if the modules are soiled (covered) by particulates/dust. • 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. • Risk of harm to livestock from construction activities.	• Loss of possible future agricultural land use due to direct occupation by the development footprint. • Soil erosion due to inadequate stormwater management.
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.
Existing Structures & Infrastructure	• Setbacks / conditions associated with surrounding land and infrastructure. • Crossing of existing infrastructure by power line.	• Setbacks / conditions associated with surrounding land and infrastructure. • Disturbances to infrastructure traversed by power line 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 N6 national road. • 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. • Sun glare off PV panels.
Aesthetics	• Landscape transformation. • Visual impacts associated with construction activities.	• Landscape transformation. • Inadequate reinstatement and rehabilitation of construction footprint. • Light pollution. • Glint and glare from PV facility. • High visibility of power lines to visual receptors.
Health	• 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. • Fire and explosion risks during BESS operation.

The cumulative impacts are discussed in **Section 13.28** below.

The findings of the specialists are of particular importance in terms of understanding the impacts of the Project and managing these during the project life-cycle, as these studies focused on the significant environmental issues identified during the execution of the EIA. As can be seen from the various impact assessments performed by the specialists, there are a host of 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.

13.6 Impact Assessment Methodology

The impacts and the proposed management thereof are first discussed in **Section 13.9** to **Section 13.26** 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 33** below). Where applicable, the impact assessments and significance ratings provided by the respective specialists are included.

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

Table 33: Quantitative Impact Assessment Methodology

Criteria	Description
Nature	The project could have the following impacts on the environment: • **Positive**; • **Negative**; or • **Neutral**.
Extent	The geographic extent of the impact on a given environmental receptor • **Local** - extend to the site and its immediate surroundings. • **Regiona**l - 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	The length of permanence of the impact on the environmental receptor • **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	The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation • **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.

Criteria	Description
	• **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, and critical habitat.

In the case of the specialist studies, some of the impact assessment methodologies deviated from the approach shown in **Table 33** above. However, the quantitative basis for these specialist evaluations of the impacts to specific environmental features still satisfied the intention of the EIA.

13.7 Impact Mitigation

13.7.1 Mitigation Hierarchy

Impacts are to be managed by assigning suitable mitigation measures, where the objectives 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 G**) 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.

13.7.2 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 the EIA Regulations 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 accordance with the above, the following EMPr's were developed for the Project:

- Generic EMPr for the development and expansion for overhead electricity transmission and distribution infrastructure (contained in **Appendix G1**);
- Generic EMPr for the development and expansion of substation infrastructure for the transmission and distribution of electricity (contained in **Appendix G2**); and
- Normal EMPr for the Solar PV Plant (contained in **Appendix G3**).

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

The following considerations and assumptions accompany the compilation of the EMPr for the Solar PV Plant:

- The EMPr is guided by the following principles, based on Lochner (2005) -
  - **Continuous improvement -** The Applicant should be committed to review and to continually improve environmental management, with the objective of improving overall environmental performance;
  - **Broad level of commitment** - A broad level of commitment is required from all levels of management as well as the workforce in order for the implementation of the EMPr to be successful and effective; and
  - **Flexible and responsive** - The implementation of the EMPr needs to be responsive to new and changing circumstances. The EMPr report is a dynamic "living" document that will need to be updated regularly throughout the duration of the project life-cycle.
- Compliance with the EMPr must be audited in terms of Regulation 34 of the EIA Regulations;
- The EMPr provides the framework for the overarching environmental management requirements for the project life-cycle. Following detailed design and planning, the EMPr may need to be revised to render the management actions more explicit and accurate to the final project specifications. Any amendments to the EMPr must be undertaken in accordance with Regulations 35 – 37 of the EIA Regulations;
- The EMPr will be linked to the project's overall Environmental Management System (EMS) (if applicable), where the EMS constitutes an iterative process that aims achieve continuous improvement and enhanced environmental performance; and
- Although every effort has been made to ensure that the scope and level of detail of the EMPr are tailored to the level of environmental risk (i.e., type and scale of activity and the sensitivity of the affected environment) and the project- and site-specific conditions, certain of the

environmental management requirements within the EMPr may be regarded as generic to make provision for activities that may take place as part of the overall Project.

13.8 Land Use

13.8.1 Impact Description

Land is required for constructing the proposed infrastructure associated with the Solar PV Plant. In addition, a servitude will be required for the proposed power line (grid connection).

The areas affected by the proposed Project footprint are rural in nature. The entire PV site and powerline option 1 is currently used for grazing. Powerline option 2 is used for grazing and the cultivation of crops. To minimise impacts to the receiving environment and current land uses, the Project's powerline route options mostly follow property boundaries.

13.8.2 Impact Assessment

Please refer to the assessment provided in **Section 13.14** below.

13.9 Soils

13.9.1 Impact Description

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 suitable storm water management measures to prevent the occurrence of erosion.

Soil may be polluted by poor storage or handling of material, spillages and inadequate housekeeping practices. Specific mitigation measures are contained in the EMPr, where the primary objective is the effective and safe management of materials on site, in order to minimise the impact of these materials on the biophysical environment. The same objective applies to the correct management and handling of hazardous substances (e.g. fuel, transformer oil, batteries).

13.9.2 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. • Soil pollution.	• Consider findings from geotechnical investigations during Project design phase and incorporate mitigation measures (as relevant) • Stabilisation of cleared areas to prevent and control erosion. • Manage drainage from sites to minimise erosion. • Reinstate and rehabilitate disturbed areas to prevent future erosion. • See mitigation measures for hazardous substances and waste.

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

13.10 Geohydrology

13.10.1 Impact Description

Groundwater may be impacted by the Project as follows:

- Possible influence on groundwater flow as a result of trenching and building of infrastructure and structures associated with the development footprint during construction;
- Use of groundwater during construction and operational phases; and
- Potential contamination of groundwater during construction and operational phases as a result of inadequate management of wastewater and spillages of dangerous goods.

13.10.2 Impact Assessment

Environmental Feature	**Geohydrology**
Relevant Alternatives & Activities	**Construction and operational activities**
Project life-cycle	**Construction & operational phases**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Groundwater pollution. • Groundwater use. • Impacts to groundwater flow.	• Provide suitable protection of groundwater during excavations. • All storage tanks containing hazardous materials must be placed in bunded containment areas with impermeable surfaces. The bunded area must be able to contain 110% of the total volume of the stored hazardous material. • Provide sufficient and suitable sanitation facilities during construction and operational phases, which shall conform to all relevant health and safety standards and codes. • Reduce sediment loads in water from dewatering operations. All dewatering shall be done through temporary sediment traps (e.g. constructed out of geo-textiles and hay bales). • If any groundwater is to be used during the construction and operational phases, it will need to comply with the provisions of the NWA, 1998.

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

13.11 Surface Water

13.11.1 Hydrology

13.11.1.1 Impact Description

Potential impacts related to the movement of water over the PV Site include the following:

- The development may alter the drainage on the site and cause an increase in runoff;
- Impacts caused by inadequate stormwater management at the PV Site; and
- Damage to the development from major flood events.

13.11.1.2 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 site. • Watercourse crossings. • Inadequate stormwater management. • Damage caused by floods.	• Structures associated with the PV facility are to be developed outside of the 1:100 year floodline of any watercourse. • Design suitable stormwater drainage system for the PV Site. • 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 100m or within the 1:100 year flood line of any watercourse. • Stabilisation of watercourses at crossings (access roads and ancillary infrastructure). • Carry out earthworks in phases across the PV Site to reduce the total area of disturbed ground at any one time.

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

13.11.2 Wetlands

The findings from the Freshwater Impact Assessment (Van Rooyen, 2023) follow. The specialist report is contained in **Appendix D1.**

13.11.2.1 Impact Assessment

Table 34: Impacts to hydrological function (Van Rooyen, 2023).

Nature: Changes to flood regimes of the watercourse through, for example, flood suppression, unseasonal flooding or the loss of flood attenuation capacity.				
ACTIVITY: Sources include the compaction of soil, vegetation removal, redirecting surface water, changes to the surface water characteristics or through construction of roads.				
	Alternative 1		**Alternative 2**	
	Without mitigation	**With mitigation**	**Without mitigation**	**With mitigation**
Construction Phase				
Probability	Moderate (3)	Unlikely (2)	Unlikely (2)	Unlikely (2)
Duration	Medium (3)	Short term (2)	Short term (2)	Short term (2)
Extent	Regional (3)	Local (2)	Regional (3)	Local (2)
Magnitude	Moderate (6)	Low (4)	Low (4)	Minor (2)
Significance	**36 (Low to Moderate)**	**16 (Low)**	**18 (Low)**	**12 (Low)**
Status (positive or negative)	Negative	Negative	Negative	Negative
Operational Phase				
Probability	Moderate (3)	Unlikely (2)	Minor (1)	Rare (1)
Duration	Medium term (3)	Short term (2)	Short term (2)	Short term (2)
Extent	Regional (3)	Local (2)	Local (2)	Local (2)
Magnitude	Moderate (6)	Low (4)	Minor (2)	Minor (2)
Significance	**36 (Low to Moderate)**	**16 (Low)**	**12 (Low)**	**6 (Low)**
Status (positive or negative)	Negative	Negative	Negative	Positive

Reversibility	Low	Moderate	Moderate	High
Irreplaceable loss of resources?	High	Low	Low	Low
Can impacts be mitigated?	Yes		Yes	
Mitigation: • The entire footprint should avoid the delineated boundaries of watercourses as well as its buffer zones; • Effective stormwater management plans should be in place during both the construction and operational phases. This should also be monitored as part of the EMPr; • Appropriate stormwater structures should be in place to control run-off and minimize the risk of pollution; • Panels should be fitted with stormwater gutters to control the runoff in an ecologically sensitive manner to prevent erosion; • All areas where vegetation was cleared should be re-vegetated in order to limit the erosion potential; • Sedimentation protection measures (such as sand bags, silt traps and fences) should be installed prior to construction; • Prevent uncontrolled access of vehicles in and around the watercourse which can impact the hydrology and alluvial soil structure; and, • All no-go areas should be clearly demarcated prior to commencement of construction activities.				
Cumulative impacts: Low to moderate and could possibly include edge effects to remaining natural vegetation as the footprint activities may result in vegetation clearing. This could lead to increase in sedimentation as well as introduction of alien and invasive species.				
Residual Risks: Expected to be low given that all structures are situated outside the delineated sensitive areas and that stormwater is managed effectively.				

Table 35: Impacts to sediment (Van Rooyen, 2023).

Nature: Change in sedimentation patterns, changes in sediment in watercourses and sub-catchment due to the removal of soil.				
ACTIVITY: Construction activities and maintenance of solar plant would result in earthworks as well as causing soil and vegetation disturbances. Loss of topsoil, sedimentation in rivers that would cause an increase in turbidity. Other potential impacts include; earthworks, clearing of vegetation would result in bare soil that could be washed into the wetland, disturbance of slopes through road works next to watercourses.				
	Alternative 1		**Alternative 2**	
	Without mitigation	**With mitigation**	**Without mitigation**	**With mitigation**
Construction Phase				
Probability	Likely (4)	Moderate (3)	Unlikely (2)	Unlikely (2)
Duration	Medium term (3)	Short term (2)	Short term (2)	Short term (2)
Extent	Local (2)	Local (2)	Local (2)	Local (2)
Magnitude	Moderate (6)	Low (4)	Low (4)	Minor (2)
Significance	**44 (Moderate)**	**24 (Low to Moderate)**	**16 (Low)**	**12 (Low)**
Status (positive or negative)	Negative	Negative	Negative	Negative
Operational Phase				
Probability	Moderate (3)	Unlikely (2)	Unlikely (2)	Rare (1)
Duration	Medium term (3)	Short term (2)	Short term (2)	Short term (2)
Extent	Local (2)	Local (2)	Local (2)	Local (2)
Magnitude	Moderate (6)	Low (4)	Low (4)	Minor (2)
Significance	**33 (Low to Moderate)**	**16 (Low)**	**16 (Low)**	**6 (Low)**
Status (positive or negative)	Negative	Negative	Negative	Positive
Reversibility	Low	Moderate	Moderate	High
Irreplaceable loss of resources?	High	Low	Low	Low
Can impacts be mitigated?	Yes		Yes	
Mitigation: • Install sediment traps;				

• Remove topsoil and keep topsoil stockpiles free of any weeds to keep topsoil viable for rehabilitation; • All stockpiles should be safeguarded against rain wash; • Ensure that stockpiles are covered during windy conditions • Remove only vegetation in areas essential for construction; • Excess water flow should be managed efficiently to avoid any impacts on the wetland; • All soil and topsoil removed should not be stockpiled within any watercourse and should take place outside delineated watercourses. All stockpiles should be protected from erosion and stored on flat surfaces; • Avoid using chemicals for cleaning of solar panels to lower the risk of polluting soils, and in times of flow will pollute surface runoff from contaminated soils; • Monitor sediment pollution; • Construction activities should take place in low flow period (as much as possible). This will lower the risk of sedimentation and polluting the wetland; • All stationary vehicles should be equipped with drip trays; • Avoid parking of vehicles close to any watercourses; • No dumping of waste or any other materials near delineated and buffered areas; and • All areas affected by construction activities should be rehabilitated upon completion of the construction phase. Areas where vegetation was removed, should be reseeded with indigenous grasses as per recommendations from Terrestrial Report.
Cumulative impacts: Low to moderate and could possibly include edge effects to remaining natural vegetation as the footprint activities may result in vegetation clearing. This could lead to increase in sedimentation as well as introduction of alien and invasive species.
Residual Risks: Expected to be low given that all structures are situated outside the delineated sensitive areas and that stormwater is managed effectively.

Table 26: Introduction and spread of alien and invasive species (Van Rooyen, 2023).

Nature: Introduction and spread of alien and invasive species.				
ACTIVITY: The removal and movement of soil and vegetation could result in opportunistic invasions after such disturbances as well as the introduction of seed in building materials and on vehicles. In addition, invasions of alien vegetation species can have an impact on hydrology through reducing the water quantity entering a watercourse and it can outcompete natural vegetation and therefore decrease natural biodiversity.				
	Without mitigation	**With mitigation**	**Without mitigation**	**With mitigation**
Construction Phase				
Probability	Likely (3)	Unlikely (2)	Unlikely (2)	Rare (2)
Duration	Short term (2)	Short term (2)	Short term (3)	Short term (2)
Extent	Local (2)	Local (2)	Local (2)	Local (2)
Magnitude	Low (4)	Low (4)	Low (4)	Low (4)
Significance	**24 (Low to Moderate)**	**16 (Low)**	**16 (Low)**	**8 (Low)**
Status (positive or negative)	Negative	Negative	Negative	Negative
Operational Phase				
Probability	Rare (1)	Rare (1)	Rare (1)	Rare (1)
Duration	Short term (2)	Short term (2)	Short term (2)	Short term (2)
Extent	Local (2)	Site-only (1)	Local (2)	Site-only (1)
Magnitude	Low (4)	Minor (2)	Low (4)	Minor (2)
Significance	**8 (Low)**	**5 (Low)**	**8 (Low)**	**5 (Low)**
Status (positive or negative)	Negative	Negative	Negative	Negative
Reversibility	Low	Moderate	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low	Low	Low
Can impacts be mitigated?	Yes		Yes	

Mitigation:

- Monitor for early detection, to find species when they first appear on site. This should be as per the frequency specified in the management plan and should be conducted by an experienced person. Early detection should provide a list of species and locations where they have been detected. Summer (vegetation maximum growth period) is usually the most appropriate time, but monitoring can be adaptable, depending on local conditions – this must be specified in the management plan;
- Monitor for the effect of management actions on target species, which provides information on the effectiveness of management actions. Such monitoring depends on the management actions taking place. It should take place after each management action; and,
- Monitor for the effect of management actions on non-target species and habitats.

Cumulative impacts: Limited alien and Invasive plant species were observed on site, cumulative impacts can be Low to Moderate. As such, continuous monitoring should be implemented during the different phases of development and rehabilitation as well as a period after rehabilitation is completed.

Residual Risks: Expected to be limited given that a recommendations from Terrestrial Assessment is followed.

Table 37: Activities causing pollution (Van Rooyen, 2023).

Nature: Surface water, groundwater and sediment pollution.

ACTIVITY: Accidental spillages of wet concrete, chemical hazardous substances, oil and diesel spillages may result in surface water, groundwater and sediment pollution.

	Without mitigation	**With mitigation**	**Without mitigation**	**With mitigation**
Construction Phase				
Probability	Likely (4)	Unlikely (2)	Unlikely (2)	Unlikely (2)
Duration	Medium term (3)	Medium term (3)	Medium term (3)	Short term (2)
Extent	Local (2)	Local (2)	Local (2)	Local (2)
Magnitude	Moderate (6)	Moderate (6)	Low (4)	Low (4)
Significance	**44 (Moderate)**	**22 (Low to Moderate)**	**18 (Low)**	**16 (Low)**
Status (positive or negative)	Negative	Negative	Negative	Negative
Operational Phase				
Probability	Likely (4)	Unlikely (2)	Unlikely (2)	Unlikely (2)
Duration	Short term (2)	Short term (2)	Short term (2)	Short term (2)
Extent	Local (2)	Local (2)	Local (2)	Local (2)
Magnitude	Moderate (6)	Low (4)	Low (4)	Minor (2)
Significance	**40 (Moderate)**	**16 (Low)**	**16 (Low)**	**12 (Low)**
Status (positive or negative)	Negative	Negative	Negative	Negative
Reversibility	Low	Moderate	Moderate	Moderate
Irreplaceable loss of resources?	High	Low	Low	Low
Can impacts be mitigated?	Yes		Yes	

Mitigation:

- The development footprint should remain outside the delineated wetland and buffer zones;
- Concrete mixing should be done outside the buffer zones and should be done on an impermeable surface;
- All stationary vehicles should be equipped with drip trays;
- No servicing of vehicles or construction equipment should take place near delineated or buffer areas and should be done on an impermeable surface area;
- No washing of construction equipment is allowed in any watercourse;
- All hazardous substances should be safely stored on an impermeable surface within the construction site camp;
- No ablution facilities should be located within 50 m of watercourses and should be outside the 1:100 year flood line;
- Construction camp, storage of construction equipment and materials, and chemicals should be located outside the 1: 100

year flood line; • No dumping of waste near or within delineated watercourses and should be adequately stored and removed from site by waste facility; • All waste and refuse should be removed from site and disposed in adequate storage containers before being disposed at a registered landfill site; • All accidental spillages should be rehabilitated immediately and contaminated soil should be adequately disposed off; • No vehicle or construction machinery are allowed within the watercourse; and, • Only use clean water in the washing of the solar panels.
Cumulative impacts: Impacted water quality will only affect local water quality. This is considered as a Moderate cumulative impact.
Residual Risks: Since pollution can be controlled and to a large extent be prevented, the impact of spillages will have a significant residual impact on local watercourses and as such should be considered a significant residual risk.

13.12 Terrestrial Ecology

The findings from the Terrestrial Biodiversity Compliance Statement (Human, 2023) follow. The specialist report is contained in **Appendix D2.**

13.12.1.1 Impact Assessment

Refer to **Table 38** below for the assessment of significance of potential impacts on the terrestrial fauna and flora.

Table 38: Assessment of significance of potential impacts on the terrestrial fauna and flora associated with the construction and operational phase (Human, 2023).

Impact 1	**Destruction, fragmentation and degradation of habitats and ecosystems**			
Problem	Construction activities will require clearing of natural habitat, to be replaced by the infrastructure. This will result in permanent local loss of habitat. Daily operational activities will permanently damage habitat and fragment it further.			
Type	Direct			
Nature	Negative			
Phases	Construction			
	Alternative 1		**Alternative 2**	
Criteria	Without mitigation	With mitigation	Without mitigation	With mitigation
Extent	2	1	2	2
Duration	3	2	2	1
Sensitivity	3	2	2	1
Severity	3	2	2	1

Probability	5	5	5	5
Significance	55 Moderate	35 Low to Moderate	40 Moderate	25 Low
Mitigation actions				
Recommendations	1. Restrict impact to development footprint only and limit disturbance in surrounding areas. 2. Prior to commencement of construction, compile a Rehabilitation Plan including monitoring specifications, to be included into the EMPr during final approval. 3. Prior to commencement of construction, compile an Alien Plant Management Plan, to be included into the EMPr during final approval.			
Monitoring				
Recommendations	As per management plans			
Impact 2	Spread and/or establishment of alien and/or invasive species			
Problem	Establishment and continued spread of alien invasive plants due to the clearing and disturbance of indigenous vegetation			
Type	Indirect			
Nature	Negative			
Phases	Construction and Operational			
	Alternative 1		**Alternative 2**	
Criteria	Without mitigation	With mitigation	Without mitigation	With mitigation
Extent	3	2	3	2
Duration	5	5	5	5
Sensitivity	4	2	2	1
Severity	3	2	3	2
Probability	4	3	4	3
Significance	60 Moderately High	33 Low	52 Moderate	30 Low
Mitigation actions				
Recommendations	1. Prior to commencement of construction, compile and implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control, including monitoring specifications.			

	2. Undertake regular monitoring to detect alien invasions early so that they can be controlled. 3. Implement control measures.			
Monitoring				
Recommendations	As per management plans			
Impact 3	Ongoing displacement and direct mortality of fauna due to disturbance			
Problem	Mortality of fauna due to higher traffic (Vehicles and staff) on site and disturbances including noise, dust, and vibrations			
Type	Direct			
Nature	Negative			
Phases	Construction and Operational			
	Alternative 1		**Alternative 2**	
Criteria	Without mitigation	With Mitigation	Without mitigation	With Mitigation
Extent	3	2	3	2
Duration	4	3	4	3
Sensitivity	3	2	2	2
Severity	3	2	3	1
Probability	5	3	4	3
Significance	65 Moderately High	27 Low	48 Moderate	24 Low
Mitigation actions				
Recommendations	Education and awareness of staff and construction personal regarding importance of faunal populations and ecosystem functioning			
Monitoring				
Recommendations	Continued monitoring of faunal populations and awareness programs as per management plan			
Impact 4	Reduced dispersal/migration of fauna			
Problem	Internal roads, fencing and infrastructure will cut off migratory routes of faunal populations			

Type	Direct			
Nature	Negative			
Phases	Construction and Operational			
	Alternative 1		**Alternative 2**	
Criteria	Without mitigation	With Mitigation	Without mitigation	With Mitigation
Extent	2	1	2	1
Duration	5	5	5	5
Sensitivity	3	2	2	1
Severity	3	2	3	1
Probability	5	4	5	4
Significance	65 Moderately High	44 Moderate	60 Moderate	36 Low
Mitigation actions				
Recommendations	Create corridors during construction phase for faunal species to move through artificial barriers			
Monitoring				
Recommendations	Continuously monitor faunal populations as per management plans			
Impact 5	Environmental pollution due to water runoff, spills from vehicles and erosion			
Problem				
Type	Direct and Indirect			
Nature	Negative			
Phases	Construction and Operational			
	Alternative 1		**Alternative 2**	
Criteria	Without mitigation	With mitigation	Without mitigation	With mitigation
Extent	3	2	2	1
Duration	5	5	5	5
Sensitivity	4	2	3	1

Severity	4	3	3	1
Probability	3	2	3	2
Significance	48 Moderate	24 Low	39 Moderately Low	16 Very Low
Mitigation actions				
Recommendations	Proper storage of harmful fluids or powders			
Monitoring				
Recommendations	Diligence checks as per storage SOP according to management plans			
Impact 6	Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust, and light pollution.			
Problem	Construction and maintenance vehicles moving around on site			
Type	Direct and Indirect			
Nature	Negative			
Phases	Construction and Operational			
	Alternative 1		**Alternative 2**	
Criteria	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	2	1	2	1
Duration	5	3	5	3
Sensitivity	3	2	2	1
Severity	4	3	3	2
Probability	5	3	4	2
Significance	70 High	33 Low	48 Moderate	14 Very Low
Mitigation actions				
Recommendations	Keep within footprint, drive within speed limits, do not idle vehicle for unnecessary periods			
Monitoring				
Recommendations	Follow SOP's as set out in Management plan, monitor faunal populations			

Impact 7	Staff and others interacting directly with fauna (potentially dangerous) and flora or poaching of animals and plants			
Problem	Staff interacting/ killing/ poaching fauna or flora species			
Type	Direct			
Nature	Negative			
Phases	Construction and Operational			
	Alternative 1		**Alternative 2**	
Criteria	Without mitigation	With mitigation	Without mitigation	With mitigation
Extent	2	1	2	1
Duration	5	5	5	5
Sensitivity	4	2	3	1
Severity	4	2	3	1
Probability	4	3	4	2
Significance	60 Moderate	30 Low	52 Moderate	16 Very Low
Mitigation actions				
Recommendations	Awareness training for staff on site regarding sensitive fauna and flora species, including relevant laws for protection of species			
Monitoring				
Recommendations	Monitoring of area for snares and disturbed soil (plant poaching), monitoring of personal effects of staff			

13.13 Avifauna

The findings from the Avifauna Impact Assessment (Kemp, 2023) follow. The specialist report is contained in **Appendix D3.**

13.13.1.1 Impact Assessment

Refer to **Table 39** to **Table 50** below for an assessment of the significance of avifaunal impacts during the construction and operational phase.

- Construction Phase:

Table 39: Assessment of the significance of avifaunal impact during construction phase- habitat destruction within the project footprint (Kemp, 2023)

Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
2	4	3	2	4	3	3	
Local/district: Will affect the local area or district.	Definite: Impact will certainly occur (Greater than a 75% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Complete loss of resources: The impact is result in a complete loss of all resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	High: Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.	**Negative High Impact**
Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
1	4	3	2	4	3	2	
Site: The impact will only affect the site.	Definite: Impact will certainly occur (Greater than a 75% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Complete loss of resources: The impact is result in a complete loss of all resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Medium Impact**

Table 40: Assessment of the significance of avifaunal impact during construction phase - destruction, degradation and fragmentation of surrounding habitats (Kempt, 2023).

Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
2	4	3	2	4	3	3	
Local/district: Will affect the local area or district.	Definite: Impact will certainly occur (Greater than a 75% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Complete loss of resources: The impact is result in a complete loss of all resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	High: Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.	**Negative High Impact**
Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
1	1	1	1	1	1	1	
Site: The impact will only affect the site.	Unlikely: The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).	Short term: The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).	Completely reversible: The impact is reversible with implementation of minor mitigation measures.	No loss of resource: The impact will not result in the loss of any resources.	Negligible cumulative impact: The impact would result in negligible to no cumulative effects.	Low: Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.	**Negative Low Impact**

Table 41: Assessment of the significance of avifaunal impact during construction phase – displacement/emigration of avifauna community (including SCC) due to pollution (Kempt, 2023).

Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
2	4	2	2	2	3	3	
Local/district: Will affect the local area or district.	Definite: Impact will certainly occur (Greater than a 75% chance of occurrence).	Medium term: The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Marginal loss of resource: The impact will result in marginal loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	High: Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.	**Negative Medium Impact**
Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
2	4	2	2	2	2	2	
Local/district: Will affect the local area or district.	Definite: Impact will certainly occur (Greater than a 75% chance of occurrence).	Medium term: The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Marginal loss of resource: The impact will result in marginal loss of resources.	Low cumulative impact: The impact would result in insignificant cumulative effects.	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Low Impact**

Table 42: Assessment of the significance of avifaunal impact during construction phase– direct mortality from persecution or poaching of avifauna species and collection of eggs (Kemp, 2023).

Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
2	3	2	1	2	4	3	
Local/district: Will affect the local area or district.	Probable: The impact will likely occur (Between a 50% to 75% chance of occurrence).	Medium term: The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).	Completely reversible: The impact is reversible with implementation of minor mitigation measures.	Marginal loss of resource: The impact will result in marginal loss of resources.	High cumulative impact: The impact would result in significant cumulative effects	High: Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.	**Negative Medium Impact**
Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
2	1	1	1	2	1	1	
Local/district: Will affect the local area or district.	Unlikely: The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).	Short term: The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).	Completely reversible: The impact is reversible with implementation of minor mitigation measures.	Marginal loss of resource: The impact will result in marginal loss of resources.	Negligible cumulative impact: The impact would result in negligible to no cumulative effects.	Low: Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.	**Negative Low Impact**

Table 43: Assessment of the significance of avifaunal impact during construction phase – direct mortality from increased vehicle and heavy machinery traffic (Kemp, 2023).

Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
2	3	2	3	3	3	2	
Local/district: Will affect the local area or district.	Probable: The impact will likely occur (Between a 50% to 75% chance of occurrence).	Medium term: The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).	Barely reversible: The impact is unlikely to be reversed even with intense mitigation measures.	Significant loss of resources: The impact will result in significant loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Medium Impact**
Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
2	2	2	1	2	2	1	
Local/district: Will affect the local area or district.	Possible: The impact may occur (Between a 25% to 50% chance of occurrence).	Medium term: The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).	Completely reversible: The impact is reversible with implementation of minor mitigation measures.	Marginal loss of resource: The impact will result in marginal loss of resources.	Low cumulative impact: The impact would result in insignificant cumulative effects.	Low: Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.	**Negative Low Impact**

- Operational Phase:

Table 45: Assessment of the significance of avifaunal impact during operational phase – Collision with infrastructure associated with the PV facility (Kemp, 2023).

Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
2	3	4	4	4	3	3	
Local/district: Will affect the local area or district.	Probable: The impact will likely occur (Between a 50% to 75% chance of occurrence).	Permanent: The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.	Irreversible: The impact is irreversible and no mitigation measures exist.	Complete loss of resources: The impact is result in a complete loss of all resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	High: Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.	**Negative High Impact**
Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
1	3	3	3	3	3	3	
Site: The impact will only affect the site.	Probable: The impact will likely occur (Between a 50% to 75% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).	Barely reversible: The impact is unlikely to be reversed even with intense mitigation measures.	Significant loss of resources: The impact will result in significant loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	High: Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.	**Negative Medium Impact**

Table 46: Assessment of the significance of avifaunal impact during operational phase – Electrocution due to infrastructure associated with the PV Facility (Kemp, 2023).

Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
1	2	3	3	3	3	3	
Site: The impact will only affect the site.	Possible: The impact may occur (Between a 25% to 50% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).	Barely reversible: The impact is unlikely to be reversed even with intense mitigation measures.	Significant loss of resources: The impact will result in significant loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	High: Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.	**Negative Medium Impact**
Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
1	2	3	1	2	2	2	
Site: The impact will only affect the site.	Possible: The impact may occur (Between a 25% to 50% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).	Completely reversible: The impact is reversible with implementation of minor mitigation measures.	Marginal loss of resource: The impact will result in marginal loss of resources.	Low cumulative impact: The impact would result in insignificant cumulative effects.	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Low Impact**

Table 47: Assessment of the significance of avifaunal impact during operational phase – Direct mortality from road kills, persecution or poaching of avifauna species and collection of eggs (Kemp, 2023).

Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
2	3	2	3	3	3	2	
Local/district: Will affect the local area or district.	Probable: The impact will likely occur (Between a 50% to 75% chance of occurrence).	Medium term: The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).	Barely reversible: The impact is unlikely to be reversed even with intense mitigation measures.	Significant loss of resources: The impact will result in significant loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Medium Impact**
Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
2	2	2	1	2	1	1	
Local/district: Will affect the local area or district.	Possible: The impact may occur (Between a 25% to 50% chance of occurrence).	Medium term: The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).	Completely reversible: The impact is reversible with implementation of minor mitigation measures.	Marginal loss of resource: The impact will result in marginal loss of resources.	Negligible cumulative impact: The impact would result in negligible to no cumulative effects.	Low: Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.	**Negative Low Impact**

Table 48: Assessment of the significance of avifaunal impact during operational phase – Pollution of water sources and surrounding habitat due to cleaning products of the PV panels (Kemp, 2023).

Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
2	3	3	3	3	3	3	
Local/district: Will affect the local area or district.	Probable: The impact will likely occur (Between a 50% to 75% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).	Barely reversible: The impact is unlikely to be reversed even with intense mitigation measures.	Significant loss of resources: The impact will result in significant loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	High: Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.	**Negative High Impact**
Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
1	1	1	1	1	1	1	
Site: The impact will only affect the site.	Unlikely: The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).	Short term: The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).	Completely reversible: The impact is reversible with implementation of minor mitigation measures.	No loss of resource: The impact will not result in the loss of any resources.	Negligible cumulative impact: The impact would result in negligible to no cumulative effects.	Low: Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.	**Negative Low Impact**

Table 49: Assessment of the significance of avifaunal impact during operational phase – Heat radiation from the BESS and PV panels (Kemp, 2023).

Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
1	2	3	3	3	3	3	
Site: The impact will only affect the site.	Possible: The impact may occur (Between a 25% to 50% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).	Barely reversible: The impact is unlikely to be reversed even with intense mitigation measures.	Significant loss of resources: The impact will result in significant loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	High: Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.	**Negative Medium Impact**
Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
1	1	3	2	2	2	2	
Site: The impact will only affect the site.	Unlikely: The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Marginal loss of resource: The impact will result in marginal loss of resources.	Low cumulative impact: The impact would result in insignificant cumulative effects.	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Low Impact**

Table 50: Assessment of the significance of avifaunal impact during operational phase – Encroachment of Invasive Alien Plants into disturbed areas (Kemp, 2023).

Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
2	4	4	3	4	3	3	
Local/district: Will affect the local area or district.	Definite: Impact will certainly occur (Greater than a 75% chance of occurrence).	Permanent: The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.	Barely reversible: The impact is unlikely to be reversed even with intense mitigation measures.	Complete loss of resources: The impact is result in a complete loss of all resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	High: Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.	**Negative High Impact**
Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
1	1	1	1	1	1	1	
Site: The impact will only affect the site.	Unlikely: The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).	Short term: The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction,	Completely reversible: The impact is reversible with implementation of minor mitigation measures.	No loss of resource: The impact will not result in the loss of any resources.	Negligible cumulative impact: The impact would result in negligible to no cumulative effects.	Low: Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.	**Negative Low Impact**

		thereafter it will be entirely negated (0 – 2 years).					

Table 51: Summary of management outcomes pertaining to impacts to avifauna and their habitats (Kemp, 2023).

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Management outcome: Habitats				
The areas to be developed must be specifically demarcated to prevent movement into surrounding environments.	Life of operation	Project Manager Environmental Officer	Development footprint	Ongoing
High sensitivity areas must be declared No-go areas, they must be demarcated to ensure no vehicles or people move int these areas.	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.	Life of operation	Project Manager Environmental Officer	Areas of indigenous vegetation	Ongoing
Solar panels must be mounted on pile driven or screw foundations, such as post support spikes, rather than heavy foundations, such as trench-fill or mass concrete foundations, to reduce the negative effects on natural soil functioning, such as its filtering and buffering characteristics, while maintaining habitats for both below and above-ground biodiversity.	Life of operation	Project Manager	Solar panels must be mounted on pile driven or screw foundations, such as post support spikes, rather than heavy foundations, such as trench-fill or mass concrete foundations, to reduce the negative effects on natural soil functioning, such as its filtering and buffering characteristics, while maintaining habitats for both below and above-ground biodiversity	Life of operation
Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018).	Life of operation	Project Manager	Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018).	Life of operation
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion. This will also reduce the likelihood of encroachment by alien invasive plant species. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are indigenous to this vegetation type.	Decommissioning /Rehabilitation	Project Manager	Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion. This will also reduce the likelihood of encroachment by alien invasive plant species. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are indigenous to this vegetation type.	Decommissioning /Rehabilitation
A hydrocarbon 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	Life of operation	Environmental Officer Contractor	Spill events, Vehicles dripping.	Ongoing

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
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.				
No cement/concrete may be mixed on site and must be brought in off site to ensure the water sources does not get polluted and that successful rehabilitation of the construction areas can take place	Planning and Construction	Project Manager Environmental Officer Contractor Engineer	Water pollution and restricted rehabilitation	During phase
Leaking equipment and vehicles must be repaired immediately or be removed from project area to facilitate repair.	Life of operation	Environmental Officer Contractor	Leaks and spills	Ongoing
A fire management plan needs to be complied to restrict the impact of fire.	Life of operation	Environmental Officer Contractor	Fire Management	During Phase

Management outcome: Avifauna

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting, or hunting terrestrial species, 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 kept to a minimum to avoid disturbing avifauna.	Construction/Operational Phase	Project Manager Environmental Officer	Construction/Closure Phase	Ongoing
Outside lighting should be designed and limited to minimize impacts on avifauna. 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 (20 km/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
All project activities must be undertaken with appropriate noise mitigation measures to avoid disturbance to avifauna population in the region	Construction/Operational Phase	Project Manager Environmental Officer	Noise	Ongoing

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
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 be found and 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	Environmental Officer	Presence of avifauna species and nests	During Phase
The design of the proposed PV and grid lines 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 (Jenkins *et al.*, 2015).	Planning and Construction	Project Manager Environmental Officer Contractor Engineer	Presence of electrocuted birds or bird strikes	During Phase
Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used.	Planning and Construction	Project Manager Environmental Officer Contractor Engineer	Presence of bird collisions	During phase
The loop in loop out lines must join in at the closest point to the existing line as possible.	Planning and Construction	Project Manager Environmental Officer Contractor Engineer	Presence of bird collisions	During phase
All the parts of the infrastructure must be nest-proofed and anti-perch devices placed on areas that can lead to electrocution	Planning and Construction	Environmental Officer Contractor Engineer	Presence of electrocuted birds	During phase
Use environmentally friendly cleaning and dust suppressant products	Construction and Operation	Environmental Officer Contractor Engineer	Chemicals used	During phase
Fencing mitigations for ClearVu or similar fencing: • **If needed, any top strands must be smooth wire, barbed wire must be avoided;** • **Routinely monitor all fencing for any collisions and mortality, as well as trapped fauna.** • **Place markers/diverters on fences, especially towards the top** • **A specialist must be consulted if any collisions or mortalities are observed.** **Conventional fencing mitigations:** • **Top 2 strands must be smooth wire** • **Routinely retention loose wires** • **Minimum 300 mm between wires** • **Place markers on fences**	Life of Operation	Project Manager Environmental Officer Contractor Design Engineer	Presence of birds stuck /dead in fences Monitor fences for collisions or mortalities every second day for the first 6 months.	During phase
As far as possible power cables within the project site should be thoroughly insulated and preferably buried.	Construction and Operation	Project Manager Environmental Officer Design Engineer	Exposed cables	During phase
Any exposed parts must be covered (insulated) to reduce electrocution risk	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds	During phase

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
The BESS must be enclosed in a structure with a non-reflective surface	Construction and Operation	Project Manager Environmental Officer Design Engineer	Reflective surfaces on BESS	During phase
Non-polarising white strips must be fitted along the edges of the panels to reduce reflection and therefore similarity to water and deter birds and insects (Horvath *et al,* 2010).	Operational	Project Manager Environmental Officer Design Engineer	Presence of dead birds in the project site. Monitoring must be undertaken in accordance with the BirdLife South Africa best practice guidelines for solar energy facilities (BirdLife South Africa, 2017). The precise location of any dead birds found should be recorded and mapped (using GPS). All carcasses should be photographed as found then placed in a plastic bag, labelled as to the location and date, and preserved (refrigerated or frozen) until identified. Feather spots (e.g., a group of feathers attached to skin) and body parts should also be collected.	During phase. The monitoring frequency is based on the collision rate.
Overhead cables/lines must be fitted with bird diverters or flappers (Shaw *et al.* 2021, Prinson *et al* 2012), .	Operational	Project Manager Environmental Officer Design Engineer	Collisions. Monitoring must be undertaken in accordance with the BirdLife South Africa best practice guidelines for solar energy facilities (BirdLife South Africa, 2017).	During phase. The monitoring frequency is based on the collision rate.
There is little to no information on the recovery of the avifauna community subsequent to the closure of Solar PV facilities within South Africa. A post-closure monitoring regime is recommended for the proposed project to document any impacts and this data must be used for improving rehabilitation measures	Closure/Rehabilitation	Project Manager Environmental Officer	Avifauna community	Wet-season and dry-season survey for the initial 3-5 years after closure.
All infrastructure including powerlines must be removed if the facility is decommissioned	Closure/Rehabilitation	Project Manager Environmental Officer	Infrastructure removal	During Process

13.14 Agricultural

The findings from the Agricultural Compliance Statement (Gouws, 2023) follow. The specialist report is contained in **Appendix D4**.

13.14.1 Impact Assessment

Table 52: Summary of Agricultural related impacts (Gouws, 2023).

Impact	Powerline Option 1	Powerline Option 2	PV Site
Loss of high potential land	The impact is small and temporary and not significant on a local or regional scale.	The impact is small and temporary and not significant on a local or regional scale.	No high potential land was found on the site. No impact.
Loss of Agricultural production	The impact is small and temporary and not significant on a local or regional scale.	The impact is small and temporary and not significant on a local or regional scale.	The impact of the development is low but permanent.
Loss of Agriculture infrastructure	The impact of the development is low and temporary.	The impact of the development is low and temporary.	There is no farming infrastructure that will be lost. There is no impact.
Loss of soil due to erosion	There is no impact.	There is no impact.	No impact is expected.

13.15 Cultural Heritage

The findings from the Heritage Impact Assessment (Kitto, 2023) follow. The specialist report is contained in **Appendix D5**.

13.15.1 Impact Assessment

Table 53: Significance of impact – Historical structure remains (Kitto, 2023).

Environmental Feature	Heritage resources – historical structure remains (Groot 01, Groot 04)					
Project life-cycle	Planning, Construction and Operation					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Possible damage to or destruction of historical structure remains	• A buffer of at least 20m (25m from the centre for the kraal) must be placed around both sites to ensure that during construction there is no indirect impact which could damage any structures • The materials demarcating the buffer must be highly visible and made of durable material • If any impact is anticipated, then a permit will be required for the alteration or destruction of any of the structures (from NW PHRA or SAHRA)					
Possible damage to or destruction of unidentified historical structure remains	• If any changes are made to the final design footprint prior to construction, monitoring of the site clearance activities must be undertaken by a heritage specialist to identify any additional historical structure remains					
Alternative 1	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Permanent	Moderate	2
After Mitigation	Positive	Local	Low	Long- term	Unlikely	1
Significance of Impact and Preferred Alternatives	The location of Groot 04 is within the PV area of the project footprint (Alternative 1) and the Option 4 powerline lies just on the 20m buffer for Groot 01. The structures at both sites are protected under s34 of the NHRA.					

Alternative 2	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Permanent	Moderate	2
After Mitigation	Positive	Local	Low	Long- term	Unlikely	1
Significance of Impact and Preferred Alternatives	The location of Groot 04 is just outside (14m north) of an internal road of the project layout (Alternative 2) but would be within a 25m buffer taken from the centre of the kraal. The Option 4 powerline lies close to the 20m buffer for Groot 01. The structures at both sites are protected under s34 of the NHRA.					

Table 54: Significance of impact – Archaeological Material (Kitto, 2023).

Environmental Feature	Heritage resources – archaeological material (Groot 02, Groot 03)					
Project life-cycle	Planning, Construction and Operation					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Possible damage to or destruction of historical structure remains	• A buffer of at least 30m must be placed around both sites to ensure that during construction there is no indirect impact which could damage any archaeological material • The materials demarcating the 30m buffer must be highly visible and made of durable material • If any impact is anticipated, then a permit will be required for the destruction of the material (from SAHRA)					
Possible damage to or destruction of unidentified archaeological material	• If any changes are made to the final design footprint prior to construction, monitoring of the site clearance activities must be undertaken by an archaeologist to identify any additional archaeological material					
Alternative 1	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Permanent	Moderate	2
After Mitigation	Negative	Local	Low	Long- term	Unlikely	1
Significance of Impact and Preferred Alternatives	The location of these two sites is just outside (23m east) of the PV area of the project footprint (Alternative 1). The material is protected under s35 of the NHRA. If any impact is anticipated, then a permit will be required to destroy the material.					
Alternative 2	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Permanent	Unlikely	1
After Mitigation	Negative	Local	Low	Long- term	Unlikely	1
Significance of Impact and Preferred Alternatives	The location of these two sites is well outside (140-159m south) of the PV area of the project footprint (Alternative 2). The material is protected under s35 of the NHRA. If any impact is anticipated, then a permit will be required to destroy the material.					

13.16 Palaeontology

The findings from the Palaeontological Impact Assessment (Butler, 2023) follow. The specialist report is contained in **Appendix D6**.

13.16.1 Impact Assessment

Table 55: Palaeontological Impact Summary (Butler, 2023).

Environmental parameter	Issues	Rating prior to mitigation	Average	Rating post mitigation	Average
Planning Phase Alternative 1 Grootvlei Solar Plant PV Facility	No Impact	0	No Impact	0	No Impact
Construction Stage Alternative 1 Grootvlei Solar Plant PV Facility Loss of fossil heritage	Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study	45	Negative Medium impact	16	Negative Low impact
Operational Phase Alternative 1 Grootvlei Solar Plant PV Facility	No Impact	0	No Impact	0	No Impact
Decommissioning Phase Alternative 1 Grootvlei Solar Plant 1 PV Facility	No Impact	0	No Impact	0	No Impact
Planning Phase Alternative 2 Grootvlei Solar Plant PV Facility	No Impact	0	No Impact	0	No Impact
Construction Stage Alternative 2 Grootvlei Solar Plant PV Facility Loss of fossil heritage	Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study	45	Negative Medium impact	16	Negative Low impact
Operational Phase Alternative 2 Grootvlei Solar Plant PV Facility	No Impact	0	No Impact	0	No Impact
Decommissioning Phase Alternative 2 Grootvlei Solar Plant 1 PV Facility	No Impact	0	No Impact	0	No Impact

13.17 Visual Quality

The findings from the Visual Impact Assessment (Buys, 2023) follow. The specialist report is contained in **Appendix D7**.

13.17.1 Impact Assessment

Refer to **Table 56** to **Table 57** below for an assessment of the significance of visual impacts during the construction and operational phase.

Table 56: Significance of Visual Impacts during the Construction Phase (Buys, 2023).

Phase	Potential Visual Impacts	Visual Significance											
		Before Mitigation						After Mitigation					
		M	D	S	P	SP	RATING	M	D	S	P	SP	RATING
Construction	Site establishment • This will involve the vegetation clearance and stripping of soil in areas designated for surface infrastructure.	6	2	3	3	33	**Medium**	6	2	3	2	22	**Low**
	Site Clearing of the project footprint: • Removal of vegetation leading to increased visual contrast and loss of VAC and increase visual intrusion on sensitive receptors. • Alteration of current landscape features impacting on landscape character and sense of place.	6	2	3	4	44	**Medium**	6	2	3	2	22	**Low**
	Construction of Solar PV facility and associated infrastructure.	6	2	3	4	44	**Medium**	6	2	3	2	22	**Low**
	Construction vehicle movement and increased human activity in and around the proposed site.	6	2	3	2	22	**Low**	6	2	3	1	11	**Low**
	General and hazardous waste management.	2	2	2	2	12	**Low**	2	2	2	1	6	**Low**
	Formation of dust plumes as a result of construction activities.	4	2	3	2	18	**Low**	4	2	3	1	9	**Low**
	Use of security lighting.	4	2	2	2	16	**Low**	4	2	2	1	8	**Low**
	Topographical alteration which will lead to increased visual intrusion and potential impact on sense of place.	6	2	3	4	44	**Medium**	6	2	3	2	22	**Low**

Mitigation Measures:

- ❑ General site management:
  - Maintain the construction site in a neat and orderly condition at all times;
  - Plan the placement of lay-down areas and any potential temporary construction camps in order to minimise vegetation clearing;
  - Ensure that rubble, litter, and disused construction materials are managed and removed regularly; and

- Ensure that all infrastructure and the site and general surroundings are maintained in a neat and appealing way.

❑ Height and Orientation:

- The height and orientation of the solar panels should be considered during the design phase. Panels should be oriented to minimize glare and reflection, and their height should be kept as low as possible to reduce their visual impact.

❑ Infrastructure:

- All constructed facilities and buildings should cause minimum visual disturbance by reducing the contrast and blending in with the surrounding vegetated natural area. This could be achieved by painting rooftops and walls of buildings in the hues and tones of the surrounding vegetation and/or by adding matt paints to highly reflective surfaces, as well as sharp protruding features on the structures. All of these solutions are subject to the technical design of individual buildings and facilities and should be pursued by the technical design and/or construction team, taking into consideration added value from reduced visibility, engineering feasibility and cost.

❑ Dust Management:

- Implement dust suppression using a water cart to minimise airborne dust; and
- Enforce a 50 km/h speed limit on-site for Light-Duty Vehicles and a 40 km/h speed limit for large construction vehicles and machinery.

Table 57: Significance of Visual Impacts during the Operational Phase (Buys, 2023).

Phase	Potential Visual Impacts	Visual Significance											
		Before Mitigation						After Mitigation					
		M	D	S	P	SP	RATING	M	D	S	P	SP	RATING
Operational	Topographical alteration which will lead to increased visual intrusion and potential impact on sense of place.	6	4	3	4	52	**Medium**	6	4	3	2	26	**Low**
	Increased vehicle and human activity in and around the Solar PV facility and associated infrastructure.	6	4	3	2	26	**Low**	6	4	3	1	13	**Low**
	Night-time illumination due to security lighting and lighting associated with the Solar PV facility and associated infrastructure.	6	4	2	3	36	**Medium**	6	4	2	2	24	**Low**
	Potential visual impact of solar glint and glare as a visual distraction.	6	4	3	3	39	**Medium**	6	4	3	2	26	**Low**

Mitigation Measures:

- Light pollution management:
  - Plan the lighting requirements of the facilities to ensure that lighting meets the need to keep the site secure and safe, without resulting in excessive illumination;
  - Avoid up-lighting of structures by rather directing lighting downwards and focusing on the area to be illuminated;
  - Reduce the height and angle of illumination from which floodlights are fixed as much as possible while still maintaining the required levels of illumination;
  - Lighting should be shielded in areas where specific objects are to be illuminated;
  - Minimise the use of lighting, where possible;
  - Lighting should exclude the blue-rich wavelengths and be closer to the red-rich wavelength spectrum. Globes used in lighting outside areas should be warm white. This also applies to light spilling out from within buildings. A colour temperature of no more than 3000 Kelvins is recommended for lighting;
  - Light intensity of illuminating lights should be limited as far as possible, i.e., to limit lighting to areas required to serve operational functionality;

- Illumination where not permanently required should be fitted with timers, motion-activated sensors or be dimmable to reduce total light emitted.

❑ Site management:

- Shape any slopes and embankments to a maximum gradient of 1:4 and vegetate, to prevent erosion and improve their appearance;
- Utilise vegetation screens where possible as visual screening devices around the proposed project where possible; and
- Eradicate invasive alien plant species.

13.18 Air Quality

13.18.1 Impact Description

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

The 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 monitored and managed and that regulated thresholds are not exceeded. The EMPr also includes measures to control and minimize greenhouse gas emissions by optimising the utilisation of construction resources, as well as preventing fires related to construction activities.

During the operational phase of the Solar PV Plant, local atmospheric pollution may reduce the irradiation received or contain significant levels of airborne corrosive substances. The efficiency of the solar plants be also reduced if the modules are soiled (covered) by particulates/dust.

13.18.2 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

Environmental Feature	**Air Quality**
Relevant Alternatives & Activities	**Operation of the Solar PV Plant**
Project life-cycle	**Operational phase**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Influence of air quality and soiling on operational efficiency of Solar PV Plant.	• An appropriate maintenance and cleaning plan is to be developed for the PV panels.

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

13.19 Noise

13.19.1 Impact Description

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

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.

Solar PV facilities produce electricity during the daytime hours, when the sun's rays are collected by the panels. When there is little to no irradiance, noise emitted by the equipment is significantly reduced. The main sources of noise from the Project will be the rack mounted inverters and the central step-up transformer, which are only expected to be audible to operational staff who will come in close proximity to these components. Other sources of noise include operation and maintenance vehicles and activities.

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.

Noise that emanates from construction and operational activities are addressed through targeted best practices in the EMPr. The associated regulated standards need to be adhered to.

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.

13.19.2 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 landowners/occupiers and 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

13.20 Hazardous Substances & Waste

13.20.1 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, pesticides, lithium-ion batteries (BESS), etc.

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 PV cells and substation components, as well as domestic waste.

Provision is made in the EMPr to manage impacts associated with hazardous substances and waste.

13.20.2 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. • 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. • BESS to have electrical and fire protection measures in the form of battery temperature monitoring, circuit breakers, fire detection and fire suppression as per regulatory requirements. • Waste to be disposed of at a licenced waste disposal facility. • Water used for cleaning of PV panels will not contain any harmful chemicals or additives. • Wastewater to be properly disposed of. Contaminated water should not be discharged to the environment. • Used lithium-ion batteries and PV panels are to be removed by the suppliers, who are to recycle material and recover any hazardous substances (as relevant). Provision to be made in the supply agreements between the Proponent and the selected suppliers.

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

Potential risks and related control measures associated with the BESS facility are captured in **Table 58** below. A detailed risk assessment will need to be undertaken based on the type of BESS technology selected and the final design of the Solar PV Plant. The outcomes of this risk assessment will need to be incorporated into the Operational EMPr.

Table 58: Proposed management of risk to BESS (based on Arup, 2018)

No.	Risk	Possible Consequences	Control Measures
1	Risk posed by veld fires (external to site) to BESS facility	Damage to BESS	▪ Implementation of a fire break around the site ▪ Include measures to deal with veld fires in the Emergency Response Plan ▪ Coordination with local fire authorities ▪ Provide fire extinguishers on site
2	Damage caused to cells by an external event	Lithium Ion Cell leakage	▪ Lithium batteries do not contain free liquid electrolytes ▪ Individual cells are used which minimises extent of release
3	Damage to batteries from vehicle collision	▪ Damage to battery cells ▪ Electrical risks	▪ Use of perimeter fence around BESS facility ▪ Appropriately designed internal access roads ▪ Limit of speed limit within fenced facility ▪ Earthing system installed as per normal electrical facilities
4	Transformer oil leakage due to corrosion of tank base or leakage of oil tank	Leakage of transformer oil to environment, with resultant pollution	▪ Use of fully bunded oil storage for transformers ▪ Regular tank inspections
5	Collapse or fall of overhead electricity line onto BESS facility	Damage to BESS facility	▪ BESS facility to be located outside of power line servitude
6	Security breach into BESS facility for theft of components	Theft of equipment or risk to personnel	▪ Installation of security fencing around entire Solar PV Plant and around the BESS facility ▪ Installation of security system to monitor key areas ▪ Inspections to monitor for security breaches
7	Spread of fire across BESS facility between battery packs	Localised fire causing damage by spreading to BESS facility	▪ Separation distances between battery packs in accordance with manufacturer recommendations ▪ Adherence to fire management measures ▪ Provide fire extinguishers on site ▪ BESS area will have a non-flammable buffer area to prevent the spread of fire. ▪ BESS will have electrical and fire protection measures in the form of battery temperature monitoring, circuit breakers, fire detection and fire suppression
8	Electrocution due to electrical fault	Electrical fault causing personnel injury	▪ Normal electrical standards and installation of appropriate earthing system ▪ Use of appropriately qualified maintenance personnel
9	Lightning striking BESS facility	Lightning strike causing damage to facility or personnel	▪ Include lightning protection measures, if deemed necessary
10	High rainfall and flooding to site	Damage to electrical equipment	▪ BESS facility to be developed outside of the 1:100 year floodline of any watercourse
11	High wind events and seismic events	Structural damage to equipment or battery packs	▪ Appropriate design of BESS facility, taking into consideration *inter alia* climatic and geotechnical conditions

13.21 Traffic

13.21.1 Impact Description

The potential impact on the surrounding environment is expected to be generated by the development traffic, of which traffic congestion and associated noise, dust and exhaust pollution form part. The construction phase will generate traffic including transportation of people, construction materials, water and equipment. The impact is however temporary in nature with a negative low impact rating after the implementation of mitigation measures.

During the operational phase, traffic and associated noise, dust and exhaust pollution would be generated due to operational traffic trips. The traffic generated during this phase will have a nominal impact on the surrounding road network. The decommissioning phase will have similar impacts and generated trips as the construction phase.

13.21.2 Impact Assessment

Environmental Feature	**Traffic and Access**
Relevant Alternatives & Activities	**All physical infrastructure that forms part of the project**
Project life-cycle	**Construction & Decommissioning**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Increase in development trips for the duration of the construction phase. • Associated noise, dust and exhaust pollution.	• Stagger component delivery to site. • Reduce construction period where possible. • Stagger the construction phase. • The use of mobile batching plants and quarries in close proximity to the site would decrease the impact on the surrounding road network. • Staff and general trips should occur outside of peak traffic periods as much as possible. • Maintenance of haulage routes. • Design and maintenance of internal roads. • Provide two access points to the site to split construction vehicle trips and reduce the risk of congestion.

	+/- Impacts	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	-	regional	medium	short-term	almost certain	2
After Mitigation	-	regional	low	short-term	Almost certain	1

Relevant Alternatives & Activities	All physical infrastructure that forms part of the project
Project life-cycle	**Operation**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Slight increase in trips due to permanent staff on site. • Increase in trips around twice a year for transport of water to site for the cleaning of solar panels.	• Source on-site water supply if possible. • Utilise cleaning systems for the panels needing less vehicle trips. • Schedule trips for the provision of water for the cleaning of panels outside peak traffic times as much as possible.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	local	low	Short term	almost certain	1
After Mitigation	-	local	low	Short term	almost certain	1

13.22 Civil Aviation

13.22.1 Impact Description

Possible impacts that may be caused by a Solar PV Plant to civil aviation include potential glare and glint from *inter alia* PV panels, steel array mounting, glass windows and rooftops that might cause temporary loss of vision to pilots on arrival or departure, as well as obstacles associated with the PV facility (e.g. power lines) that may pose a risk to safe air navigation.

Glint and glare are caused by many reflective materials, whereby light from the sun is reflected off such materials with a potential to cause hazard, nuisance or unwanted visual impact. It is noted that solar panels are designed to absorb, not reflect, irradiation.

According to the findings from the National Web Based Environmental Screening Tool, the PV site and powerline has a low sensitivity in terms of relative civil aviation theme. Accordingly, no Glint and Glare Impact Assessment in terms of Obstacle Notice 4/2017, was undertaken, as there are “no major or other types of civil aviation aerodromes” in proximity to the site. The South African Civil Aviation Authority (SACAA) was engaged with as part of the EIA and the Applicant will adhere to the requirements of this authority.

13.22.2 Impact Assessment

A quantitative impact assessment was not undertaken from a civil aviation perspective due to the reasons provided above.

13.23 Existing Structures and Infrastructure

13.23.1 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;
- ❑ 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.

During the public participation process conducted to date, infrastructure owners and custodians provided wayleave requirements and conditions when working near or closer to existing services.

13.23.2 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, 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

13.24 Health and Safety

13.24.1 Impact Description

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 for 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.

Operational Phase

The predominant types of hazards associated with battery systems include electric shock, stored energy, chemical, flammable emission, thermal runaway, transportation, kinetic energy and manual handling (Energy Storage Council, 2016). A lithium-ion based BESS must be designed with proper disconnects, relays, thermal management, enclosures, layout, monitoring and controls to mitigate risks to the required level of safety. Operating strategies spanning proper planning, risk assessment, storage methods, maintenance protocols, and response protocols are the other important factors in mitigating lithium-ion safety risks (Butler, 2013).

Electromagnetic fields (EMFs) are produced whenever electricity is used. Research into electric and magnetic fields undertaken at utility scale PV installations in California by Chang and Jennings (1994), indicated that magnetic fields were significantly less for solar arrays than for household applications. Chang and Jennings (1994) found magnetic fields from solar arrays were not distinguishable from background levels at the site boundary, suggesting the health risk of EMFs from solar arrays is minimal.

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 Project's proposed substation, 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 risks associated with the Project during the operational phase include the following:

- Leaching of materials from broken or fire damaged PV modules;

- ❑ Injuries to workers from operation and maintenance activities (vehicle accidents, replacement of components/parts, etc.) and;
- ❑ Emergency fire hazards; and
- ❑ Electrocution of workers.

13.24.2 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 shall remain within the 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	likely	3
After Mitigation	-	local	low	short-term	unlikely	1

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. • Measures at the battery storage area to manage fire risks will include a non-flammable buffer area to prevent the spread of fire, battery temperature monitoring, circuit breakers, fire detection and fire suppression as per fire and electrical regulatory requirements. • Provide adequate access/egress for installation and maintenance at the BESS. • Maintain servitude. • Ensure EMF remain less that occupational limits within substation. • Control access to the substation.

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

13.25 Socio-Economic Environment

The findings from the Socio-Economic Impact Assessment (Chidley, 2023) follow. The specialist report is contained in **Appendix D8.**

13.25.1 Impact Description

The potentially significant socio-economic impacts associated with the Project are summarised in **Table 59** below.

Table 59: Activities, aspects and impacts related to the social environment (Chidley, 2023).

Activity	Aspect	Potential Impact – Positive	Potential Impact – Negative
Land and Servitude Rights Acquisition	Land Acquisition	-	Loss of agricultural production
		-	Loss of land (including, structures and cultivated areas) through project infrastructure
		-	Community dissatisfaction
	Servitude Rights	-	Some restrictions on use of productive land
Scheme Operations	Electricity generation	Economic growth and induced impacts.	-
	Supply of goods and services to the project	Opportunity for local business	-
		Opportunity for local labour force	-
	Administration and Technical Input	Employment of staff locally	-
		Skills development	-
Construction Phase	Access into properties	-	Security concern
		-	Risk of intrusion
	Solar Park Construction – piling, frame erection and solar panel mounting, electrical installation and rehabilitation	Employment of people locally	-
		Sourcing of equipment, machinery, and services locally	-
		-	Noise
		-	Dust
		Employment of local people	-
		-	Injuries on site
		-	Increased community conflicts due to employment of outsiders
		-	Influx of people seeking employment and associated impacts (e.g., cultural conflicts, squatting, demographic changes, anti-social

Activity	Aspect	Potential Impact – Positive	Potential Impact – Negative
			behaviour, and incidence of HIV/AIDS)
		Sourcing of equipment, machinery, and services locally	-
		-	Livestock and game animal safety
	Transport of goods to site and employment of staff	-	Increased traffic
	Transmission Line	Employment of people locally	-
		-	Security concerns when contractor's access private property
		Sourcing of equipment, machinery, and services locally	-
	Rehabilitation	-	Damage or wear to access roads
		-	Security Concerns
		-	Damage to property or equipment

13.25.2 Impact Assessment

Refer to **Table 60** to **Table 69** below for an assessment of socio-economic impacts during the planning, construction and operational phase.

Table 60: Planning Phase Impacts - Institutional, Legal, Political and Equity (Chidley, 2023).

Environmental Feature		Institutional, Legal, Political and Equity				
Project life cycle		All Phases				
Potential Impact		Proposed Management Objectives / Mitigation Measures				
Loss of land through project infrastructure		• Where the construction takes place will result in the land being acquisitioned and so adequate steps must be taken to ensure that the owner is not treated unfairly in the process.				
		• Promptly address any concerns raised by the public in a transparent manner.				
		• Include all relevant community members in decisions affecting them.				
Some restrictions on use of productive land		• Once the project is operational, the land will be dedicated exclusively to the project and so its prior productivity will no longer apply. This must be clearly communicated and the owner should be adequately compensated.				
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Site	Moderate	Long Term	High	2
After Mitigation	Negative	Site	Low	Long Term	High	1
Significance of Impact and Preferred Alternatives	The impact on project progress could be significant if grievances are not addressed. This can be effectively mitigated through the establishment of a grievance procedure and adherence to local by-laws The impact has no consequence for project alternatives.					

Table 61: Construction Phase Impacts - Economic Opportunities (Chidley, 2023).

Environmental Feature		Economic Opportunities				
Project life-cycle		Construction phase				
Potential Impact		Proposed Management Objectives / Mitigation Measures				
Economic and social stimuli arising from the developmental initiative of the project.		• Local SMMEs should be given an opportunity to participate in the construction of the project through the supply of services, material or equipment.				
		• Youth development should be considered as an initiative so that there is a benefit of transferring skills to the community. This can be achieved through the assistance of the local municipality.				
		• The main contractor should employ non-core labour from the regional study area as far as possible during the construction phase.				
Informal trading being established at the site boundaries		• Spaza/informal trader shops may open next to the site to cater for construction workers. These should be controlled by the contractor to limit their footprint and to ensure that the MLM By-laws are complied with.				
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Positive	Regional	Medium	Short Term	Likely	1
After Mitigation	Positive	Regional	Large	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 on such a construction will take place irrespective of which site alternative is preferred.					

Table 62: Construction Phase Impacts - Gender Relations (Chidley, 2023).

Environmental Feature	Gender Relations
Project life-cycle	All phases
Potential Impact	Proposed Management Objectives / Mitigation Measures
Cultural resistance towards women because of increased gender representation in the workforce	• Sensitise staff in respect of gender sensitive issues that are pertinent to the workplace.
	• Ensure gender inclusivity and equity with respect to all compensation.
	• Prioritise gender inclusivity and equity in access to resources, goods, services and decision making with the aim of empowering women.
	• Promote equal job opportunities for women and men during the construction and operational processes.
	• Prioritise and articulate gender inclusivity and equity in the project documents by including specific strategies and guidelines for implementation.
	• The project documents should also include clear mechanisms through which the actual implementation of the activities and the impact on the ground can be monitored and evaluated.
	• Develop a grievance procedure to specifically address gender matters.
	• Factors such as culture should be considered when planning for gender activities since they play a great role in influencing gender relations.

	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Site	Moderate	Short term	High	2
After Mitigation	Negative	Site	Low	Short term	High	1
Significance of Impact and Preferred Alternatives	The impact on project equity promotion would be moderate if this impact were not addressed. This can be effectively mitigated through the design of a specific gender-focused. The impact has no impact on alternative project layouts.					

Table 63: Construction Phase Impacts - Property and Production (Chidley, 2023).

Environmental Feature	Property and Production					
Project life-cycle	Construction phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Risk of intrusion	• The project proponent should ensure entrance management and control.					
Livestock & game animals Safety	• There should be clear demarcation of the area in development so that livestock and game animals are prevented from wandering nearby.					
Loss of agricultural production	• The project proponent should ensure that the schedule for construction is made available to the local community so that they can suitably prepare.					
Damage to property	• If a risk exists of damage taking place on 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 for the proven loss of these crops; • The farmer should be compensated for any loss of income experienced at the account of the contractor.					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Short Term	Likely	1
After Mitigation	Positive	Local	Minor	Short Term	Likely	3
Significance of Impact and Preferred Alternatives	Costs related to damage and theft should be borne by the developer. There are no alternatives suggested.					

Table 64: Construction Phase Impacts - Disturbances Arising from Construction (Chidley, 2023).

Environmental Feature	Disturbances Arising from Construction					
Project life-cycle	Construction phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
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; • Mitigation measures management should be adhered to according to the relevant specialist studies.					
Noise impacts	• Prior notice should be given to surrounding communities of noisy event such as blasting. • Construction work should take place during working hours – defined as 07h00 to 17h00 on weekdays and 07h00 to 14h00 on Saturdays. Should overtime work be required, that will generate noise, consultation with the affected community or landowner should take place.					
	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 of contractor proceedings and performance during construction phase. Negative impacts owing to the construction will unfortunately be experienced irrespective of the site and routing alternative that is most preferred and chosen.					

Table 65: Construction Phase Impacts - Worker Health and Safety (Chidley, 2023).

Environmental Feature		Worker Health and Safety				
Project life cycle		Construction Phase				
Potential Impact		Proposed Management Objectives / Mitigation Measures				
Injuries on Site		• 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 powerline; • Contractors should establish HIV/AIDS awareness programmes at their site camps. • Gender sensitive work place practises should be planned for and adopted on site. Employment practises should be demonstrated free of coercion or harassment.				
Protecting the Vulnerable		• There should be a policy on harassment that is well understood by all. • There should be separate changing facilities for men and women, and they should be clearly marked as such. • There should separate toilet facilities for men and women, and they should be clearly marked as such.				
	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	The significance of the impact is high as community attitudes can be altered. The implementation of the overall mitigation measures is essential and necessary to minimise the impact from workers' health and safety and community impacts.					

Table 66: Construction Phase Impacts - Influx of Job Seekers (Chidley, 2023).

Environmental Feature	Influx of Job Seekers
Project life cycle	Construction Phase
Potential Impact	Proposed Management Objectives / Mitigation Measures
Job seekers influx into the community.	• All employment of locally sourced labour should be controlled and formalised. No employment should take place from the project gate and contracts of employment should be entered into taking into account the Labour Relations Act; • If possible, and if the relevant Ward Councillors deems it necessary, the employment process should include the affected Ward Councillors and their ward committee. • To limit the growth of informal settlements in the project area, labour should be sourced from existing labour sending areas, from people who resided in the area prior to appointment. This process should include the Ward Councillor to ensure that only local residents are employed, rather than labour migrants. • No staff accommodation should be allowed on site; • To limit the growth of settlements near the project site the project proponent should provide worker transport to and from the work site for the duration of construction.
Increased community conflicts due to employment of local and non-local labourers	• Programmes should be developed to boost the local economy. These can be in the form of Corporate Social Responsibility (CSR) that will favour local empowerment.
Increase health risk	• Measures should be taken to provide condoms and, where necessary, access to counselling to address any risks to health.

Increased social pathologies such as crime, drug abuse and sexual behaviours.	• The mitigation method will require a change in community values and attitudes; This can be done through creating social awareness, and educating the workforce with regards crime awareness and social pathology prevention					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Site	Moderate	Short term	High	2
After Mitigation	Negative	Site	Low	Short term	High	1
Significance of Impact and Preferred Alternatives	The significance of the impact is high as community attitudes can be altered. The implementation of the overall mitigation measures is essential and necessary to minimise the impact from job-seekers influx and community impacts.					

Table 67: Construction Phase Impacts – Security (Chidley, 2023).

Environmental Feature	Security					
Project life cycle	Construction Phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Ensuring the security of the project site	• The camp site for the project and the longitudinal construction sub-site laid down areas should be fenced for the duration of construction; • All contractors' staff should be easily identifiable through their respective uniforms; • A project policy on management of workers should be developed. This would include education and awareness to be conducted with regards crime, trespassing and not gathering outside the site could be conducted. • Security staff should only be allowed to reside at contractor camps and no other employees.					
	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 are to be expected. These can then be successfully mitigated through contractor specifications that are issued at a tender stage and through the continuous monitoring of contractor proceedings and performance during construction phase.					

Table 68: Operational Phase Impacts - Economic Impacts (positive) (Chidley, 2023).

Environmental Feature	Economic Impacts (positive)					
Project life-cycle	Operational Phase					
Potential Impact	Proposed Management Objectives / Mitigation Measures					
Economic	• The solar park will stimulate the local economy through the provision of jobs and through local procurement. • It will contribute to the improvement of the national electricity supply at a price that has been set by a competitive bidding process					
Local Procurement	• Local SMMEs should be given an opportunity to participate in the operation of the project through the supply of services, material or equipment.					
	• A procurement policy promoting the use of local business where possible, should be put in place and applied throughout the operational phases of the project.					
Job Creation and Skills Development	• Women should be given equal employment opportunities and encouraged to apply for positions.					
	• A skills transfer plan should be put in place at an early stage and workers should be given the opportunity to develop skills whilst in employment.					
	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	The solar park in the regional study area will provide economic stimulus to the regional study area for the long-term. The solar park should adopt policies that are supportive of local procurement and support for local enterprises. Economic impact considerations require that the most cost-effective transmission power line route be adopted to service the project.

Table 69: Operational Phase Impacts - Economic Well Being (negative) (Chidley, 2023).

Environmental Feature		Economic and material well-being (negative)				
Project life-cycle		Operational Phase				
Potential Impact		Proposed Management Objectives / Mitigation Measures				
Loss of productive land		• A very low impact that does not require mitigation.				
Loss of grazing land		• A very low impact that does not require mitigation.				
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Low	Short Term	Low	1
After Mitigation	Negative	Local	Low	Short Term	Low	1
Significance of Impact and Preferred Alternatives	This impact is not considered significant. It should be noted that this study defers to the agricultural specialists with regards the impact of the project on regional production.					

13.26 "No-Go" Impacts

The "no-go option" is the alternative of not implementing the activity/development. 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 Project (see **Section 8** above).

SA has identified the need to supply 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.

In contrast, should the proposed Project not go ahead, any potentially significant environmental issues associated with the Project (refer to **Section 13.9** to **Section 13.26** above) would be irrelevant and the status quo of the local receiving environment would not be affected by the Project-related activities. The prerogative will lie with the landowner to determine an alternative future desired use of the land where the Solar PV Plant is proposed. It is noted that the site is currently used for agricultural purposes. With the "no-go option" the objectives of the Project would not be met. This will *inter alia* mean that the Project's intended benefits will not materialise. The "no go option" is thus not preferred.

13.27 Cumulative Impacts

13.27.1 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.

13.27.2 Other Renewable Energy Projects in Proximity to the Proposed PV Site

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.

It is noted that the accurate characterisation of the future state of the Project area is inherently speculative to an extent, due to the dynamic nature of future decisions related to land use and growth, protection of terrestrial and aquatic biological resources, water use (consumptive, waste-related and encroachments), etc.

According to the REEA Database (Quarter 2, 2023), the following renewable energy applications have been made for properties that are located within a 30km radius of the PV site (refer to **Figure 6** in **Section 6.8**):

- The proposed development of Biochemical refinery plant, a 130MW PV solar plant and associated infrastructure JB Marks local municipality, Dr Kenneth Kaunda District, North West Province (Application Ref No.: 14/12/16/3/3/2/2184), (status: Approved); and
- Proposed Establishment of a Photovoltaic (PV) Installation at the Bloemfontein Airport, Free State Province (Application Ref No.: 12/12/20/2149/A3), (status: Approved). Note that although this project is located according to the REEA Database within a 30km radius of the proposed PV project, the project may have been incorrectly captured in the database as it relates to a project that is located in Bloemfontein, Free State Province.

The following is noted in terms of the cumulative impacts of the Project and the approved renewable energy applications for properties that are located within a 30km radius of the PV Site (assuming that these developments will proceed):

- There will be a cumulative loss of indigenous vegetation and habitat for these renewable energy developments. The total area within the 30 km buffer around the project area amounts to 395,565 ha, but when considering the transformation (201,043 ha) that has taken place within this radius, 194,522 ha of intact habitat remains, according to the 2018 National Biodiversity Assessment. Therefore, the area within 30 km of the project has experienced approximately 50.8% loss in natural habitat. Considering this context, the project footprint for the proposed development (according to the provided layout) and similar projects that exist in the 30 km region measuring a maximum of 5543ha (as per the latest South African Renewable

Energy EIA Application Database). This means that the total amount of remaining habitat lost as a result of solar projects in the region amounts to 1.2% (the sum of all related developments as a percentage of the total remaining habitat);

- The Project is not located in the same quaternary catchment as the other renewable energy developments. Cumulative impacts to freshwater resources through sedimentation (silt-laden runoff) caused by inadequate stormwater management, as well as contaminated through inadequate storage and handling of hazardous materials and poor management of waste and wastewater, would thus not affect the same catchment. Provision is made in the Project's EMPr to manage stormwater and to prevent pollution of water resources.
- The renewable energy developments will require water for construction and operational purposes. As explained in **Section 9.8.2** above, water for the Project will be supplied from approved sources such as the local municipality. Provision is made in the Project's EMPr to manage the consumptive use of water; and
- Localised impacts in terms of noise, reduction in air quality (dust) and traffic disruptions will be managed by the provisions of the EMPr for the respective renewable energy developments.

13.27.3 Cumulative impacts identified in terms of specialist studies

- Freshwater Impact Assessment:
  - Limited alien and Invasive plant species were observed on site, cumulative impacts can be Low to Moderate. As such, continuous monitoring should be implemented during the different phases of development and rehabilitation as well as a period after rehabilitation is completed;
  - Impacted water quality will only affect local water quality. This is considered as a Moderate cumulative impact;
  - Cumulative impacts to the hydrological function is low to moderate and could possibly include edge effects to remaining natural vegetation as the footprint activities may result in vegetation clearing. This could lead to increase in sedimentation as well as introduction of alien and invasive species.
- Terrestrial Biodiversity Compliance Statement:
  - Contribution to cumulative habitat loss, especially in the ecological corridors such as the wetlands which will also have an impact on the water resource and ecological processes in the region which is of moderate significance.
- Avifaunal Impact Assessment:
  - Cumulative impacts to avifauna include loss of habitat and disruption of surrounding ecological corridors which is of medium significance.
- Heritage Impact Assessment:
  - The baseline impacts for the project area are considered low for Heritage resources, and additional project impacts (if no mitigation measures are implemented) will not increase the significance of the existing baseline impacts, where the cumulative unmitigated impact will probably be of a low-moderate significance. The impact is going to happen and will be long-term in nature, therefore the impact risk class will be Low to Moderate. However, with the

implementation of the recommended management and mitigation measures this risk class can be minimized to a Low rating.

- ❑ Palaeontological Impact Assessment:
  - The Cumulative impacts of the development near Lichtenburg is considered to be medium pre- mitigation and Low post mitigation and falls within the acceptable limits for the project. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area.
- ❑ Visual Impact Assessment:
  - Cumulative visual impacts resulting from landscape modifications because of the proposed activities in conjunction with other commercial activities are likely to be of moderate significance, however, it can be reduced with the successful implementation of the proposed mitigation measures.

13.27.4 The Proposed Project's contribution towards Cumulative Impacts

The following is noted in terms of the Project's contribution towards cumulative impacts:

- ❑ 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 the vegetative cover over large areas associated with 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. Sensitive receptors to dust and other air quality impacts in the study area are discussed in **Section 13.18** above. Measures to manage dust are included in the EMPr;
- ❑ Construction of the proposed facilities along with construction activities of other developments in the Project Area could potentially increase noise impacts on surrounding land uses. This impact will be temporary in nature. It is further noted that noise is a localised issue that diminishes in intensity with distance from the source. Sensitive receptors to noise in the study area are discussed in **Section 13.19** above. The Project's contribution to cumulative noise impacts is thus not anticipated to be significant. Measures are included in the EMPr to manage noise impacts that may be caused by the Project;
- ❑ 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; and

- 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.

13.27.5 Cumulative Environmental Impact Statement

From a cumulative impact perspective, there are two (2) known approved renewable energy application within a 30km radius of the Project's PV Site (refer to **Section 13.27.2** above) according to the REEA Database (quarter 2, 2023). Cumulative impacts in relation to the Project were assessed individually and mitigation measures were developed for each of the impact categories.

14 ANALYSIS OF ALTERNATIVES

14.1 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 Best Practicable Environmental Option (BPEO) can be selected with technical and environmental justification. Münster (2005) defines 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*".

14.2 "No-Go" Option

The implications of the "no-go" option are discussed in **Section 13.26** 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 EIA Report and EMPr.

14.3 Layout Alternatives

14.3.1 Solar PV Plant

The original layout of the Solar PV Plant, referred to as Layout Alternative 1, was assessed by the various specialists. The layout was refined to take the following sensitive environmental features identified through the screening process and specialist input into consideration:

- The depression wetland and its associated buffer zones;
- Identified heritage resources and their associated buffer zones.

The refined layout is referred to as Layout Alternatives 2 and based on recommendations by the specialists was identified as the Best Practicable Environmental Option (BPEO).

14.3.2 Power Line

Two powerline route options were assessed for the project namely:

- Option 1 which consists of 2 x 132kV powerlines, approximately 14 kilometres (km) in length, from the new facility 33kV substation to new 400/132kV Main Transmission Substation (MTS) to Loop In-Loop Out (LILO) of the Pluto – Watershed 275kV power line; and

- Option 2 that comprises of 2.8km 132 kV line from the new facility 33kV substation facility 33kV substation to the Makokskraal Substation.

It should be noted that the applicant will make use of both options to evacuate power from the solar PV plant and thus both are preferred.

14.4 Technology Alternatives

14.4.1 Solar PV Technology

Solar PV technology consists of either monofacial or bifacial solar panels used on either a fixed mounting system or tracking mounting system.

14.4.2 Solar CSP Technology

Four types of CSP technologies will be considered: parabolic troughs, power towers, dish/engine systems, and linear Fresnel reflectors. The parabolic trough system was the first CSP technology, thus it is the most developed and most replicated system.

Solar PV Technology is considered as the preferred technology.

14.4.3 BESS Technology

The BESS can be broken into solid state and flow battery systems. A single battery technology, or a combination of two or more technology alternatives, may be implemented for the Project.

15 PUBLIC PARTICIPATION

15.1 Introduction

The purpose of public participation includes the following:

1. To provide I&APs with an opportunity to obtain information about the Project;
2. To allow I&APs to express their views, issues, and concerns with regard to the Project;
3. To grant I&APs 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 I&APs into the Project, where feasible.

The public participation process that is being undertaken is governed by NEMA and the EIA Regulations. **Figure 69** below outlines the public participation process for the upfront Announcement Phase (completed), Scoping Phase (completed) and EIA Phase (current).

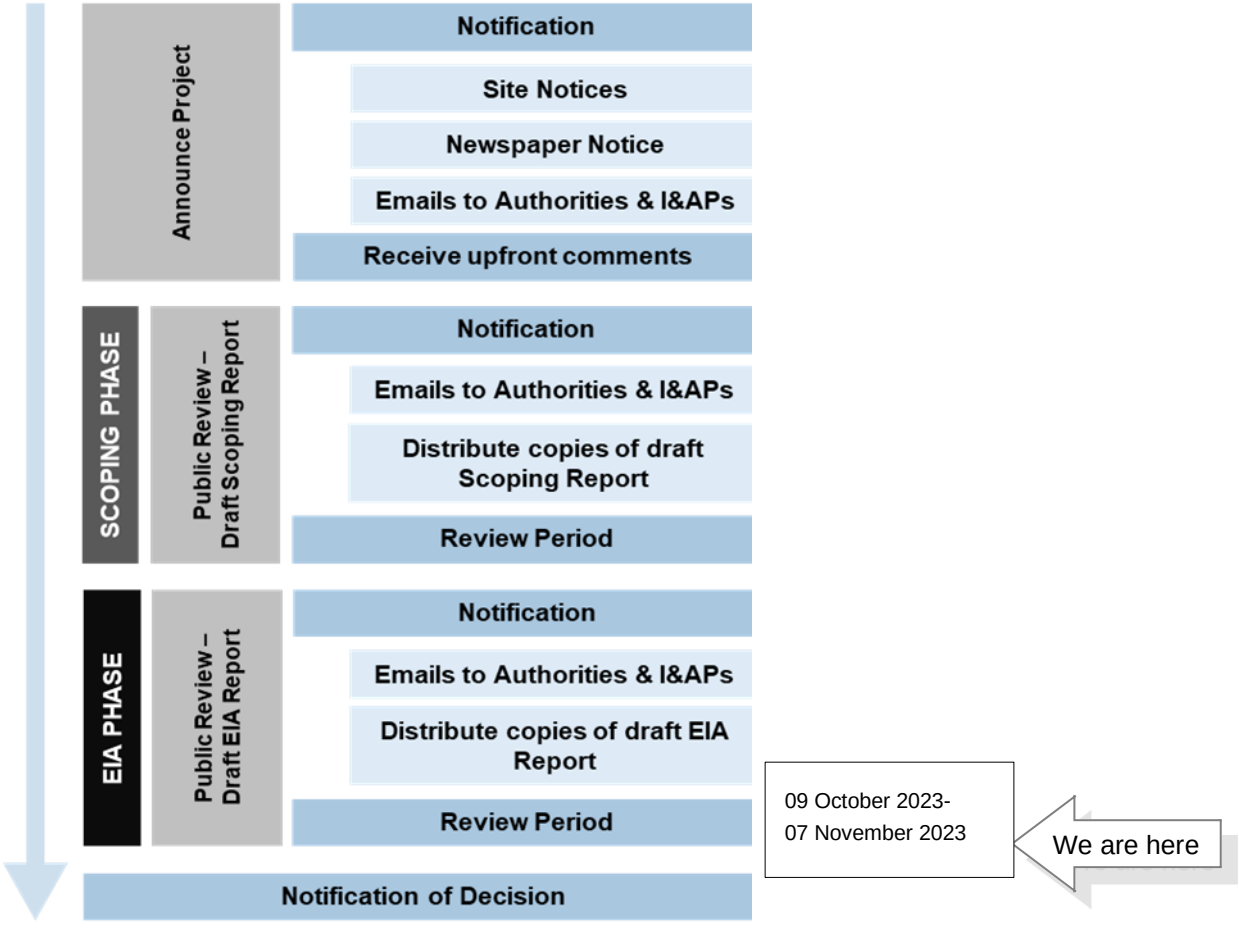

Figure 69: **Outline of Public Participation Process (*note: dates are subject to change*)**

15.2 Public Participation during the Announcement & Scoping Phases

The primary tasks undertaken as part of public participation during the Announcement and Scoping Phases included the following (details provided in the Scoping Report):

- Compiling a database of organs of state and I&APs;
- Announcing the Project by placing notices in newspapers, erecting site notices and circulating a Background Information Document and Reply Form to organs of state and I&APs;
- Lodging the draft Scoping Report for public review and notifying organs of state and I&APs; and
- Compiling and maintaining a CRR (contained in **Appendix F**).

15.3 Public Participation during the EIA Phase

15.3.1 Maintenance of the Stakeholders' Database

The database of stakeholders (contained in **Appendix E**), which includes authorities, different spheres of government (national, provincial and local), parastatals, stakeholders, landowners, interest groups, members of the general public and I&APs, was maintained during the EIA phase.

15.3.2 Period to Review the Draft EIA Report

In accordance with Regulation 43(1) of the EIA Regulations, organs of state and I&APs are granted an opportunity to review and comment on the draft EIA Report from 09 October 2023 until 07 November 2023.

15.3.3 Notification of Review of Draft EIA Report

Organs of state and I&APs contained in the database (refer to **Appendix E**) were notified via email of the review of the draft EIA Report. Proof of notifications will be included in the final EIA Report.

15.3.4 I&APs' Access to the Draft EIA Report

The draft EIA Report will be made available for public review as follow:

- A hardcopy will be placed at the Ventersdorp Public Library; and
- An electronic copy will be uploaded to the following website, for downloading purposes: https://nemai.co.za/downloads/.

15.3.5 Copies of Draft EIA Report to Authorities

The draft EIA Report will be provided to the following parties, which include key regulatory and commenting authorities with jurisdiction over the receiving environment:

- DFFE (including Directorate Biodiversity and Conservation and Directorate Protected Areas);
- North West DEDECT;

- DWS: North West Regional;
- NW DPWR,
- Eskom;
- SAHRA/NWPHRA;
- DMRE; and
- The local and district municipality.

15.3.6 Public Meeting to Present the Draft EIA Report

Anyone that has an interest in attending a public meeting will need to inform Nemai Green in writing by 18 October 2023. Only preregistered parties that confirmed interest will receive an invitation to the public meeting.

15.3.7 Comments Received on the Draft EIA Report

The CRR will be updated with all comments received from organs of state and I&APs during the review period of the draft EIA Report. The updated CRR will be appended to the final EIA Report that will be submitted to DFFE.

15.4 Notification of DFFE Decision

Registered I&APs 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.

16 CONCLUSIONS

16.1 Outcomes of the EIA Phase

The following key tasks were undertaken during the EIA phase for the proposed Project:

- The specialist studies identified in the Plan of Study for the EIA were undertaken and the findings were incorporated into the EIA 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 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.

16.2 Sensitive Environmental Features

The following sensitive and significant environmental features and aspects that are associated with the Project and its receiving environment are highlighted, for which mitigation measures are included in the EIA Report and EMPr:

- One wetland HGM unit was identified namely a large depression wetland;
- In terms of the North West Biodiversity Sector Plan the PV site and Powerline option 1 overlap with a CBA2, ESA1 and ESA2. Powerline option 2 overlap with ESA1;
- Ten (10) avifaunal risk species (species at risk for collisions, electrocutions or sensitive to habitat loss) were recorded during the field investigation;
- Powerline option 1 traverse cultivated land and land under irrigation which are sensitive agricultural features;
- From a cultural heritage perspective, historical structures and iron age sites were identified in the study area; and
- Outcrops of weathered stromatolites were identified.

A combined sensitivity map overlaid with the Project’s BPEO (including powerline options) is provided in **Figure 70** and **Figure 71** below. Key environmental features that contributed towards the sensitive areas shown in these maps include wetlands and heritage sites.

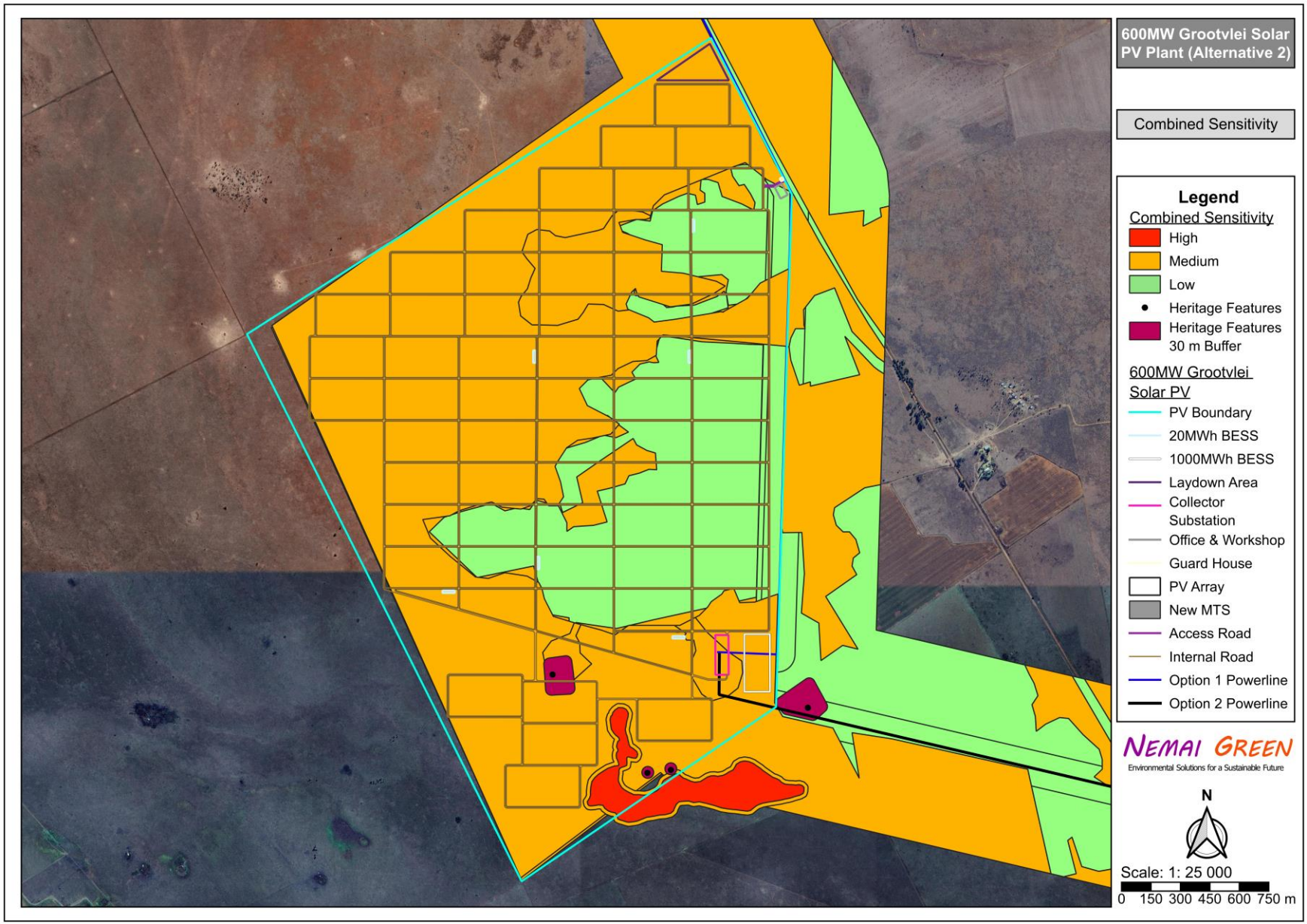

Figure 70: Combined sensitivity map of BPEO.

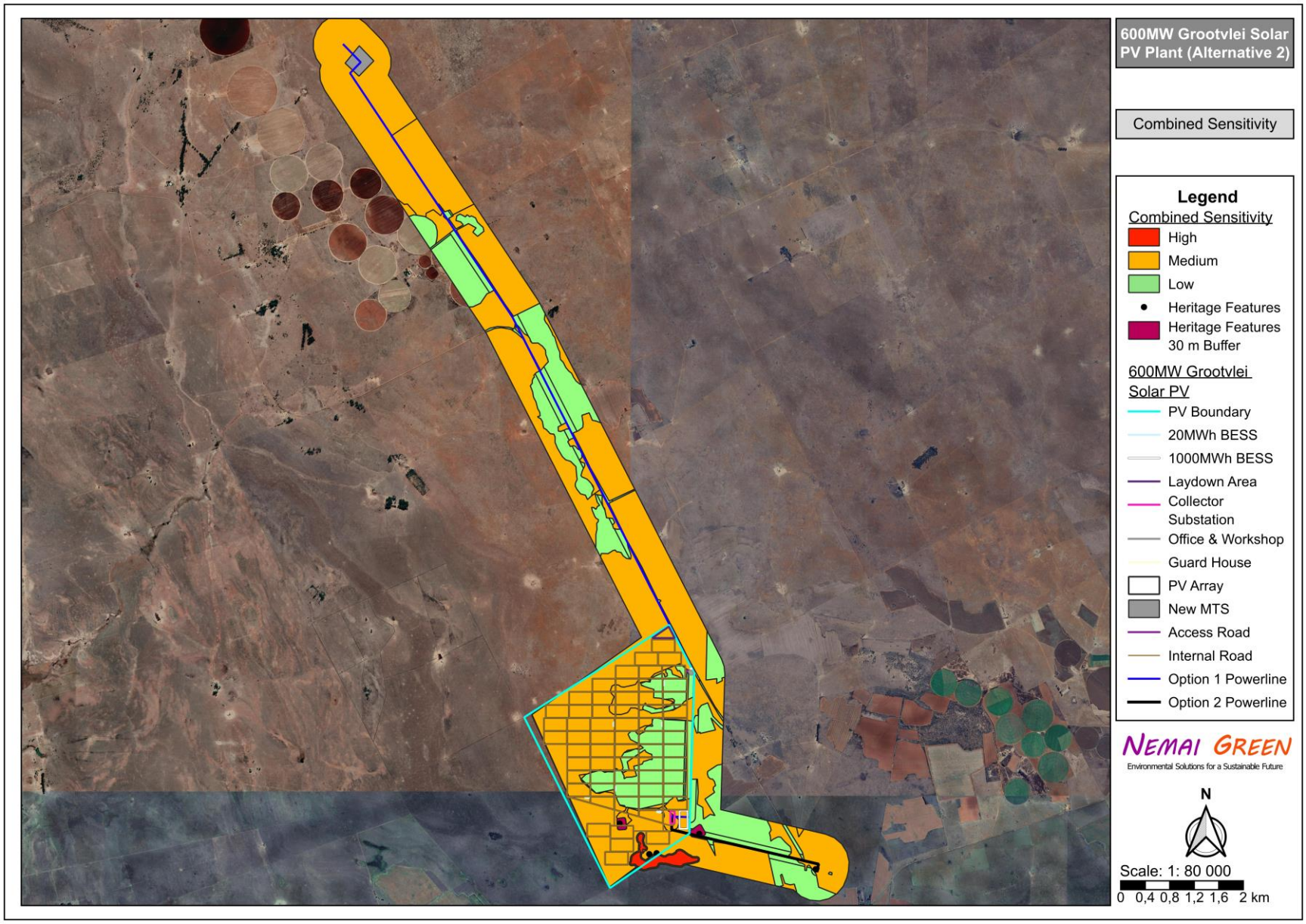

Figure 71: Combined sensitivity map of BPEO (including powerline options)

16.3 Environmental Impact Statement

The 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. In this regard, the Applicant intends to bid for the current and future REIPPPP bid windows and/or other renewable energy markets within SA.

The rationale for the siting of the Project is based on its suitable geographic location, including the area's high solar yield area, flat topography, grid connection. suitable site access and availability of land as well as the intended value that the Project will provide to the JB Marks LM and users of electricity.

The initial PV layout was revised to prevent encroachment into the delineated wetland, its associated buffer and to avoid identified heritage resources. Based on the environmental screening process and with input from specialists, environmental sensitivities were identified for the project site which have necessitated changes to the initial proposed layout. The initial proposed layout was subsequently revised to ensure that infrastructure development do not encroach on these sensitivities. Based on the recommendations of the specialists, technical considerations and the comparison of potential impacts, PV layout alternative 2 were identified as the BPEO and that the proposed project receive a positive EA based on the implementation of the recommended mitigation measures.

The potentially significant environmental impacts were investigated through relevant specialist studies. Based on the impact assessment undertaken, the proposed Project will not result in potential residual environmental impacts of a high significance post-mitigation. Most of the potential impacts have been assessed to be of a low to very low significance after the implementation of the recommended mitigation measures.

Key findings from the EIA, apart from the sensitive environmental features and aspects listed in **Section 16.2** above, which may also influence of the conditions of the Environmental Authorisation (if granted), include the following:

- The necessary permits will need to be obtained from SAHRA or the PHRA should sites, features and objects of heritage significance be impacted upon;
- Should archaeological sites or graves be exposed in other areas during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made;
- A Chance Find Protocol should be implemented if fossils are uncovered during the excavation phase of the development;
- Undertake a walkdown survey of the power line routes to confirm the most suitable locations of the towers;

- A detailed risk assessment will need to be undertaken based on the type of BESS technology selected and the final design of the Solar PV Plant. The outcomes of this risk assessment will need to be incorporated into the Operational EMPr; and
- Suitable measures need to be implemented to prevent erosion, manage site drainage and rehabilitate cleared areas during the project life-cycle.

The Project is considered to be compatible with existing land uses encountered in the area. The impacts and risks assessed as part of the EIA process that was undertaken for the Project are considered manageable with the effective implementation of the measures stipulated in this EIA Report and EMPr.

With the selection of the BPEO, the adoption of the mitigation measures included in the EIA Report 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 in 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 EIA was executed in an objective manner and that the process and EIA Report conform to the requirements stipulated in the EIA Regulations.

16.4 EA Authorisation Period

Appendix 1(3)(1)(q) of the NEMA EIA Regulations 2014, as amended requires “where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised” must be included in the BA Report.

The EA is required for a period of 10 years from the date of issuance of the EA to the end of the construction period (including rehabilitation), when the proposed activities applied for are completed.

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APPENDICES