PROPOSED SEELO BETA 240MW SOLAR PHOTOVOLTAIC (PV) AND BATTERY ENERGY STORAGE SYSTEM (BESS) PROJECT NEAR THE TOWN OF CARLETONVILLE, NORTH WEST PROVINCE

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

DFFE REFERENCE NO.: 14/12/16/3/3/2/2342

DRAFT

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TITLE AND APPROVAL PAGE

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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), via Eskom, 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 Battery Energy Storage Systems (BESS) that the Department of Mineral Resources and Energy (DMRE) intends to develop and implement as identified in the approved Integrated Resource Plan (IRP) 2019.

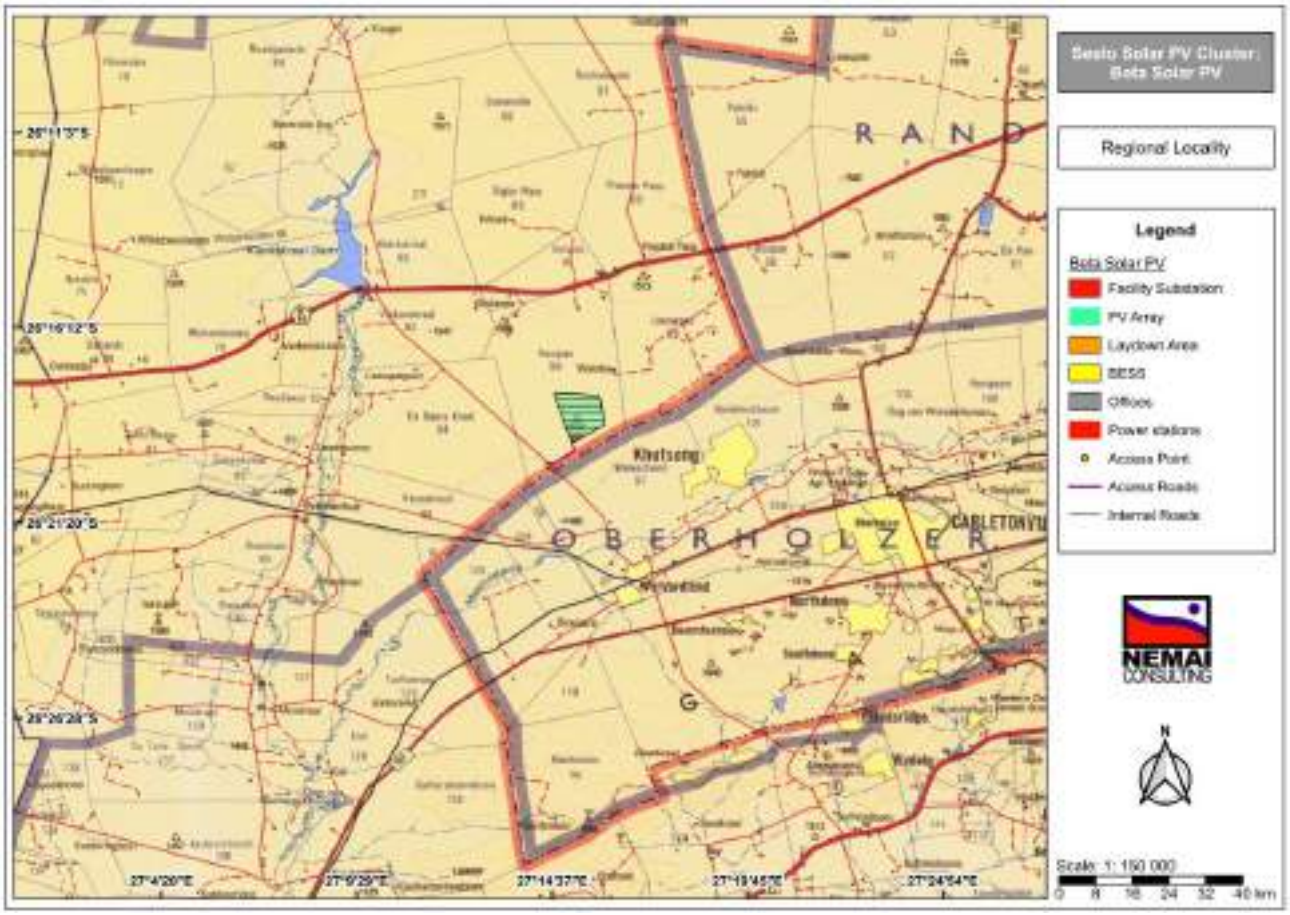
Seelo Beta Solar PV (RF) (Pty) Ltd (the Applicant) has proposed the development of the Seelo Beta 240MW Solar PV Project and BESS near the town of Carletonville, in the North West Province (the "Project"). The electricity generated by the Project will be injected into the existing Eskom 132 kV distribution system. The Applicant intends to bid for the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows or private wheeling arrangement.

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

B. PROJECT LOCATION

The Project is located in the most eastern part of the North West Province (at the boundary between North West and Gauteng) and falls within the Dr Kenneth Kaunda District Municipality and the JB Marks Local Municipality. The site is located approximately 13km to the north-west of the town of Carletonville.

The property earmarked for the Project [Portion 1 of Farm 96 (Rooipan) IQ] covers a combined area of approximately 1130 ha, of which the buildable area determined by the engineering team is approximately 355 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.

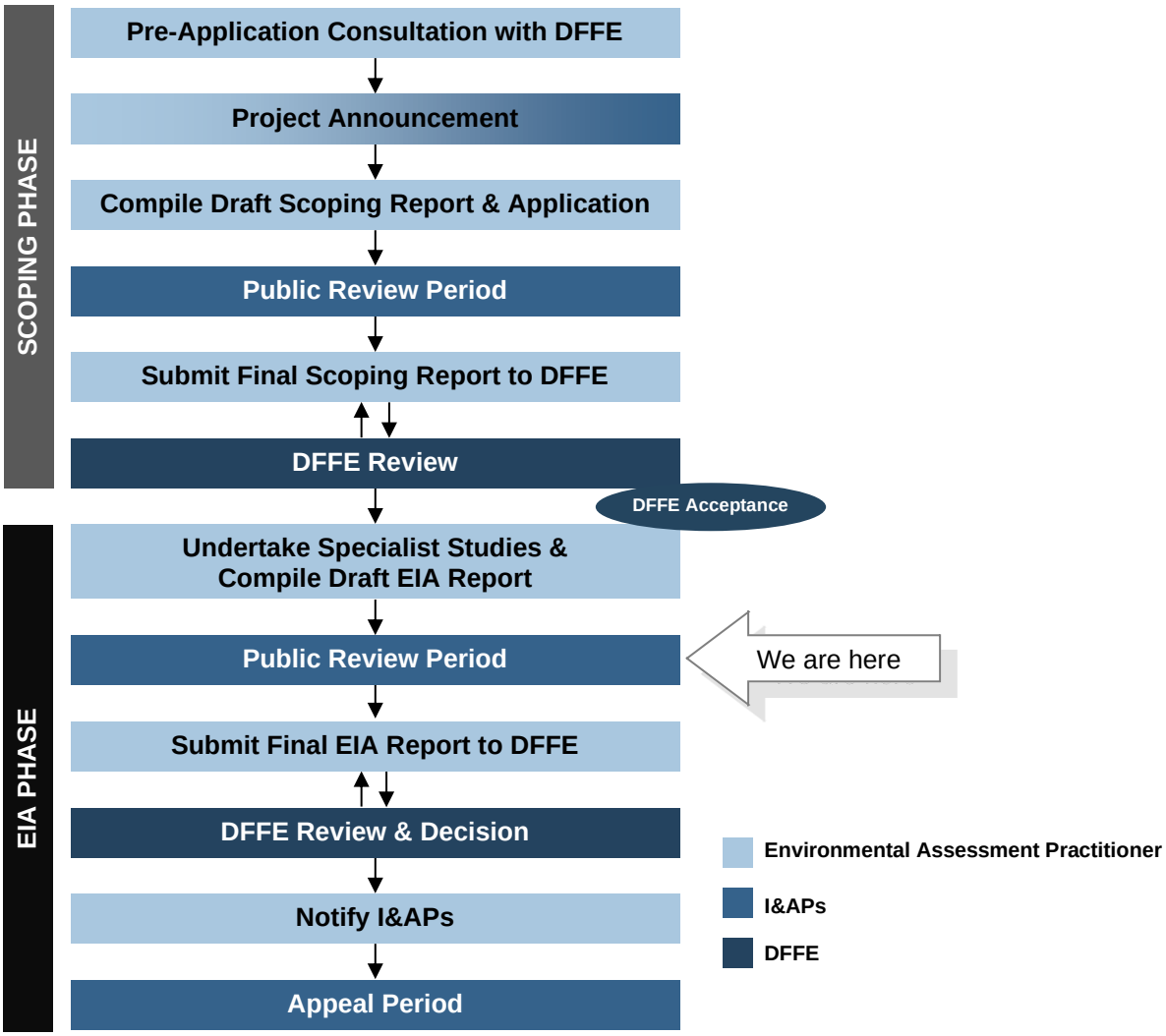
The relationship between the Project and the following key pieces of environmental legislation is also explained:

- 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 (EA) 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 below.



Overview of S&EIR Process

E. PROJECT'S TECHNICAL DESCRIPTION

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

- PV panel arrays, which are the subsystems which convert incoming sunlight into electrical energy;
- Mounting structures to support the PV panels;
- On-site inverters to convert direct current (DC) to facilitate alternating current (AC) connection between the solar energy facility and electricity grid;
- BESS;
- IPP substation;
- Eskom switching substation[1];

[1] The dedicated grid connection for the proposed Project which includes a 132/33 kV switching substation which does not form part of the current application for EA.

- Cabling between the Project's components, to be laid underground (where practical);
- Administration Buildings (Offices);
- Workshop areas for maintenance and storage;
- Operation and Maintenance building;
- Temporary and permanent laydown areas;
- Internal access roads and perimeter fencing of the footprint;
- High Voltage (HV) Transformers; and
- Security Infrastructure.

The EIA Report provides an overview of the components of the proposed Solar PV Facility, as well as the BESS. 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 layout alternatives, technology alternatives and the no-go option.

F. PROFILE OF THE RECEIVING ENVIRONMENT

The EIA 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. Aquatic Biodiversity Compliance Statement;
2. Terrestrial Biodiversity Compliance Statement;
3. Avifaunal Impact Assessment;
4. Agricultural Compliance Statement;
5. Phase 1 Cultural Heritage Impact Assessment;
6. Paleontological Impact Assessment;
7. Visual Impact Assessment;
8. Social Impact Assessment;
9. Transport Impact Assessment;

10. Geohydrology Assessment.

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

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

H. IMPACT ASSESSMENT

The 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) for the PV Site and Generic EMPr for the substation provides a comprehensive list of mitigation measures for specific elements of the Project, which extends beyond the impacts evaluated in the body of the EIA 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 three (3) known renewable energy applications within a 30km radius of the Project's PV Site. Cumulative impacts in relation to these projects were assessed as part of the scope of specialist studies and included as part of the EIA Report.

Other aspects identified 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;
- 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;
- The Project is expected to increase the cumulative visual impact experienced by identified sensitive receptors;
- Problems associated with the influx of employment seekers; and
- Positive cumulative economic effects from the construction of multiple developments in the area.

I. ANALYSIS OF ALTERNATIVES

An initial layout was proposed by the Applicant. Through the environmental screening process and with input from specialists, no environmental sensitivities were identified for the project site. Therefore, currently one layout alternative is presented for inclusion in the study. The layout was assessed and deemed acceptable by all specialists.

In terms of PV technology, both fixed and tracking system PV panel technologies are considered for the proposed Solar PV Facility. Bifacial and monofacial solar panels are further both considered. Bifacial solar panels are however preferred, as this technology optimise the Project's yield output. The preferred technology will however only be determined with a financial model during the more detailed design phase of the project.

In terms of BESS technology alternatives, options include solid state and flow battery systems. The preferred alternative is solid state lithium-ion technology. However, a single battery technology, or a combination of the two technology alternatives may be implemented for the project. The preferred technology will only be determined with a financial model during the more detailed design phase of the project.

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 Interested and Affected Parties;
- Notification of review of the draft EIA Report;
- Means of accessing the draft EIA Report;
- Supplying of copies of the draft EIA Report to Authorities; and
- Commenting on the draft EIA Report.

H. CONCLUSION

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

- The specialist studies identified in the Plan of Study 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 Best Practicable Environmental Option (BPEO) was identified. The “no-go” option is not supported when considering the implications of not implementing the Project.

An Environmental Impact Statement is 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, 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.
September 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
BESS	Battery Energy Storage System
BPEO	Best Practicable Environmental Option
CBA	Critical Biodiversity Area
CBD	Central Business District
COD	Commercial Operation Date
CPV	Concentrated 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
DEDECT	Department of Economic Development, Environment, Conservation and Tourism
DFFE	Department of Forestry, Fisheries and the Environment
DC	Direct Current
DMRE	Department of Mineral Resources and Energy
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
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
KZN	KwaZulu-Natal
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 Consulting (Pty) Ltd was appointed by Seelo Beta Solar PV (RV) (Pty) Ltd (the "Applicant") to conduct the Environmental Impact Assessment (EIA) for the **Proposed Seelo Beta 240MW Solar Photovoltaic (PV) and Battery Energy Storage Systems (BESS) Project near Carletonville, in the North West Province** (the "Project").

The EIA has been 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 29th of June 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 **06 September 2023 to 09 October 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 E	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 H	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 G	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 I	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 Seelo Beta 240MW Solar PV with BESS Project near Carletonville, in the North West Province. The electricity generated by the Project will be injected into the existing Eskom 132 kV distribution system.

The Applicant intends to bid for the current and future Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows or secure private offtake.

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.

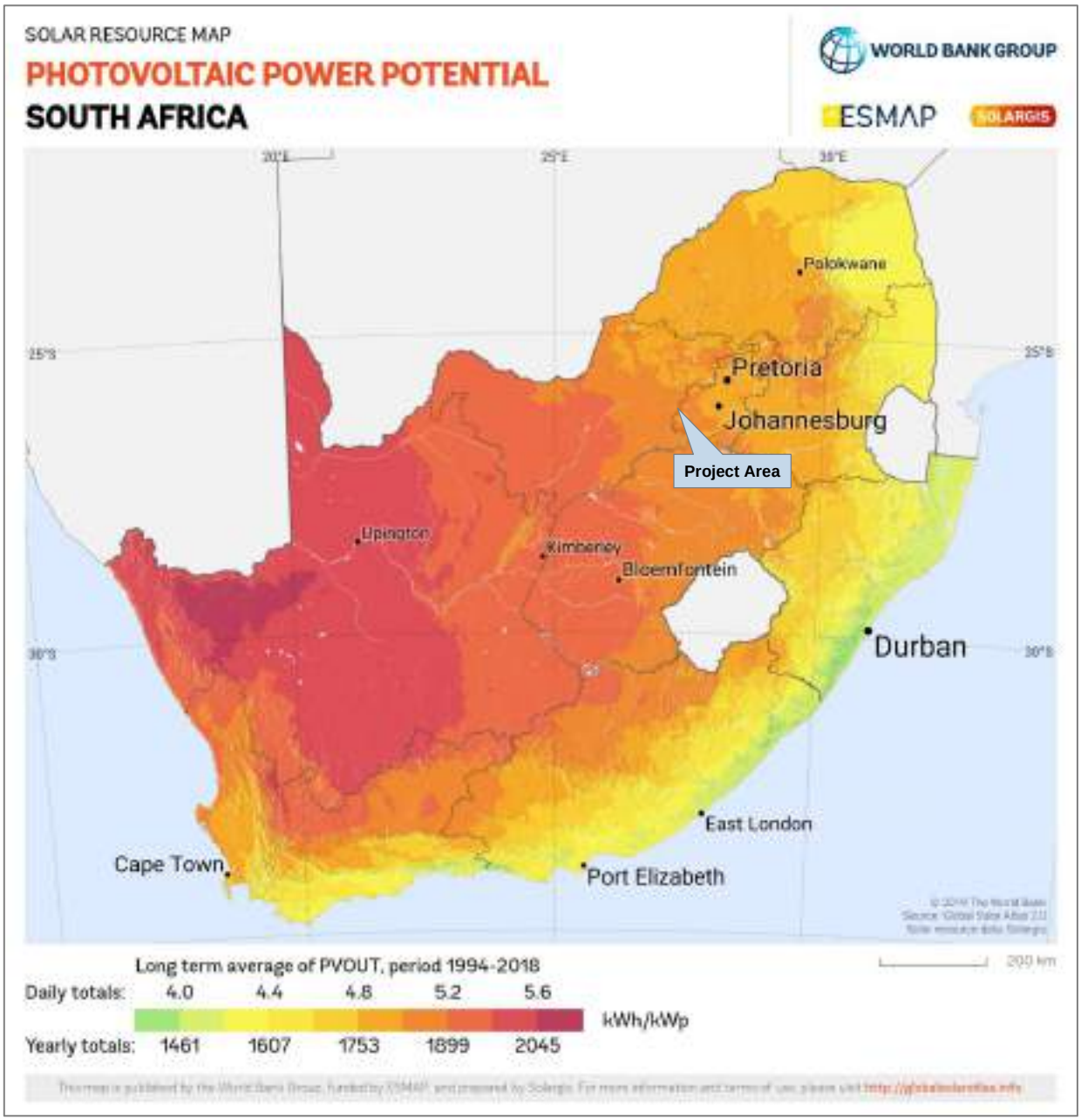

Figure 1: Location of the Project relative to PV Power Potential
(© 2019 The World Bank, Source: Global Solar Atlas 2.0, Solar resource data: Solargis)

4.2 Geographical Context

The Project is located in the most eastern part of the North West Province (at the boundary between North West and Gauteng) and falls within the Dr Kenneth Kaunda District Municipality (DKKDM) and the JB Marks Local Municipality (JBMLM). The site is located approximately 13km to the north-west of the town of Carletonville. The locality maps are provided in **Figure 2** and **Figure 3** below, and are also contained in **Appendix A**. For the location of the PV array and associated infrastructure within the Project, refer to **Figure 8** in **Section 9.3.2** below.

The property earmarked for the Project covers a combined area of approximately 1130 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.
PV Site	
Portion 1 of Farm 96 (Rooipan) IQ	T0IQ00000000009600001
Access Road Route	
Portion 1 of Farm 96 (Rooipan) IQ	T0IQ00000000009600001
Portion 2 of Farm 96 (Rooipan) IQ	T0IQ00000000009600002

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

- **PV Site Boundaries** –

Table 3: PV Site Coordinates

Description	Coordinates
Corner and Bend Coordinates of buildable area	26°18'45.26"S; 27°15'59.82"E
	26°18'42.83"S; 27°15'59.80"E
	26°18'0.96"S; 27°15'52.62"E
	26°17'59.91"S; 27°15'52.22"E
	26°17'58.86"S; 27°15'50.61"E
	26°17'54.94"S; 27°14'58.31"E
	26°17'54.94"S; 27°14'40.24"E
	26°17'56.50"S; 27°14'40.24"E
	26°17'59.25"S; 27°14'41.00"E
	26°19'4.76"S; 27°15'4.91"E
	26°19'4.76"S; 27°15'7.80"E
	26°18'59.72"S; 27°15'18.47"E
	26°19'5.75"S; 27°15'20.81"E
	26°19'5.74"S; 27°15'21.83"E

- **Proposed access road location** (start and end points, as well as bend points) –

Table 4: Access Road Coordinates

Description	Coordinates
Start point (at PV area)	26°19'4.69"S; 27°15'23.69"E
Bend 1	26°19'5.03"S; 27°15'23.87"E

Description	Coordinates
Bend 2	26°19'13.09"S; 27°15'8.42"E
Bend 3	26°19'24.76"S; 27°15'12.57"E
Bend 4	26°19'29.19"S; 27°15'7.26"E
Bend 5	26°19'47.83"S; 27°14'35.58"E
Bend 6	26°19'47.83"S; 27°14'33.64"E
End point (at road tie-in)	26°19'49.07"S; 27°14'31.93"E

- **Substation area** –

Table 5: Substation area Coordinates

Description	Coordinates
Corner Coordinates of substation area	26°19'4.16"S; 27°15'9.19"E
	26°19'11.17"S; 27°15'11.97"E
	26°19'13.35"S; 27°15'7.89"E
	26°19'6.02"S 27°15'5.17"E

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

Table 6: BESS area Coordinates

Description	Coordinates
Corner Coordinates of BESS area	26°19'2.46"S; 27°15'12.74"E
	26°19'9.12"S; 27°15'15.88"E
	26°19'11.24"S; 27°15'11.90"E
	26°19'4.19"S; 27°15'9.08"E

- **Construction yard/laydown/storage area** –

Table 7: Construction yard/laydown/storage area Coordinates

Description	Coordinates
Corner Coordinates of construction yard/laydown/storage area	26°18'59.74"S; 27°15'18.44"E
	26°19'4.40"S; 27°15'20.28"E
	26°19'7.08"S; 27°15'14.90"E
	26°19'2.53"S; 27°15'12.75"E

- **Office, Operation and Maintenance Building, workshops and parking area** –

Table 8: Office, Operation and Maintenance Building, workshops and parking area Coordinates

Description	Coordinates
Corner Coordinates of office and parking area	26°19'4.50"S; 27°14'28.01"E
	26°19'6.44"S; 27°15'21.00"E
	26°19'9.14"S; 27°15'15.89"E

Description	Coordinates
	26°19'7.12"S; 27°15'14.91"E

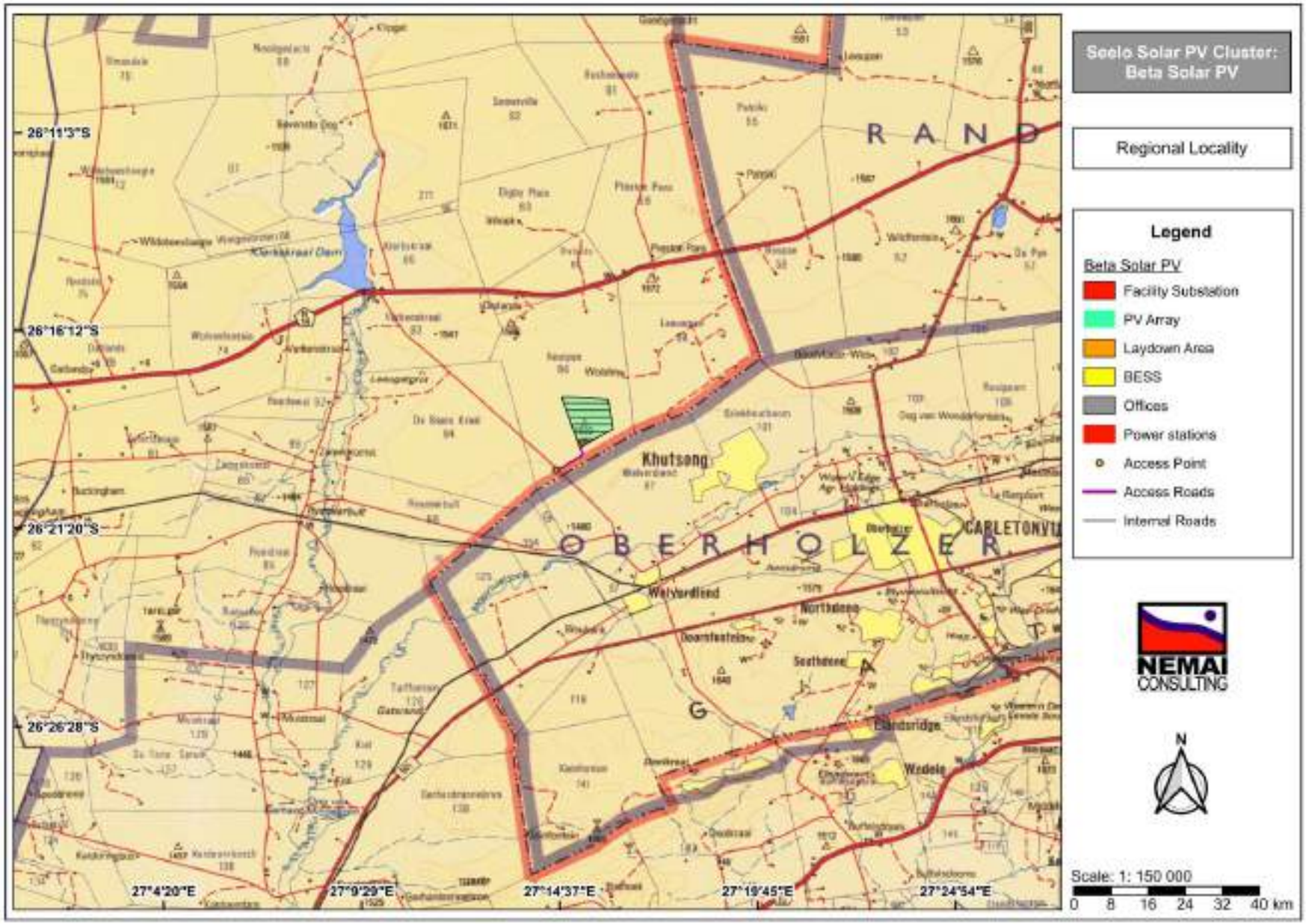

Figure 2: Regional locality map

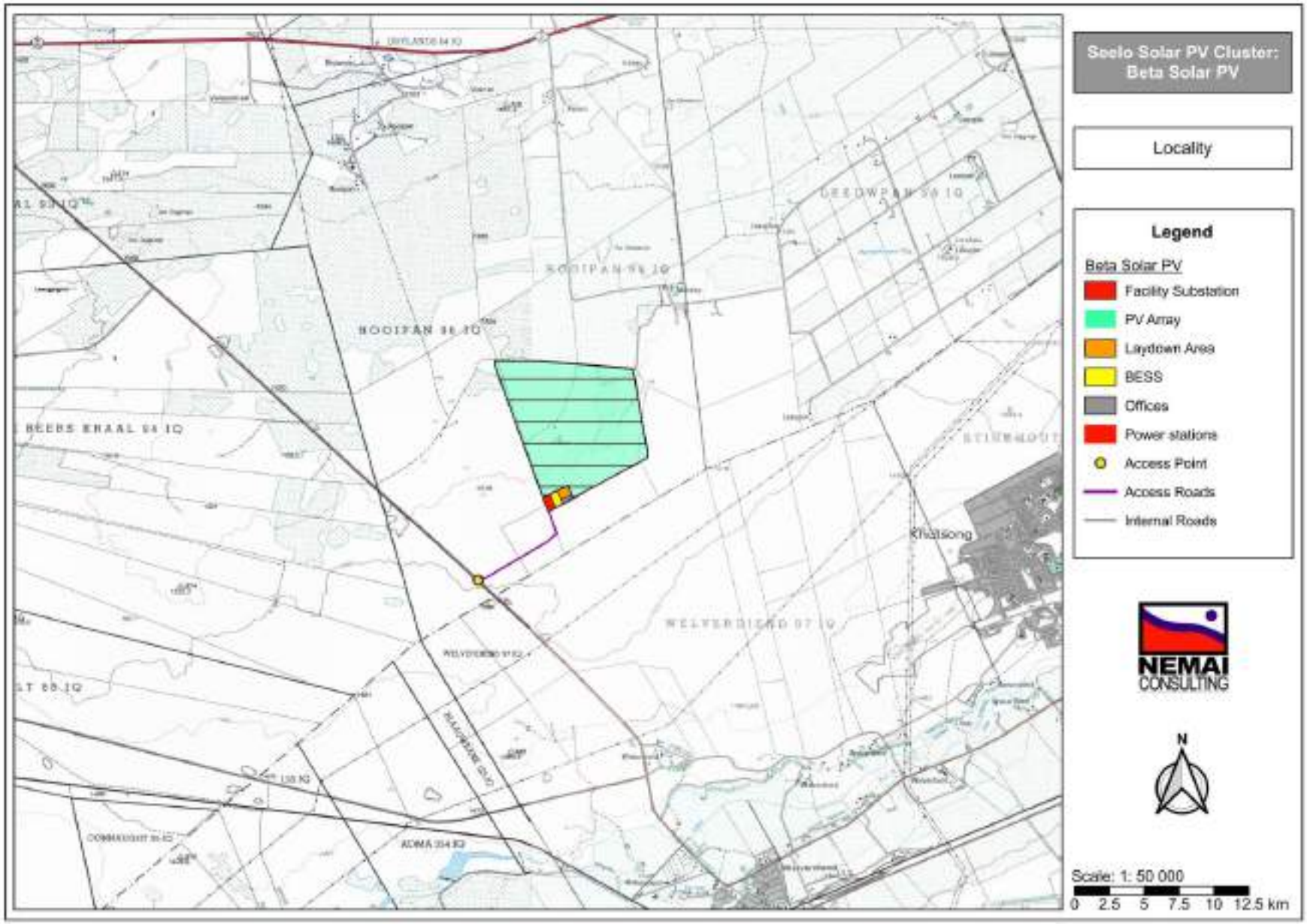

Figure 3: Locality map (topographical map)

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 9** 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 9: 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 proposed Seelo Beta Solar PV Facility will require the construction and operation of an on-site facility substation with a capacity of up to 132kV to facilitate the connection of the facility to the national grid.</td></tr>
<tr><td>GN No. R.983 – Activity 14:

The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.</td><td>Installation of BESS (lithium-ion technology).</td></tr>
</table>

Legislation	Description and Relevance	
	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* *(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.*	*New roads required for the Project (construction and operational phases).* *With regard to the roads, the internal roads will be up to 6m wide with a 12m reserve.* *The access road to the project site will be up to 8m wide with a 14m reserve.*
	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 and game farming, outside of an urban area.*
	GN No. R.983 – Activity 56: *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 internal farm roads will 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: *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 PV facility with a total generation capacity of 240MW renewable solar energy.*
	GN No. R.984 – Activity 15:	*Clearance of areas associated with the construction footprint.*

Legislation	Description and Relevance
	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.*
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. ▪ No activities under Listing Notice 3 are relevant to this Project.
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. ▪ 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 Act, 2004 (Act No. 10 of 2004)	▪ Management and conservation of the country's biodiversity. ▪ Protection of species and ecosystems. ▪ 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.

Legislation	Description and Relevance
	○ 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: ○ Section 34 – protection of structure older than 60 years. ○ Section 35 – protection of heritage resources. ○ Section 36 – protection of graves and burial grounds. ○ 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 Provincial Heritage Resources Authority NWPHRA).
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). ▪ *Authorisation in terms of the Act not required for the project.*
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 9** above and **Table 10** below.

Table 10: 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 and game farming, 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 240MW.
	Activity no. 15	The cumulative area to be cleared for entire Project (excluding linear components) will exceed 20 hectares.
Facility Substation & Battery Energy Storage System (BESS)	***GN No. R.983 (as amended)***	
	Activity no. 11(i)	Proposed on-site facility substation with a capacity of up to 132kV to facilitate the connection of the PV facility to the national grid.
	Activity no. 14	Installation of BESS (lithium-ion technology)
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 site will have a reserve of 12m and be 6m wide. The access road will have a reserve of 14m and be 8m wide.
	Activity 56 (ii)	The upgrading of existing roads (existing farm roads) to the PV site.

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 is contained in **Appendix C**, which 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.

Based on input from the Freshwater Specialist, it was concluded that the project site is not affected by any watercourses and wetlands. The specialist study was however limited to the proposed project footprint and did not include the extended 500m regulated area. It is not known whether the project site is located within 500m of any watercourses or wetlands. It is there not known whether the project would require any authorisation for water uses in terms of Section 21 of the NWA.

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 Terrestrial and Aquatic Biodiversity Compliance Statements are included in **Section 12.3** and **Section 12.4** 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 and Palaeontological Impact Assessment that were undertaken for the Project are included in **Section 12.8** and **Section 12.9** 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 EIA Report:

❑ Guideline on Alternatives, EIA Guideline and Information Document Series (DEA&DP, 2010);
❑ 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 (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 Mark Local Municipality IDP and SDF;
❑ North West Biodiversity Plan; 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 not located in a REDZ but falls within the Central Strategic Transmission Corridor. 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.

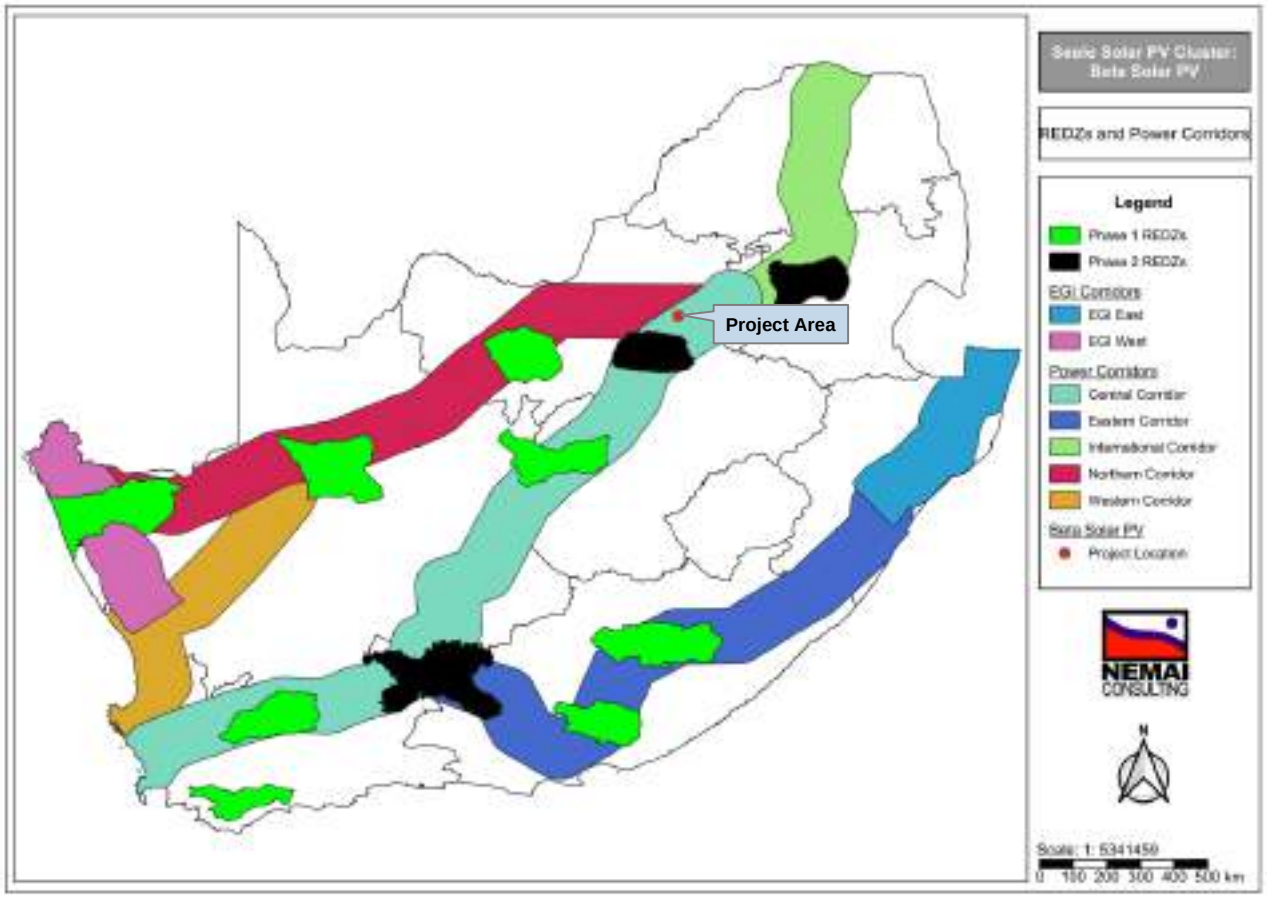

Figure 4: The Project in relation to REDZs

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

6.2 Environmental Assessment Practitioner

Nemai Consulting (Pty) Ltd 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 Consulting (Pty) Ltd 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 Consulting (Pty) Ltd 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 Consulting (Pty) Ltd that are involved with the S&EIR process for the Project are captured in **Table 11** below, and their respective Curricula Vitae are contained in **Appendix D**. The oath of the EAP is contained in **Appendix I**.

Table 11: Scoping and EIA Core Team Members

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

Name	Qualifications	Selected Experience - Renewable Energy & Bulk Power Projects
		▪ 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 Screening Report for the proposed Project are appended to the revised Application Form (refer to **Appendix C**).

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 5.2.1** and **Section 5.2.2** 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 5** below. The objectives of the EIA process, based on the EIA Regulations, are captured in **Section 1** above.

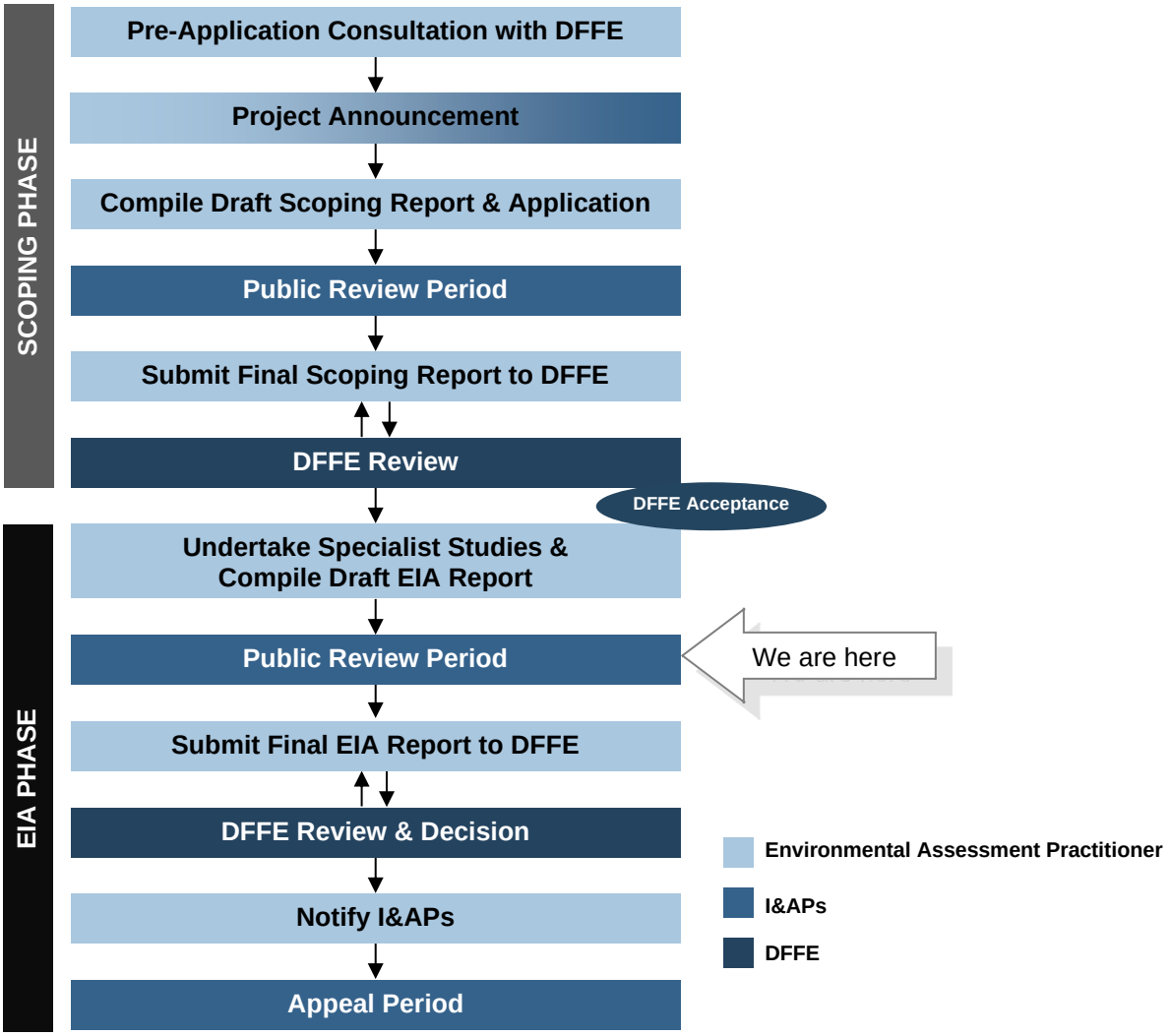

Figure 5: S&EIR process outline

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 28 February 2023;
- ❑ 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 for Environmental Authorisation and draft Scoping Report were submitted to DFFE on 30 March 2023;
❑ The draft Scoping Report was lodged for public review from 14 April 2023 to 15 May 2023;
❑ The final Scoping Report was submitted to DFFE on 18 May 2023; and
❑ DFFE accepted the Scoping Report and Plan of Study for the EIA on 29 June 2023 (refer to **Appendix B**), which allowed the commencement of the EIA phase.

6.6 Amended Application Form

An amended Application Form is contained in **Appendix C**, which include changes related to the refinement of listed activities triggered by the Project.

6.7 Alignment with 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 12** below.

Table 12: 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 E**
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**

6.8 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 (Quarter 1, 2023), the following renewable energy application has been made for a property which are located within a 30km radius east of the PV Site:

- 200MW PV facility for Sibanye Gold Limited on Portion 1, 2, 4, 5 and 6 of the Farm Uitval 280 within the Westonaria Local Municipality in the Gauteng Province (application 14/12/16/3/3/2/919), (status: Approved).

In addition to the above-mentioned application as per the REEA Database, applications for two (2) renewable energy projects are known to have been made immediately north east and south west of the proposed Beta Solar PV project. Note that these projects are not captured within the REEA Database. The details of these projects are as follow:

- Proposed Seelo Alpha 240MW Solar PV and BESS project located on Portion 2 of Farm 96 (Rooipan) IQ (Application Ref No.: 14/12/16/3/3/2/2343), (status: In process); and
- Proposed Seelo Charlie 140MW Solar PV and BESS project located on Portion 2 of Farm 58 (Leeuwpan IQ (Application Ref No.: 14/12/16/3/3/2/2341), (status: In process).

Potential cumulative impacts associated with the Project and this other renewable energy application are discussed in **Section 13.24** below.

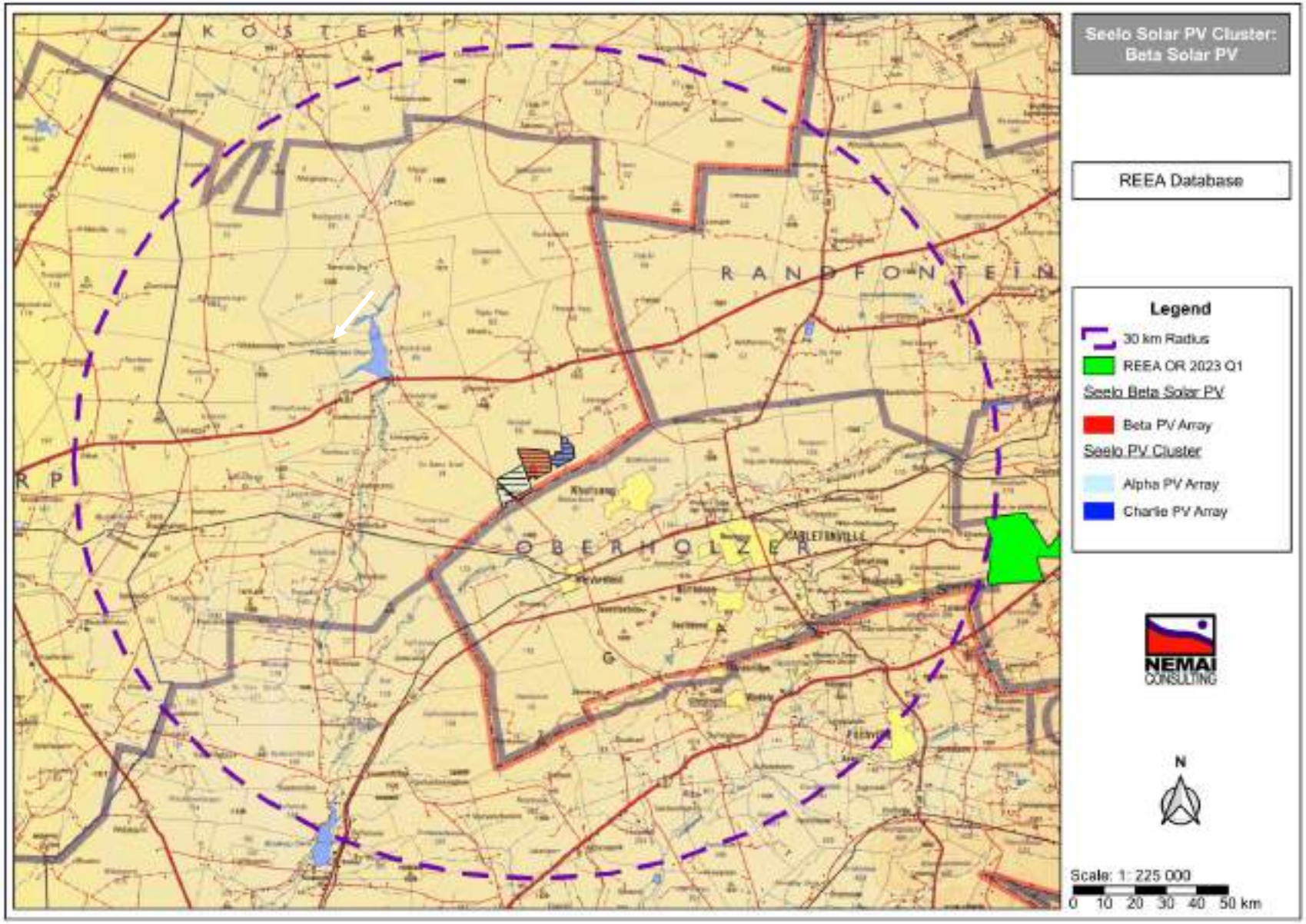

Figure 6: Renewable energy applications in relation to the Project (within a 30km radius).

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; and
- 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.

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 13** below.

Table 13: 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 were undertaken to assess the impacts of the Project on the ecological integrity of the area: • Aquatic Biodiversity Compliance Statement; • Terrestrial Biodiversity Compliance Statement; and • Avifaunal Impact Assessment. The following conclusions were made as per the above-mentioned studies: • The proposed site is situated in an agricultural landscape (small and large livestock). According to the NBA 2018 NWM 5 spatial data, two small depressions are located in the northern section of the footprint. However, during the site visit, this could not be verified and can rather be classified as terrestrial habitat. No plants indicative of a moisture gradient was recorded in the target areas. Therefore, the site does not contain any sensitive features in terms of watercourses; • The area has experienced long-term and continuous disturbance, mostly due to the agricultural grazing practices and associated impacts. The project area is modified and as such is assigned a sensitivity rating of 'Low'; • The development of the project area is likely to result in negligible negative impacts, especially considering the extent of 'Low' sensitivity areas confirmed; and • It is the opinion of the specialists that the project may be favourably considered provided that all the mitigation and recommendations provided are implemented.
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 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. Mitigation measures are included in the EIA Report and EMPr's to manage the above impacts, according to the mitigation hierarchy.

Question No.	Response
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 minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?	The Project may cause surface water, groundwater, soil, air, noise and light pollution during the construction and operational phases. Mitigation measures were identified and included in the EIA Report and EMPr to manage these impacts. Refer to the following related sections in the EIA Report: • Section 13.6 - impact assessment for soils; • Section 13.7 - impact assessment for groundwater; • Section 13.5 - impact assessment for surface water; • Section 13.9 - impact assessment for terrestrial ecology; • Section 13.15 - impact assessment for air quality; • Section 13.16 - impact assessment for noise; and • Section 13.17 - impact assessment for hazardous substances and waste.
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 are included in the EMPr's contained in **Appendix H.**
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. According to the findings from the Heritage Impact Assessment, no heritage resources were identified within the project footprint.

Question No.	Response
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 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.
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?)* *1.7.3. Do the proposed location, type and scale of development promote a reduced dependency on resources?*	The Solar PV Power Plant with BESS proposes to generate electricity from a renewable energy resource, namely the sun. In addition, some of this electricity will be stored in the BESS and will be discharged during evening peak hours when there is no sun. Impacts to the receiving environment were assessed through various specialist studies that are summarised in **Section 12** below. The results of the impact assessment are contained in **Section 13** below. Opportunity costs are associated with the net benefits forgone for the development alternative. The Project Area is considered to have favourable solar radiation levels, making it suitable for the production of solar power via PV Panels (refer to **Section 4.1** above). The Project's PV Site is located outside the urban edge and is also vacant and was historically used for agricultural purposes.
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?*	An initial layout was proposed by the Applicant. Based on the environmental screening process and with input from specialists, no environmental sensitivities were identified for the project site which would have necessitated changes to the proposed layout. The assumptions and limitations that accompany the EIA (including the specialist studies) are captured in **Section 7** above.

Question No.	Response
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?*	These impacts were evaluated as part of the Social and Visual Impact Assessment and the findings are provided in **Section 13.13** and **Section 13.22** below. Mitigation measures to manage impacts to the social environment and visual quality are 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.)?	Refer to response to question no. 1.7 above. The areas affected by the proposed Project footprint are rural in nature. The Project is located approximately 15km northwest of Carletonville's CBD. The Project's PV Site is vacant and was historically used for agricultural purposes. According to the Agricultural Compliance Statement (Gouws, 2023), the there is no high potential sensitive land on the PV site and has a low agricultural sensitivity.
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. 1.1 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. An initial layout was proposed by the Applicant. Based on the environmental screening process and with input from specialists, no environmental sensitivities were identified for the project site which would have necessitated changes to the proposed layout. The Best Practicable Environmental Option (BPEO) is presented in **Section 14** below, which was identified based on the recommendations of the specialists, technical considerations, feedback from I&APs and the comparison of the impacts.
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?	The cumulative impacts of other renewable energy projects that are located within a 30km radius of the proposed PV Site are discussed in **Section 13.24** below. The proposed project's contribution towards cumulative impacts is also discussed in **Section 13.24.**

Question No.	Response
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.),* *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").*	The socio-economic environment is discussed in **Section 11.9** below. The following is noted from a planning perspective: • The proposed PV Site 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. • Other renewable energy applications have been made within a 30km radius of the PV Site, according to DFFE's REEA Database (Quater 1, 2023) (refer to **Section 6.9** above). The nearest approved PV facility is located approximately 28km to the east of the Project Area; and • The proposed PV Site is located approximately 10.5km to the north-west of a civil aviation aerodrome. According to the findings from the National Web Based Environmental Screening Tool, the PV Site has a 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),*	2.5.1. 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 were assessed in **Section 13** below as part of the Agricultural Compliance Statement, 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 PV Site is located outside of the urban edge and should not impact on future urban expansion. 2.5.7. The resources and services required for construction and operation are discussed in **Section 9.7** 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.

Question No.	Response
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?*	2.5.10. Not deemed to be relevant, due to the nature of the development. 2.5.11. Provision is 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 Social Impact Assessment identified the socio-economic benefits associated with the Project. 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)?* *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?*	The assumptions, gaps and limitations that accompany the Social Impact Assessment are captured in **Section 7** above. The findings of the assessment of the social impacts are contained in **Section 13.22** below. None of the adverse social impacts that were assessed had a high residual risk after mitigation.
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 Compliance Statement, 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 findings of the following related specialist studies: • Agricultural compliance Statement (refer to Section 12.6 and Section 13.11 below); • Visual Impact Assessment (refer to Section 12.10 and Section 13.14 below); and • Social Impact Assessment (refer to Section 12.12 and Section 13.22 below). Also refer to the response to question no. 1.9 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 is presented in Section 14 below, which was identified based on the recommendations of the specialists, technical

Question No.	Response
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?*	considerations, feedback from I&APs and the comparison of the impacts.
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 PV Site is vacant. Consent has been provided by the landowner for the proposed development.
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 assessment of the social impacts are contained in **Section 13.22** below. Mitigation measures to manage these impacts are included in the EMPr's. 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 15** below provides an overview of the public participation process to date, which includes the following: • Public Participation during the Scoping Phase; • Maintenance of the database of I&APs; • Period to review the draft EIA Report; • Notification of review of the draft EIA Report; and • Means of accessing the draft EIA Report. The Comments and Responses Report (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.
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-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	The findings of the assessment of the social impacts are contained in **Section 13.22** below. Mitigation measures to manage these impacts are included in the EMPr's. Also refer to the responses to questions no. 1.9 and 2.5 above.

Question No.	Response
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 are assessed in **Section 13.21** below. These risks are addressed through mitigation measures identified under other environmental features, such as social 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.
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.
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 (DoE) (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 or sell to a private off taker. The REIPPPP is a competitive tender process that was designed to facilitate private sector investment into grid-connected RE generation in SA.

Question No.	Response
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 PV Plant proposes to generate electricity from a renewable resource, namely the sun. The total generation capacity of the Project will be 240MW 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 were assessed through various specialist studies that are summarised in **Section 12** below. The results of the impact assessment are contained in **Section 13** below.
2.19. Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	The mitigation measures included in the EIA Report and EMPr's are considered to be realistic. The mitigation measures proposed reduce the residual risks to an acceptable level. The solar PV facility will have an estimated lifespan of 30 years. It is at this time impossible to accurately predict the exact nature of the surrounding environment in 30 years' time or whether the area would have developed to the point where the solar PV facility will be upgraded to continue providing electricity, or decommissioned. Decommissioning of facilities that require environmental authorisation such as the solar PV facility is also a listed activity in terms of NEMA and will thus require the decommissioning and closure to be approved by the relevant authorities at the time, based on the current legislative framework. However, it is also not possible to predict the legal framework in 30 years' time. For the purposes of this EIA, it is assumed that the facility will eventually be decommissioned, and the site rehabilitated.
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?	A rehabilitation fund is setup for the project to provide for any potential remedial work. This is also supported by a sound EMPr to address any foreseeable risks throughout the life cycle of the project.
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 is presented in **Section 14** below, which was identified based on the recommendations of the specialists, technical considerations, feedback from I&APs and the comparison of the impacts. An initial layout was proposed by the Applicant. Based on the environmental screening process and with input from specialists, no environmental sensitivities were identified for the project site which would have necessitated changes to the proposed layout.
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?	The cumulative impacts of other renewable energy projects that are located within a 30km radius of the proposed PV Site are discussed in **Section 13.24** below. The proposed project's contribution towards cumulative impacts is also discussed in **Section 13.24.**

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 PV Technology Overview

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

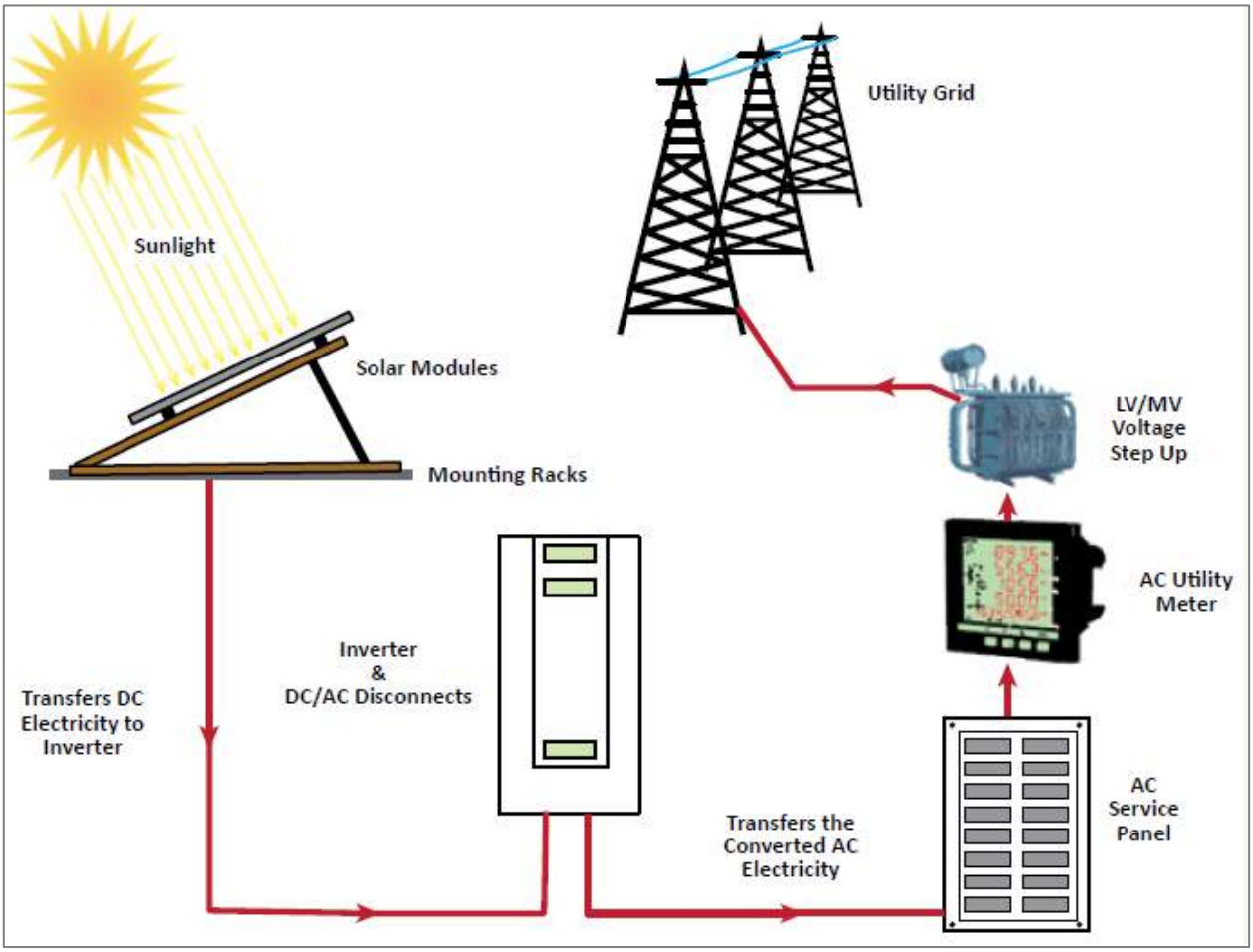

Figure 7: Overview of Solar PV Power Plant (IFC, 2015)

9.3 Project Overview

9.3.1 Overview of Technical Details

The technical details of the proposed Solar PV Plant are captured in **Table 14** below.

Table 14: Technical details of the proposed PV Plant

No.	Component	Description / Dimensions
1.	Location of the site	Portion 1 of Farm Rooipan 96 IQ
2.	Maximum generation capacity of facility	240MW
3.	Height of PV panels	± 1 – 6 m
4.	Area of Project (total disturbance footprint, including access road)	Total area of ± 386.5 ha
5.	Area of PV Arrays only	Total area of ± 345 ha
6.	No. of PV Modules	±500 000
7.	Number of inverters required	Approximately 55
8.	Area occupied by inverter / transformer stations / substations	▪ Area occupied by inverter stations (± 28 inverter stations) = ± 0.5 ha ▪ Area occupied by the facility transformer stations = ± 0.5 ha ▪ Area occupied by facility (step-up/switching) substation = ± 3 ha
9.	Capacity of on-site substation	33/132 kV
10.	Area occupied by both permanent and construction laydown areas	▪ Construction laydown areas = ± 2 ha ▪ Operation & Maintenance infrastructure = ± 1 ha ▪ Total combined = ± 3 ha
11.	BESS Footprint	▪ BESS = ± 3 ha
12.	Buildings	▪ ± 3 ha Including Operational Control Centre, Operation and Maintenance Area / Warehouse / Workshop and Office, Ablution Facilities and Substation Building
13.	Length of internal roads	± 11 km
14.	Width of roads	▪ The internal roads = 12 m reserve and road width of 6 m. ▪ Access roads = 14 m reserve and road width of 8 m.
15.	Proximity to grid connection	Approximately 12.5 km 132 kV transmission line from PV Site to existing Eskom's Carmel Main Transmission Substation
16.	Height of fencing	± 3.5 m
17.	Type of fencing	Type will vary (e.g., welded mesh, palisade and electric fencing).

9.3.2 Project Layout

The overall layout of the Solar PV Plant is shown in **Figure 8** below. The desirability of the earmarked site for the development of the proposed Solar PV 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 connection**: The electricity generated by the Solar PV Plant will be injected into the existing Eskom 132 kV distribution system (refer to **Section 9.5** below). The PV Site is located relatively close to the Eskom grid. The final grid connection will be assessed in a separate application for Environmental Authorisation.
- **Extent of site**: The overall extent of the site is sufficient for the installation of the PV facility.
- **Site access**: Access to the Project is proposed off District Road 331 approximately 150m from the most southern border of Portion 2 of the Farm Rooipan No. 96. The exact location of the access point along the D331 is to be determined together with the road authority, ensuring that adequate sight distance and access spacing are adhered to. The internal access road will utilise an existing servitude right of way along the southern boundary of Portion 2 of Farm 96 for approximately 1km before following an existing internal road heading in a northerly direction for approximately 700m on Portion 1 of Farm No. 96 until it reaches the southern boundary of the Project.

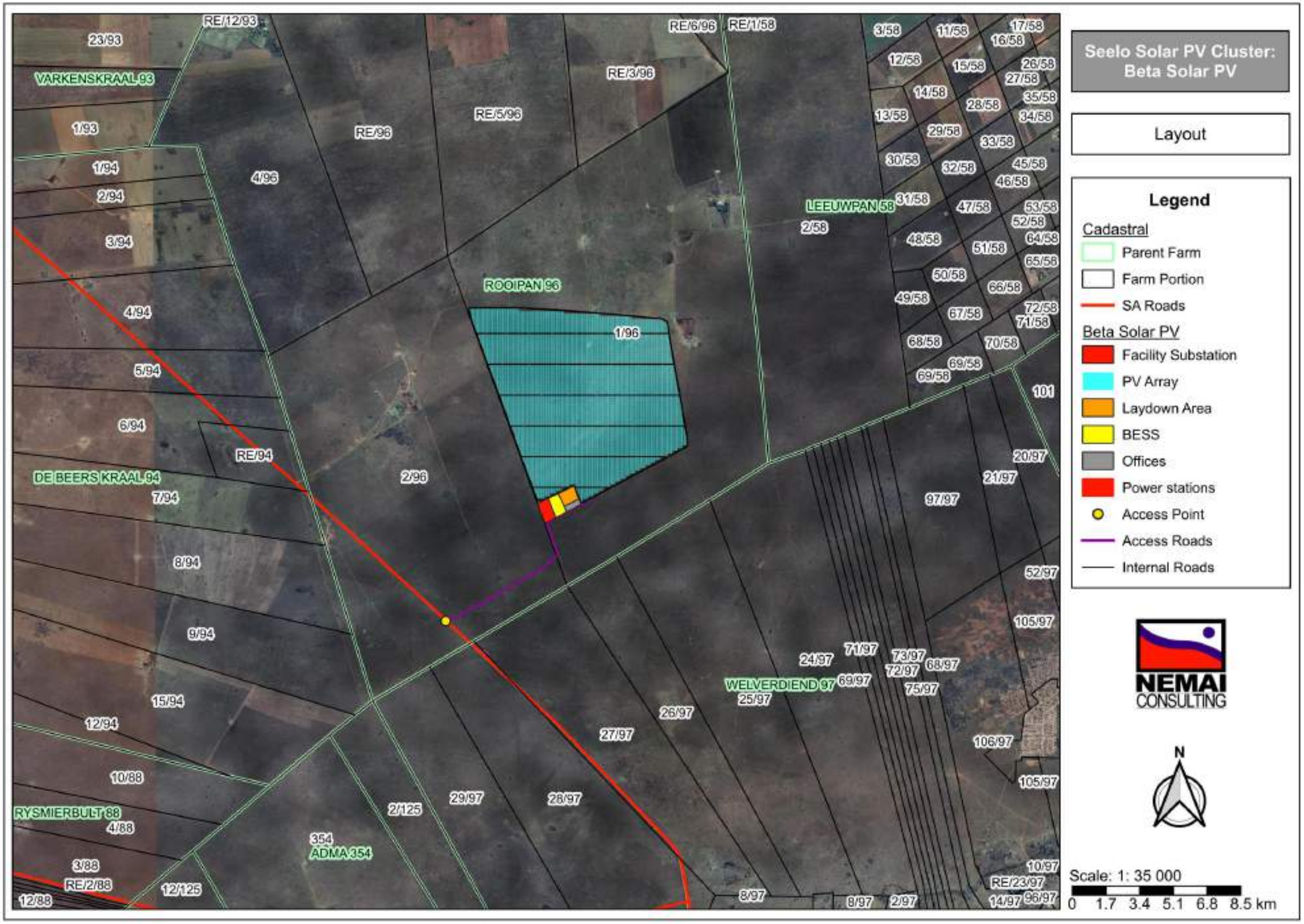

Figure 8: Proposed Layout of the Solar PV Plant (Orthophotograph)

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

- Requirements of the PV 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.

9.3.3 Components of the Proposed Solar PV Plant

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

- PV panel arrays, which are the subsystems which convert incoming sunlight into electrical energy;
- Mounting structures to support the PV panels;
- On-site inverters to convert DC to facilitate AC connection between the solar energy facility and electricity grid;
- BESS;
- IPP substation;
- Eskom switching substation[2];
- Cabling between the Project's components, to be laid underground (where practical);
- Administration Buildings (Offices);
- Workshop areas for maintenance and storage;
- Operational and Maintenance building;
- Temporary and permanent laydown areas;
- Internal access roads and perimeter fencing of the footprint;
- High Voltage (HV) Transformers; and
- Security Infrastructure.

The components of the proposed Solar PV Facility are discussed below.

9.3.4 Solar PV Panels/Modules

It is anticipated that the PV modules will be connected in series and parallel to form an array of modules, thus increasing total available power output to the needed voltage and current for a particular application. A PV module will be composed of interconnected solar cells that are encapsulated between a glass cover and weatherproof backing. The modules will be typically framed in aluminium frames suitable for mounting.

The PV modules will be mounted on high-rise or elevated structures that are either fixed, at a defined angle, or mounted to a single or double axis tracker to optimise electricity yield. The technology alternatives for the PV modules at this stage are under consideration. **Figure 9** below depicts the typical layout of a PV Facility.

[2] The dedicated grid connection for the proposed Project which includes a 132/33 kV switching substation which does not form part of the current application for EA.

Figure 9: Typical layout of a Solar PV Facility (PV Magazine, 2018)

9.3.5 Mounting Structures

Various options exist for mounting structure foundations, which include cast/pre-cast concrete foundations, driven/rammed piles, or ground/earth screws/augured piles. The foundation design will be governed by the supporting conditions and the applied loads: i.e., the site specific geotechnical and groundwater conditions, the PV module support structure and the selected PV technology (fixed or tracking).

9.3.6 Inverters

The inverter converts the direct current (DC) to alternating current (AC). The inverter and transformer are anticipated to be housed within the same inverter station housing (typically an insulated, steel-framed 6 m shipping container or small brick building). The transformers transform the low voltage AC from the inverter to medium voltage. The actual number of the required inverter stations for the proposed project will be determined prior to the commencement of the construction phase of the project. The inverters will vary in size and frequency depending on technology. Inverter stations will be installed in between the PV panel rows in a line inside the layout area at the end of each row, located on a concrete plinth. The proposed project will utilise either central inverter stations, string inverters or power transformers.

9.3.7 Cabling

The proposed facility grid connection infrastructure will include underground medium-voltage cabling between the project components and the facility substation. It is envisaged that the electrical cables will be installed using trenches that are excavated adjacent to the internal roads. The depth

of the cabling will typically be approximately 1000 mm below the ground but the exact depth should be established at the detailed design stage. The exact placement of the grid connection infrastructure will be available at the detailed design phase. A detailed layout map will be submitted to DFFE before construction commences, indicating the position of this infrastructure.

9.3.8 Substation

The IPP portion of the on-site 33 / 132 kV substation comprises an inverter (step-up facility) which converts power from DC to AC and will step up electrical current from 33 kV to 132 kV. The substation will consist of at least one (1) small building, outdoor electrical plant, equipment, and transformers. An ESKOM Switching Station will be constructed adjacent to the IPP Substation. The Switching Station will be permitted separately in a BA process that will be undertaken for the grid connection infrastructure associated with the solar PV facility. The combined development footprint of the IPP Substation and Eskom Switching Substation will be approximately 3 ha.

9.3.9 Guardhouses, Operation, Maintenance

Additional infrastructure is required in order to support the operations of a solar energy facility, as well as to provide services to personnel tasked with the operations and maintenance of a facility. Operations & Maintenance (O&M) Buildings typically include Offices, Operational and Control Centre, Workshop, Warehouse and Ablution Facilities.

9.3.10 Roads

Access to the Project is proposed off District Road 331 approximately 150m from the most southern border of Portion 2 of the Farm Rooipan No. 96 IQ. The exact location of the access point along the D331 is to be determined together with the road authority, ensuring that adequate sight distance and access spacing are adhered to. The internal access road will utilise an existing servitude right of way along the southern boundary of Portion 2 of Farm 96 for approximately 1km before following an existing internal road heading in a northerly direction for approximately 700m on Portion 1 of Farm No. 96 until it reaches the southern boundary of the Project.

The internal road layout is dependent on the PV module layout, however, it is anticipated that a network of gravel internal access roads (each with a width of up to 6m) will be required to access the PV modules for cleaning and maintenance that may be required during operational phase.

It is proposed that cut-off trenches and side drains along roads be constructed to intercept the surface flow and redirect it away from the project infrastructure. In addition, infiltration trenches and retention areas may be required to attenuate the surface flow and recharge groundwater on the project site.

9.3.11 Fencing, Security and Lighting

It is planned that the site will be cordoned off and fenced during both the construction and operational phases. This is likely to entail the establishment of an electrified fence which will remain in situ for the lifetime of the project (i.e. for the operational phase). For the construction phase, the construction area and construction site camp may also be cordoned off with temporary fencing. The fencing is expected to be approximately 3,5m in height.

9.3.12 Stormwater Infrastructure

Cut-off trenches and side drains along roads will be required to intercept the surface flow and redirect it away from the project infrastructure. Infiltration trenches and retention areas may be required to attenuate the surface flow and recharge groundwater on the project site.

9.4 Battery Energy Storage System (BESS)

The Battery Energy Storage System (BESS) allows for the storage of surplus energy generated by the solar PV facility for later use. The BESS enables a balance between supply and demand of electricity during the day and uses the stored energy during peak demand periods (i.e., morning and evenings). Energy generated from the PV panel array is a DC and is converted to an AC by the inverters and then transferred to the onsite substation where it is determined if the energy should be stored or evacuated. When the energy is required, it is evacuated into the grid network. Should the energy not be required, it is transferred to the BESS and stored for later use. A BESS typically either consists of stacked containers or a multistorey building with a maximum height of 8 m and will have a footprint of up to 3 ha.

9.5 Grid Connection

It is proposed that a 33/132 kV substation is constructed, hereafter referred to as the IPP substation, which will include inverter-stations, transformers, switchgear and internal electrical reticulation. It is estimated that the maximum size of the facility substation will not exceed 1.5 hectare (ha). The electricity generated will be transmitted to the Eskom switching substation located immediately adjacent to the IPP substation. Thereafter, the generated electricity is expected to be transmitted with a 132 kV Overhead Power Line to connect to the existing Carmel Main Transmission Substation, or other substation as directed by available capacity. The location and installation of the 132 kV line is subject to a separate application process for EA.

9.6 Project Life-Cycle

The project life-cycle for a typical Solar PV 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 PV Plant and BESS;
  - 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 plant is up and running the facility will be largely self-sufficient. Operational activities associated with the maintenance and control of the Solar PV 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 –

PV panels are guaranteed to produce at least 80% of their rated power for 20 to 30 years. In practice, PV panels will perform satisfactorily well beyond this timeframe. At the end of the 20-30 year lifespan, two scenarios exist for the PV 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 PV facility will be decommissioned after 30 years. Instead, the facility will continually be reconditioned as the PV panels are recycled and replaced with more advanced technology as it becomes available. In the event that the 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.

9.7 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.

9.7.1 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.

9.7.2 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. The necessary negotiations will be undertaken with the landowners or the Municipality to obtain water from approved sources.

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 PV collection surfaces like PV panels, as well as for domestic consumption by the staff.

Water for use during the operational phase will either be sourced from the local Municipality, a third-part supplier or from an onsite borehole.

9.7.3 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

Sewage from the buildings and toilets across the site will be discharged into various septic tank systems. The soakaway systems will be designed with sufficient spare capacity to accommodate the possibility of excessive usage above the anticipated average. This option is the most cost-effective system for this Project. It is to be considered that a well-constructed and maintained septic tank should be odourless and problem free.

Should the receiving environment be regarded as sensitive, then the use of honey sucker services from an independent contractor will be considered.

9.7.4 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.

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

General and hazardous waste generated during the operational phase will be removed by an appointed registered waste management company and will be disposed of at licenced waste disposal sites.

9.7.5 Roads

Construction

There will be no temporary access roads during construction.

Operation

Access to the Project is proposed off District Road 331 approximately 150m from the most southern border of Portion 2 of the Farm Rooipan No. 96 IQ. The internal access road will utilise an existing servitude right of way along the southern boundary of Portion 2 of Farm 96 for approximately 1km before following an existing internal road heading in a northerly direction for approximately 700m on Portion 1 of Farm No. 96 until it reaches the southern boundary of the Project.

9.7.6 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.

9.7.7 Electricity

Construction

The EPC Contractor will be responsible for the supply of electricity during construction. The electricity supply will be obtained from either a small-scale solar system, diesel generators or temporary supply via cables from the existing Eskom supply that is available on the site.

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 early morning and early 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.

9.7.8 Laydown Areas

Construction

A laydown area for the PV footprint will be required during the construction phase and is demarcated in the layout drawing (refer to **Figure 8** above).

9.7.9 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

The selected PV Site was identified through a prefeasibility study/screening process which took into consideration a set of location factors. The location factors which favour the selected PV site include:

- Suitable solar irradiation levels;
- Proximity to and availability of grid connection point. Many areas in South Africa do not have available generation connection capacity of the transmission network. The site is located approximately 13km from a grid connection point that has confirmed capacity to evacuate the electricity generated;
- Flat topography;
- Low agricultural sensitivity;
- Suitable site access; and
- Availability of the particular property for the development of a PV facility.

As a process was followed to identify the site for the proposed PV facility based on the application of the above location factors, alternative sites are not proposed for this project.

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 proposed by the Applicant (refer to **Figure 8** above). Through the environmental screening process and with input from specialists, no environmental sensitivities were identified for the project site. Therefore, currently one layout alternative is presented for inclusion in the study.

10.4 Technology Alternatives

10.4.1 PV Technology

Very few technological options exist as far as PV technologies are concerned; those that are available are usually differentiated by climatic conditions that prevail. The impacts of the different PV technologies on the environment are very similar. The construction, operation and decommissioning activities associated with the facility will all be the same, irrespective of the chosen technology. Both technology alternatives are considered reasonable and relevant to this application, based on the current technology available and potential engineered simplification of solar tracking systems in the coming years.

The Fixed and Tracking PV panel technologies are both considered for the proposed Solar PV Facility. The different solar PV panel technologies are briefly discussed in the following sub-headings:

- Fixed / mounted PV panels; and
- Tracking PV panels (these solar panels rotate to follow the sun's movement/trajectory).

10.4.1.1 Fixed Mounted PV System

In a fixed mounted PV System (**Figure 10**), the PV panels are installed at a pre-determined angle from which they will not move during the lifetime of the plant's operation. The limitations imposed on this system due to its static placement are countered by the fact that the PV panels are able to absorb incident radiation reflected from surrounding objects. In addition, the misalignment of the angle of the PV panels have been shown to only marginally affect the efficiency of energy collection. There are advantages which are gained from fixed mounted systems, and includes the following:

- The maintenance and installation costs of a fixed mounted PV system are lower than that of a tracking system, which is mechanically more complex given that these PV mountings include moving panels;
- Fixed mounted PV systems are an established technology with a proven track record in terms of reliable functioning. In addition, replacement parts are able to be sourced more economically and with greater ease than with alternative systems; and,
- Fixed mounted systems are robustly designed and able to withstand greater exposure to winds than tracking systems.

A typical fixed structure will have two rows of twenty (20) modules (2 strings). The modules are placed in portrait arrangement. The foundation technology is usually a direct-driven (rammed) installation, with a ramming depth subject to the soil characteristics, or reinforced concrete strip footings.

Figure 10: Fixed Solar PV Panels

10.4.1.2 Dual Axis Tracking System

In a dual axis tracking system, PV panels are fixed to mountings which track the sun's trajectory. There are various tracking systems namely a single axis tracker or a dual axis tracker. A 'single axis tracker' will track the sun from east to west, while a 'dual axis tracker' will in addition be equipped to account for the seasonal waning of the sun. These systems utilise moving parts and complex technology, including solar irradiation sensors to optimise the exposure of PV panels to sunlight. Tracking systems are a new technology and, as such, are more complex to operate in South Africa. This is due to:

- A high degree of maintenance is required due to the nature of the machinery used in the system, which consists of numerous components and moving parts. A qualified technician is required to carry out regular servicing of these tracking systems, which are normally located in remote areas;
- The cost of the system is necessarily higher than a fixed mounted system due to the maintenance required for this system and given that separate mountings need to be placed apart from one another to allow for their tracking movement; and,
- A power source is needed to mechanically drive the tracking system and this would offset a certain portion of the net energy produced by the plant.

However, the additional improvements in capacity factor and efficiency may make a tracking system attractive despite these challenges. This can only be determined with a financial model during the more detailed design phase of the project.

10.4.2 BESS Technology

As technological advances within battery energy storage systems (BESS) are frequent, two BESS technology alternatives are considered namely, solid state battery electrolytes and redox-flow technology.

10.4.2.1 Solid State Batteries

Solid state battery electrolytes, such as lithium-ion (Li-ion), zinc hybrid cathode, sodium ion, flow (e.g. zinc iron or zinc bromine), sodium sulphur (NaS), zinc air and lead acid batteries, can be used for grid applications. Compared to other battery options, Li-ion batteries are highly efficient, have a high energy density and are lightweight. As a result of the declining costs, Li-ion technology now accounts for more than 90% of battery storage additions globally (IRENA, 2019).

These energy storage units come in a range of containerised systems with size categories from 500 kWh to 4 MW. The total footprint area required for the containerised systems to accommodate the 240 MW project with this type of battery is approximately 3 ha.

Solid state batteries consist of multiple battery cells that collectively form modules. Each cell contains an anode, cathode and a solid electrolyte. Modules are usually assembled within shipping containers and delivered to the site. Multiple containers will be required. The container unit dimensions are approximately 17 m long, 3.5 m wide, and 4 m high. Containers will be placed on a raised concrete plinth (300 mm) and may be stacked on top of each other to a maximum height of approximately 8 m. Additional instrumentation, including inverters and temperature control equipment, may be positioned between the battery containers (see **Figure 11** below).

Figure 11: Typical illustration of a Battery Energy Storage System Technology

Considering the nature of the project, a solid-state technology type is envisaged for the proposed technology. The technology includes batteries housed within containers which are fully enclosed

and self-contained. Therefore, the assessment proposes all solid-state technologies for authorisation to allow the precise technology to be selected when the project is implemented, on the understanding that further investigation into the specific technologies available at the time of being awarded preferred bidder status will allow for one of two to be selected and ultimately developed.

A lithium-ion (Li-ion) battery is a rechargeable electrochemical battery operating on a wide array of chemistries where lithium ions are transferred between the electrodes during the charge and discharge reactions (Parsons, 2017).

A Li-ion cell is comprised of three main components; cathode and anodes electrodes, and an electrolyte that allows lithium ions to move from the negative electrode to the positive electrode during discharge and back when charging (**Figure 12**) (Parsons, 2017). While charging, lithium ions flow from the positive metal oxide electrode to the negative graphite electrode which is reversed during discharge (i.e. ion flow is in the opposite direction).

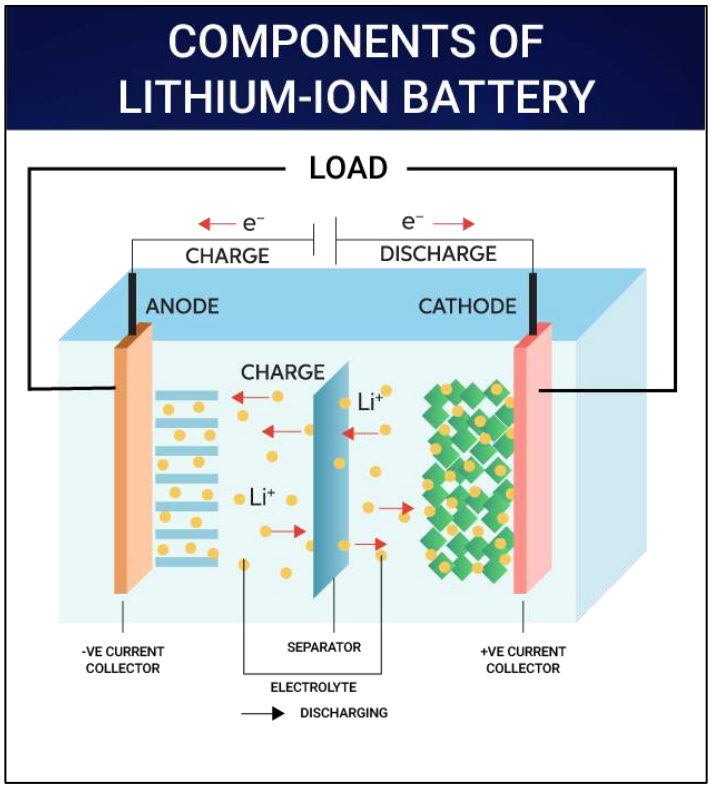

Figure 12: An example of a LI-ION Cell and its components
(https://esmito.com/blog/lithium-ion-batteries.html)

Li-ion battery cells contain two reactive materials which are capable of electron transfer chemical reactions (commonly a lithium source cathode and a graphite anode). A Li-ion battery comprises one or more power generating blocks called cells. A battery has the following main components: cathode (positive electrode), anode (negative electrode), electrolyte, separator, positive terminal (positive current collector) and negative terminal (negative current collector). The anode and cathode store the lithium and the electrolyte carries positively charged lithium ions from the anode

to the cathode and vice versa through the separator. The movement of the lithium ions creates free electrons in the anode which creates a charge at the positive terminal. The electrical current then flows from the current collector through a device being powered to the negative terminal. The separator blocks the flow of electrons inside the battery.

While the battery is discharging and providing an electric current, the anode releases lithium ions to the cathode, generating a flow of electrons from one side to the other. When plugging in the device, the opposite happens: Lithium ions are released by the cathode and received by the anode. Li-ion batteries initially got popular in consumer electronics industry because of their rechargeable quality. Today, they have become a standard for any device that needs a rechargeable battery. With their high energy density feature, they are revolutionizing the electrical vehicles as well. Li-ion batteries can work under different conditions that include very low as well as very high temperature, high as well as low drain, and for shock and vibration tolerant environments. First, Li-ion batteries are capable of packing huge amounts of power. They have one of the highest energy densities among different battery types, in the range of 100 – 200 Watt-hour / kg (Estimo, 2021).

Li-ion batteries utilise both lithium and a heavy metal (commonly cobalt or manganese) in the reactions required for energy storage, resulting in environmental impacts during the preconstruction phases of the technology (i.e. supply chain impacts). Lithium can however be recycled, adding the future potential use of this battery technology, however the recycling process is difficult and expensive.

The high round-trip efficiency (the fraction of energy put into the storage that can be retrieved), high power and energy density of this technology provide a significant advantage where a small footprint and available space are an issue. A significant disadvantage to Li-ion has been the high initial cost, as well as the limited cycle lives produced by earlier (historical) chemistries used in the battery (Parsons, 2017). Regardless, recent technological advances and large-scale manufacturing have reduced the price drastically and increased performance, with the result that Li-ion batteries are expected to be an important BESS through to 2030 in both small- and large-scale applications.

10.4.2.2 Flow Batteries

Flow-battery technologies provide alternative means for power smoothing through on-site battery storage. For this technology, energy is stored as an electrolyte in the flow cells. Options include Sodium polysulfide/bromine (PSB) flow batteries, Vanadium Redox (VRB) flow batteries, and Zinc-Bromine (ZNBR) flow batteries which would be contained in small bunded areas. The footprint of a Redox Flow Battery (RFB) system is approximately 150 m x 100 m, with a height of 8 m. For this technology, energy is stored as an electrolyte in the flow cells. The system consists of two electrolyte storage tanks that are contained within a 2.5 m high berm wall, which prevents leakage of the electrolyte chemical into the surrounding environment.

With a simple flow battery, it is straightforward to increase the energy storage capacity by increasing the quantity of electrolyte stored in the tanks. The electrochemical cells can be electrically connected in series or parallel, so determining the power of the flow battery system. They store and release energy through a reversible electrochemical reaction between two electrolytes (chemical reactants), which are separated by a membrane through which charging, and discharging occurs. These batteries provide an energy output greater than or equal to lead acid batteries, and their storage capacity is dependent upon the size of the electrolyte tanks while the power output is dependent on the size of the reaction stack (Parsons, 2017).

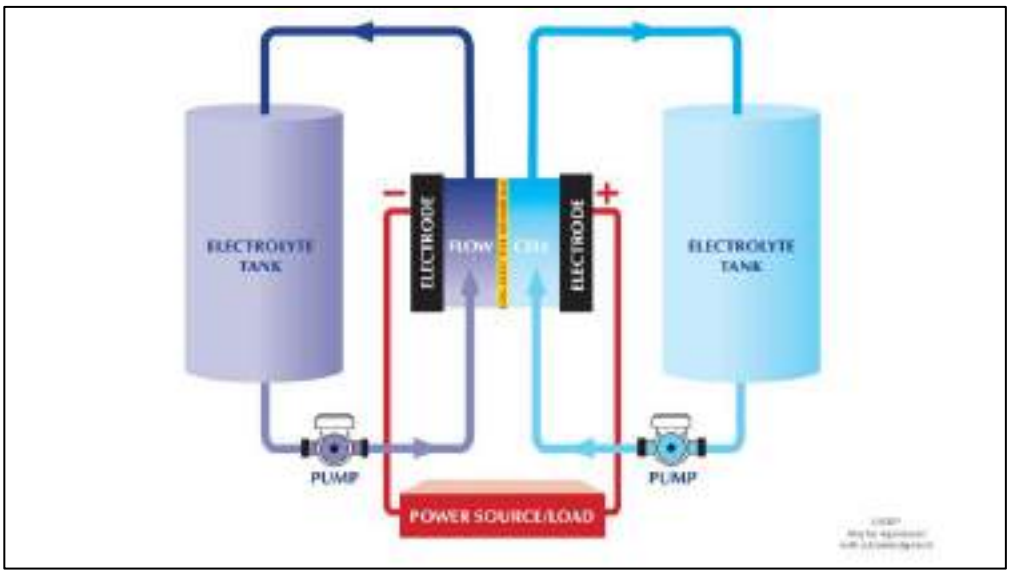

Figure 13: An example of a Flow Battery and its components
(https://flowbatteryforum.com/what-is-a-flow-battery/)

Flow batteries (**Figure 13**) are a technology of battery which requires mechanical systems (pumps, pipes, and tanks) and are therefore inherently more complex than a solid-state battery (for example, lithium-ion, lead or advanced lead acid batteries discussed above). The greatest advantage these batteries exhibit is their scalability and their longer duration discharge cycles which are more cost efficient when compared to solid-state batteries (Parsons, 2017). The most successful and widespread of these batteries use vanadium and zinc-bromine chemistries.

Redox Flow Batteries (RFB) are a class of electrochemical energy storage technology which entail a chemical reduction and oxidation reaction that stores energy in liquid electrolyte solution flowing through a battery of electrochemical cells during charge and discharge. They are therefore a subset (or one variant) of flow batteries and essentially work by two separate containers of dissolved chemical components, separated by a membrane, which facilitate ion exchange (and thus the resulting flow of electric current) across the membrane when an electrical load is applied to the system. These batteries may act as a fuel cell, where spent electrolyte solution is exchanged once no longer effective, or rechargeable, where regeneration may be achieved by applying a source of electricity to the electrolyte). The energy capacity of this battery is a function of the volume of the electrolyte solution, allowing for a high degree of scalability.

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. The study area includes the entire footprint of the Project.

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 and Land Cover

The Project is located approximately 15km north west of the central business district of Carletonville and falls within Ward 28 of the JB Marks Local Municipality (JBMLM), in the North West Province. The Project Site is vacant and was historically used for agricultural purposes.

Agriculture is the dominant land use in the Project area. The following land uses are encountered around the Project's PV Site:

- Farming activities on the property and surrounding properties;
- The Abe Bailey Provincial Nature Reserve is located 0.5 km south of the site; and
- The National Road (N14) is located approximately 10km north of the site which provides regional access to the area.

In terms of land cover, the project site consists of natural grassland and fallow lands/old fields that were converted back to grassland.

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 mean minimum and maximum temperatures for the project area over the year are shown in **Figure 14** below. The warmest month, on average, is January with an average high of 27°C and low of 16°C. The coolest month on average is July, with an average low of 2°C and high of 18°C.

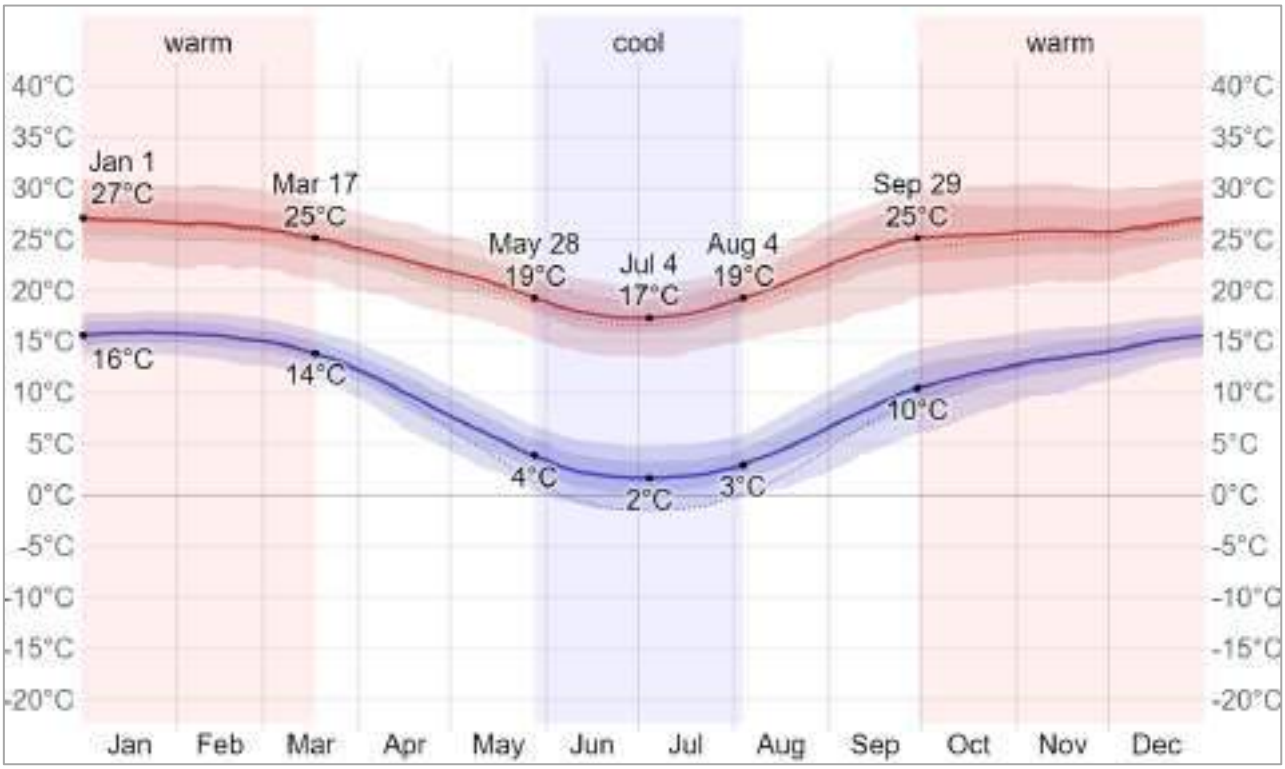

Figure 14: Average minimum and maximum temperatures (Weatherspark, 2023)

The mean monthly precipitation over the year is shown in **Figure 15** below. The average annual precipitation 531 mm.

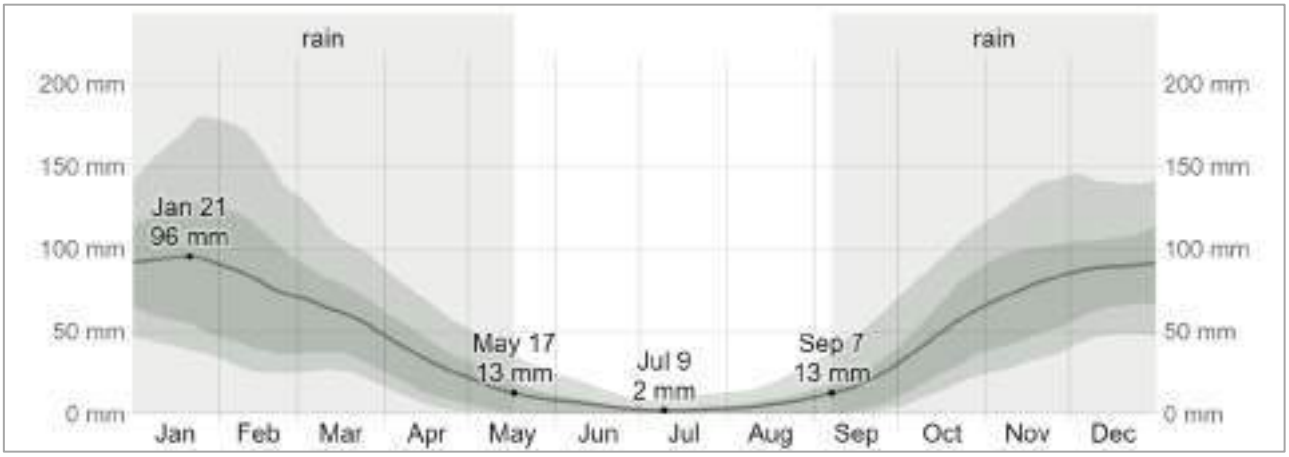

Figure 15: Average monthly precipitation (Weatherspark, 2023)

11.4 Geology and Soils

According to the 2626 West Rand – 1:250 000 Geological map series, the Project Area is underlain by the Malmani dolomites (see **Figure 16** below). The lithology for the Malmani dolomites is predominately calcareous rocks which consist of limestone, dolomite and calcarenite and forms part of the Chuniespoort Group and the Transvaal Supergroup. The Malmani dolomites comprise a succession of stromatolitic carbonate rocks, with interbedded chert and subordinate shale and quartzite, occurring throughout the Transvaal basin.

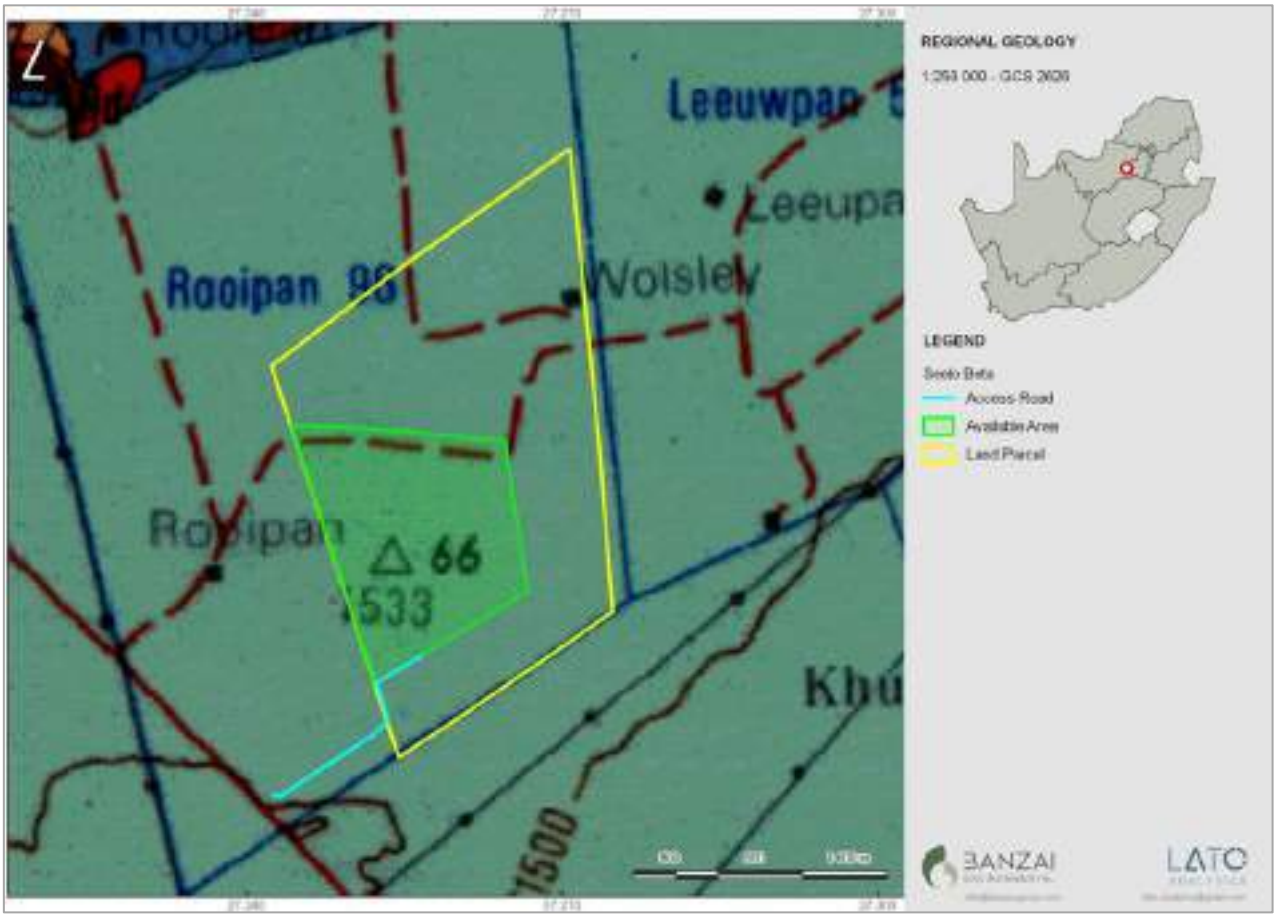

Figure 16: Extract of the 1:250 000 West Rand 2626 (1986) Geological Map indicating that the proposed development site is underlain by the Malmani Subgroup (Butler, 2023)

The underlaying geology of the study area supports mostly shallow Mispah and Glenrosa soil forms. Deeper red to yellow apedal soils (Hutton and Clovelly soil forms) occurs sporadically (Mucina & Rutherford, 2006). Refer to **Figure 17** below for the soil classes associated with the project site.

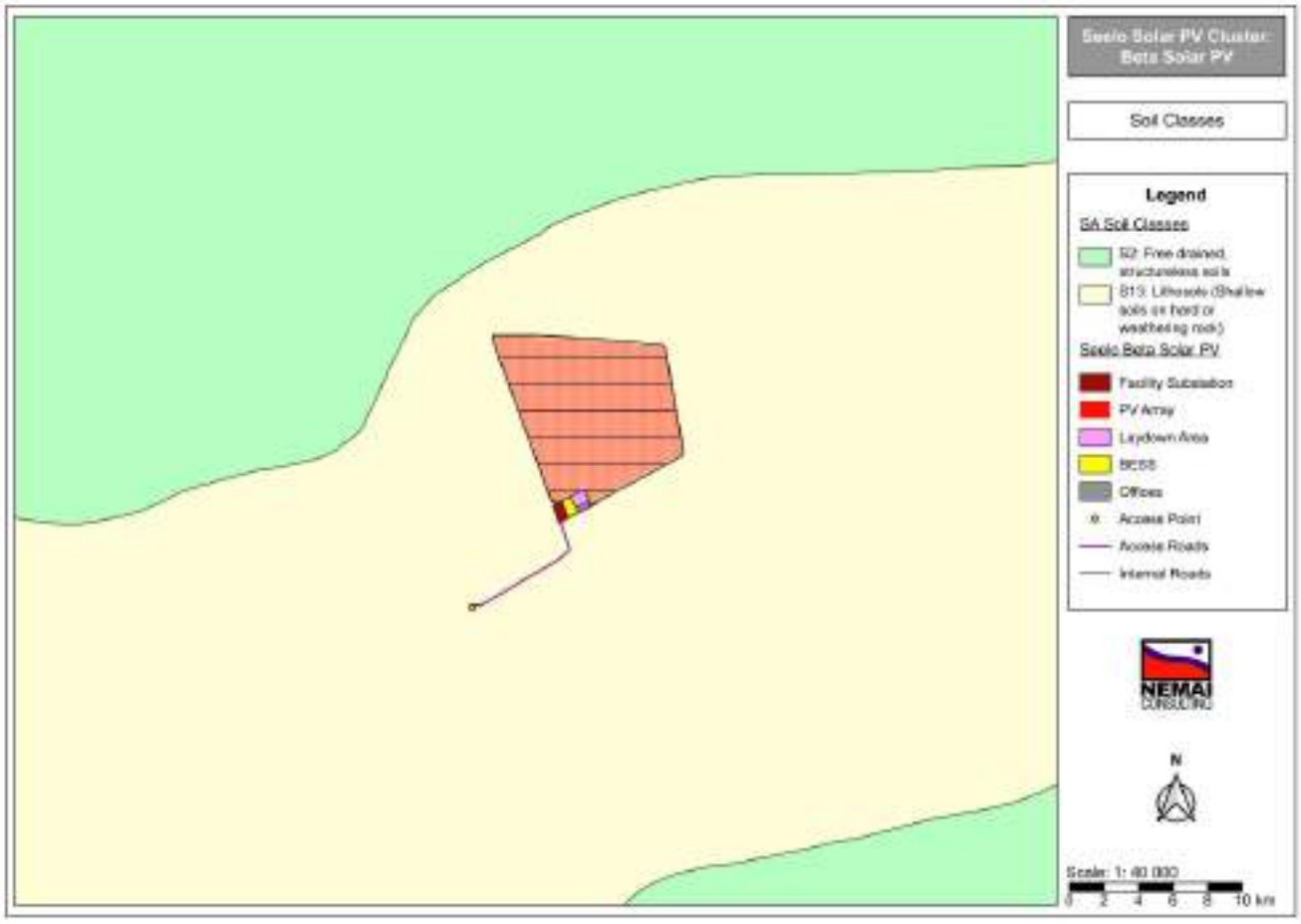

Figure 17: Soil classes.

11.5 Geohydrology

The aquifers underlaying the site area are categorised as most vulnerable. Aquifer vulnerability indicates the tendency for contamination to reach the groundwater system after introduction to a location above the uppermost aquifer. As such, this aquifer is susceptible to contamination from pollutants that are continually discharged or leached.

The site lies within a Strategic Water Source Area (SWSA), which represents an area with high groundwater availability as well as where this groundwater forms a nationally important resource. The site overlays a combination of 25% karst and 75% fractured aquifer type. The karst aquifer yields 0.1 – 0.5 ℓ/s and the fractured aquifer yields 2.0 – 5.0 ℓ/s. The water yield delivered by the fractured aquifer indicates that there is potential for economic quantity yields.

11.6 Topography

The proposed site ranges from approximately 1530 to 1510 metres above mean sea level (mamsl), with a relatively steep slope (decrease in elevation slope) towards the south-southeast and south southwest. The topography or terrain morphology of the region is broadly described as plains with low to moderate 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 18** below for the landform encountered over the PV site.

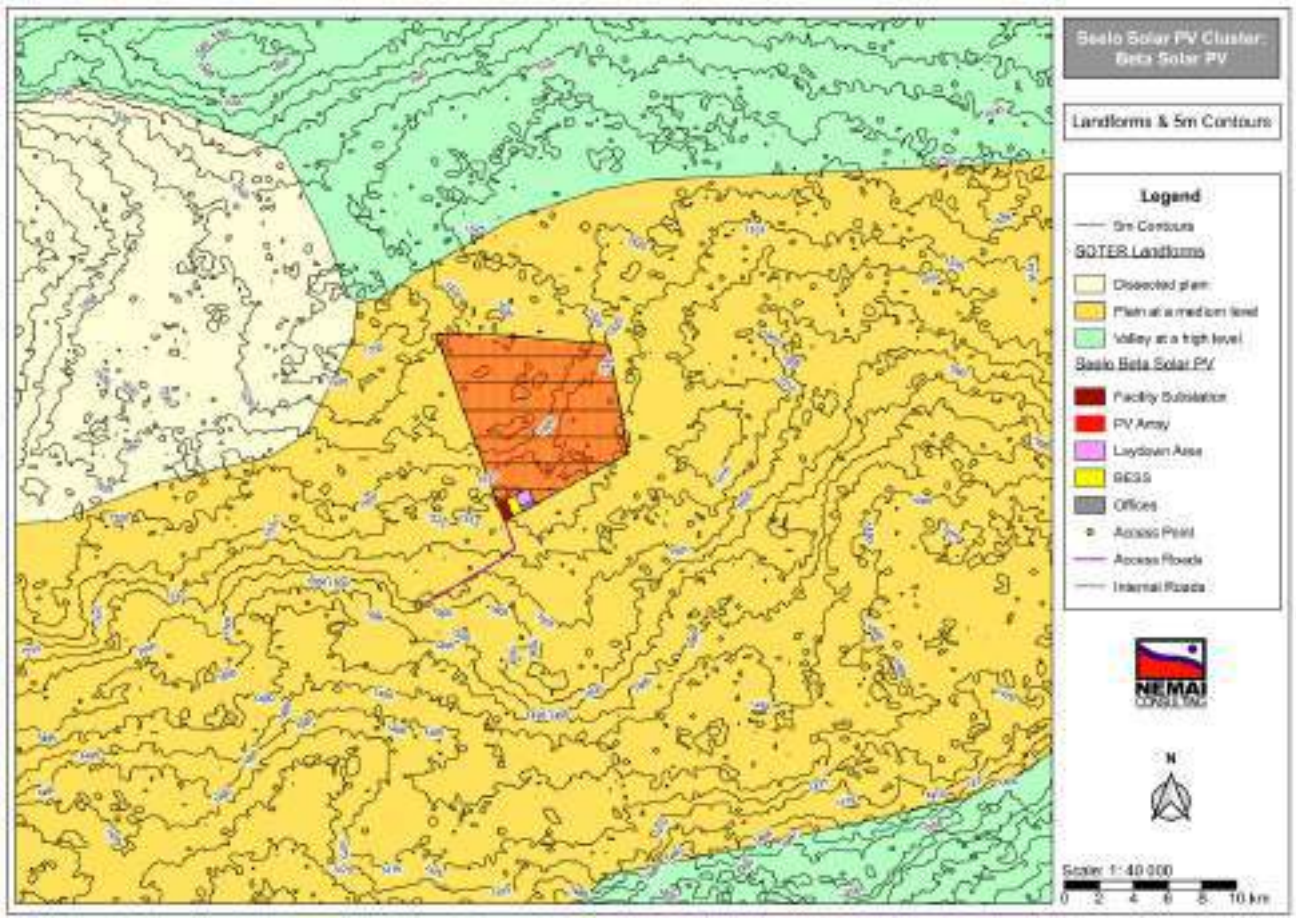

Figure 18: Landforms associated with the project site.

11.7 Surface Water

The Project Area is situated on the border of two Quaternary Catchment areas (C23E and C23G), which falls within the upper Vaal Water Management Area (WMA) (refer to **Figure 19** below). The major rivers found within these sub-catchments are the Vaal and Mooi rivers. Smaller tributaries include the Mooiriverloop and Loopspruit. The project site is located ± 5.45 km north of the perennial Mooirivierloop. Drainage from the proposed development site is via free overland flow towards the Mooirivierloop in a southern direction. No non-perennial rivers are situated in close proximity of the project site.

According to the National Biodiversity Assessment (NBA) National Wetland Map (NWM) 5 spatial data, two small depressions are located in the northern portion of the project site (refer to **Figure 20).** Further to this, the development site is not located within any Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) as per the North West (NW) Biodiversity Sector Plan (**refer to Figure 21).**

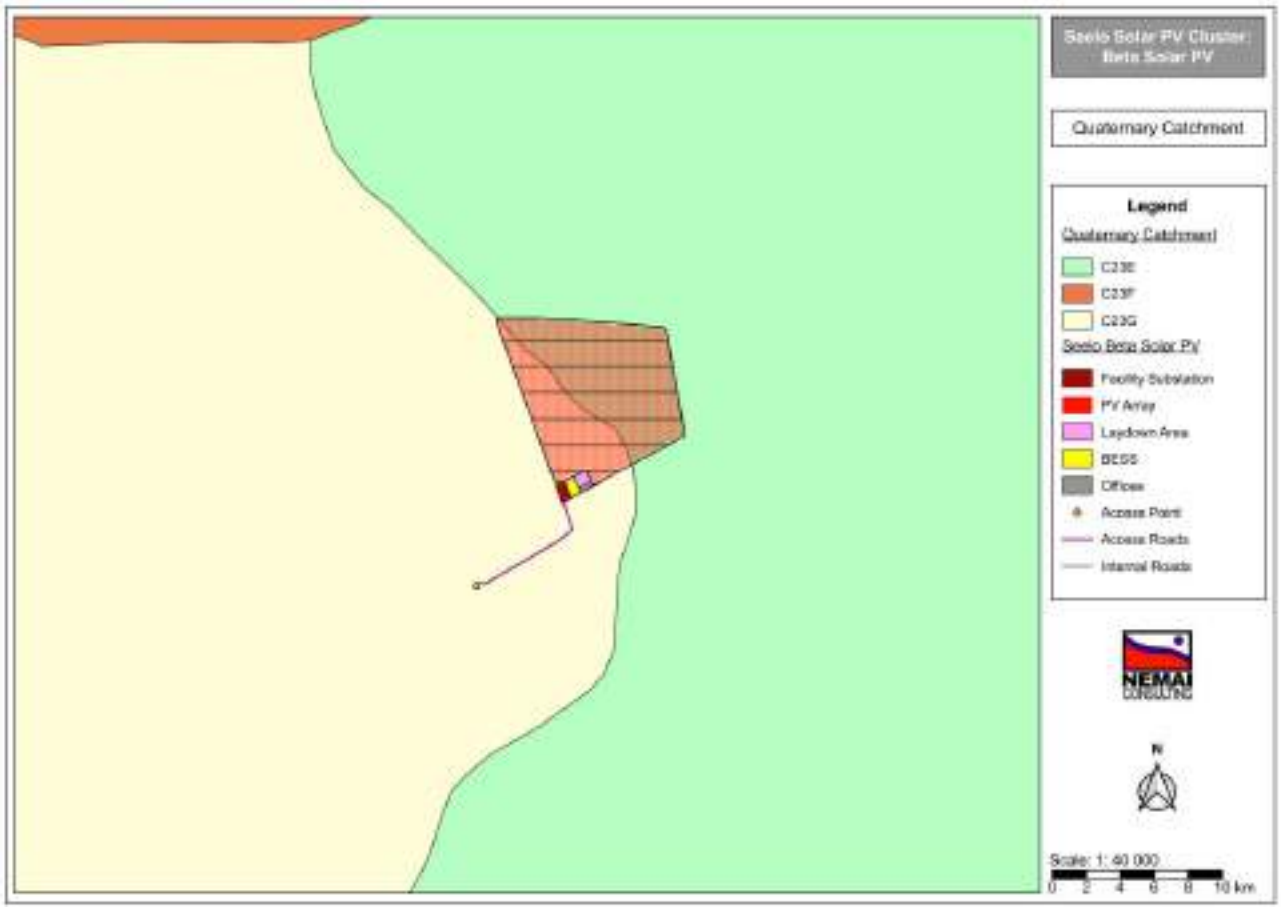

Figure 19: Quaternary catchment map.

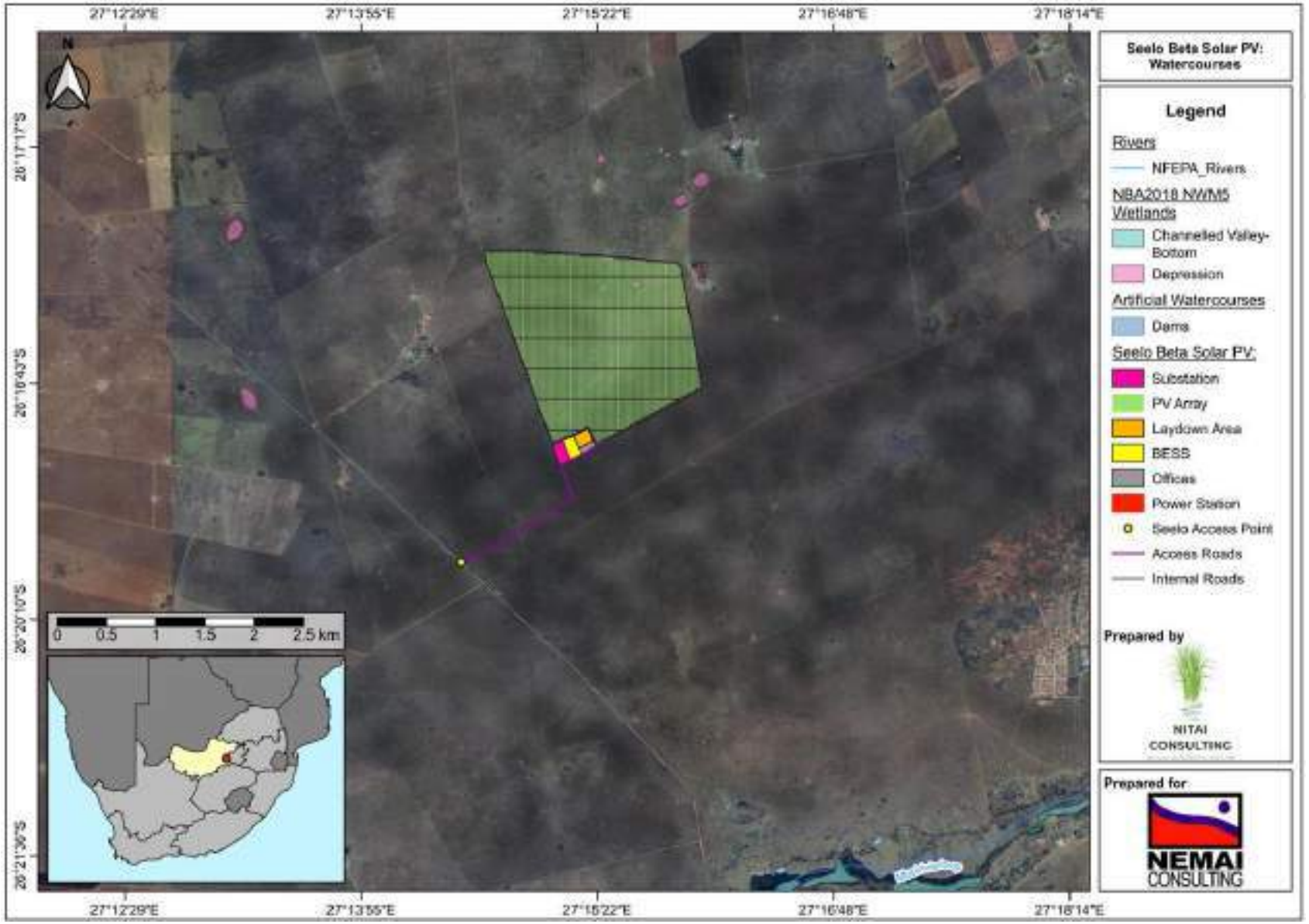

Figure 20: Watercourses associated with the project site (Van Rooyen, 2023).

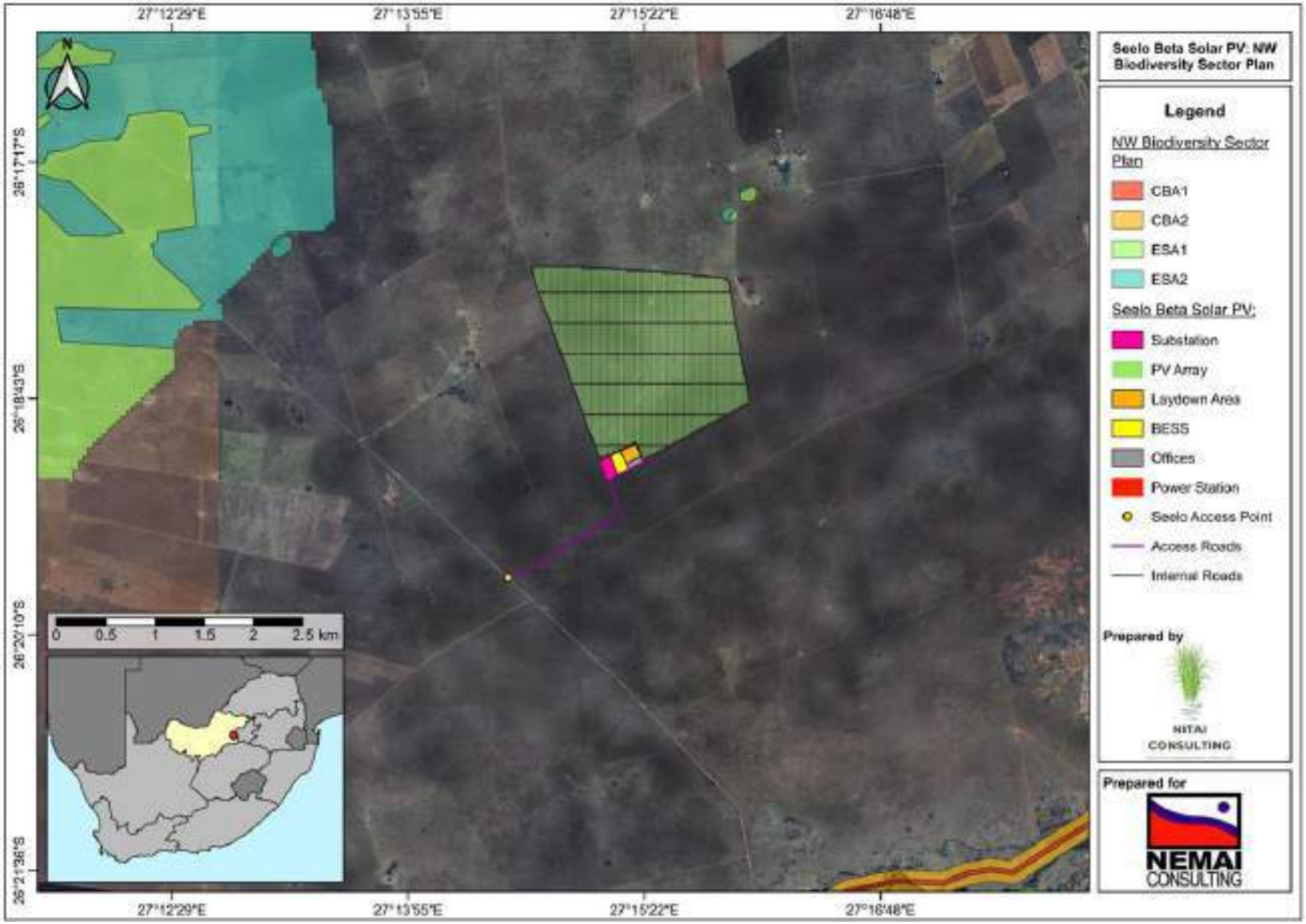

Figure 21: Critical Biodiversity Areas and Ecological Support Areas associated with the project site (Van Rooyen, 2023).

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 does not fall in any CBAs or ESAs (refer to **Figure 22** below).

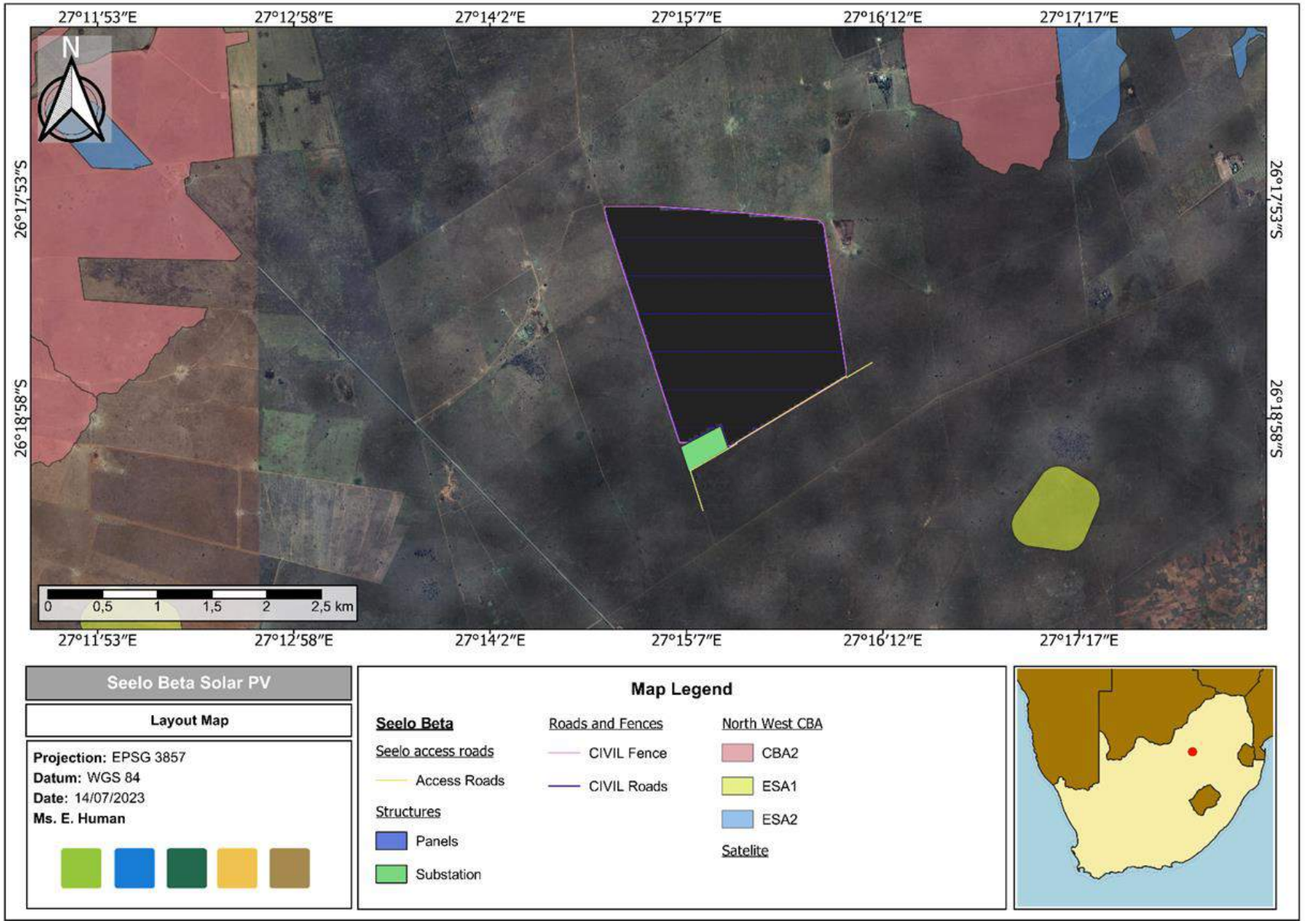

Figure 22: Map illustrating the locations of CBAs and ESAs relative to the project area (Human, 2023).

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 23** below).

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 24** below).

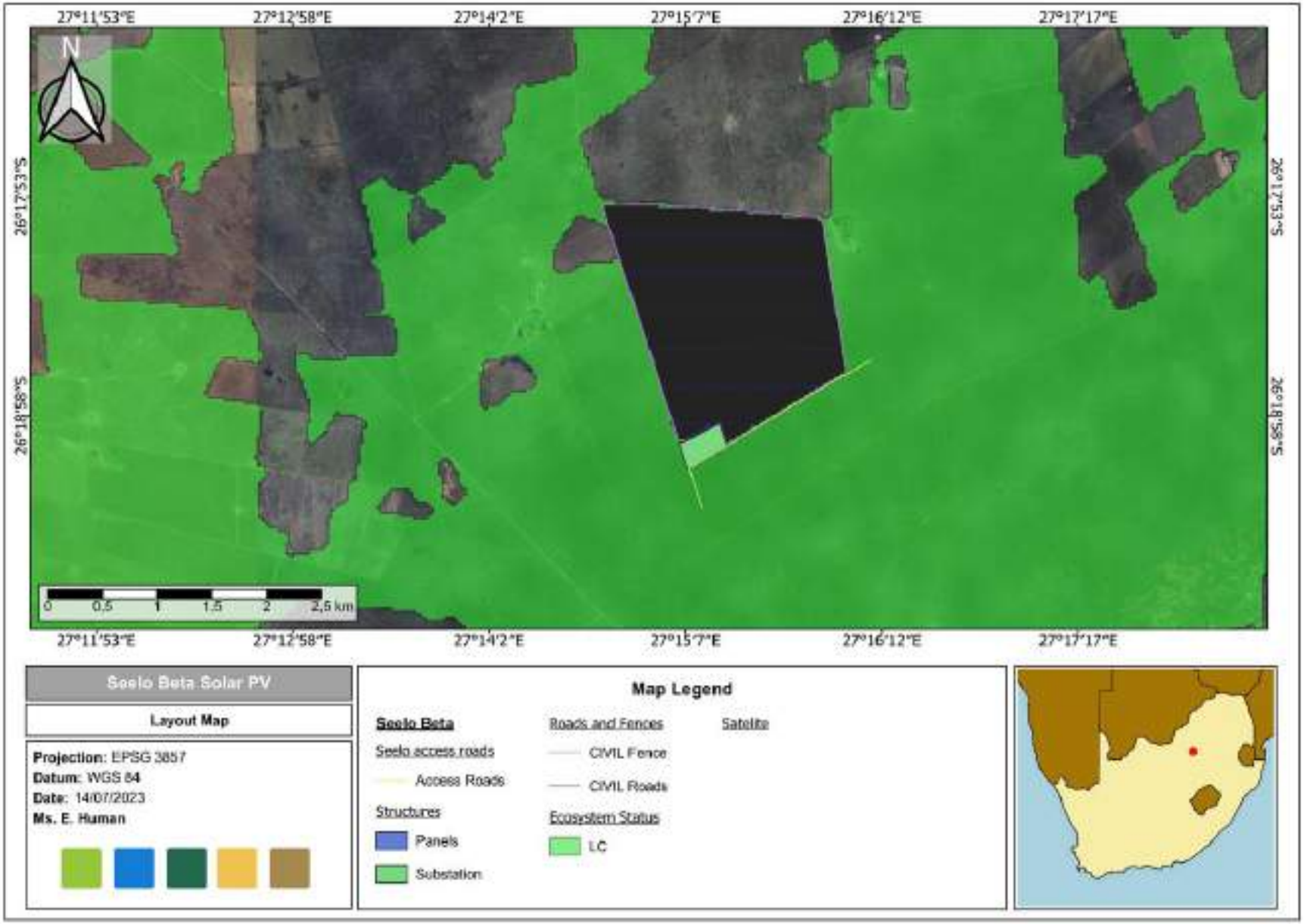

Figure 23: Ecosystem threat status associated with the Project Area (Human, 2023).

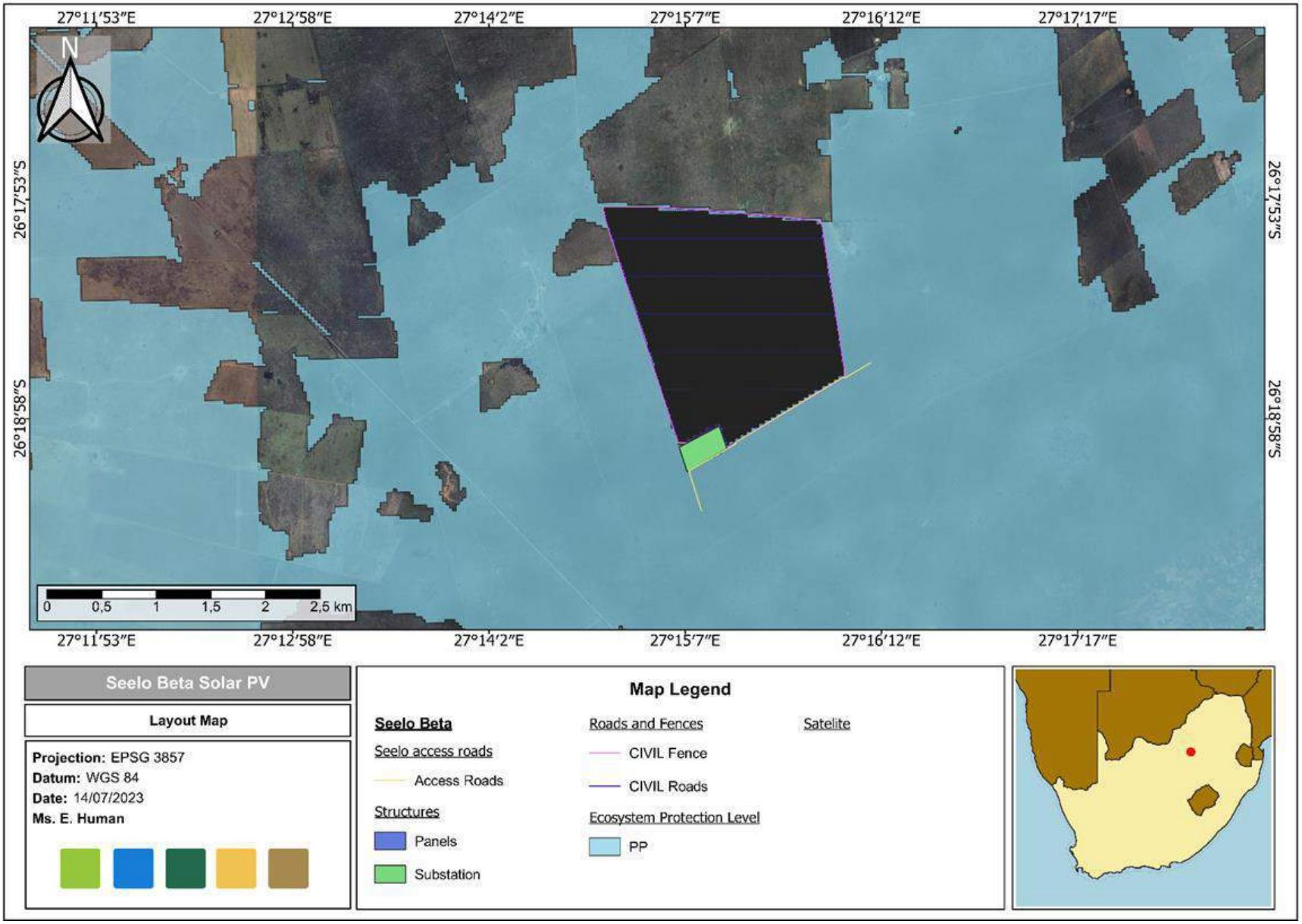

Figure 24: Ecosystem protection status of the Project Area (Human, 2023).

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 Project Area is located within ±12 km from the Fred Coetzee Private Nature Reserve and the Somerville Private Nature Reserve (refer to **Figure 25** below).

11.8.4.2 National Protected Area Expansion Strategy

The Department of Environmental Affairs (now the Department of Forestry, Fisheries and the Environment) led the development of the National Protected Areas Expansion Strategy (NPAES) in consultation with the protected area agencies and other key private and public sector stakeholders. The need for the development of the NPAES was established in the National Biodiversity Framework in 2009. The NPAES is a 20-year strategy with 5-year implementation targets aligned with a 5-year revision cycle. (DEA, 2016).

South Africa's protected area network currently falls far short of representing all ecosystems and maintaining healthy functioning ecological processes. In this context, the goal of the NPAES is to achieve cost effective protected area expansion thus enabling better ecosystem representation, ecological sustainability, and resilience to climate change. A comprehensive set of priority areas was compiled based on the priorities identified by provincial and other agencies in their respective protected area expansion strategies. These focus areas are generally large, intact and unfragmented and are therefore of high importance for biodiversity, climate resilience and freshwater protection (DEA, 2016).

The project area does not overlap with priority focus areas for expansion according to the 2016 NPAES dataset but is within 1 km of a Protected area (Abe Bailey Nature Reserve[3]) (refer to **Figure 26** below).

11.8.4.3 Buffer Zone applicable to the Abe Bailey Nature Reserve

The Abe Bailey Nature Reserve is located within the Gauteng Province on the western border with the North West Province. All level 1 and 2 protected areas in Gauteng must be protected by a 1km buffer zone to filter out deleterious edge effects. Buffer zones are also valuable in providing more landscape needed for ecological processes such as fire. The first 300m of this buffer zone must be protected from transformation and is designated as a minimal use zone. Only grazing (wildlife and livestock) and low-impact tourism and residential developments (footprint <5%of the property) are considered appropriate land uses in the minimal use zone. Subdivision should not be allowed in the minimal use zone.

[3] Note that the Abe Bailey Nature Reserve is not a proclaimed protected area in terms of the National Environmental Management: Protected Areas Act, 2003 (NEMPPA) (as amended).

The remaining 700m of the buffer zone (i.e., up to 1km away from the protected area) is designated as a medium use zone. Appropriate land uses in the medium use zone include agriculture (excluding piggeries, chicken batteries and feedlots), game farms, residential and tourism-related developments associated with 80% open space, roads, railways, powerlines, pipelines, masts, cell phone towers and cemeteries. Inappropriate land uses include industry, open cast mining, landfills, and sewerage farms. A small portion of the proposed Project Area are located within the remaining 700m of the buffer zone designated as medium use zone.

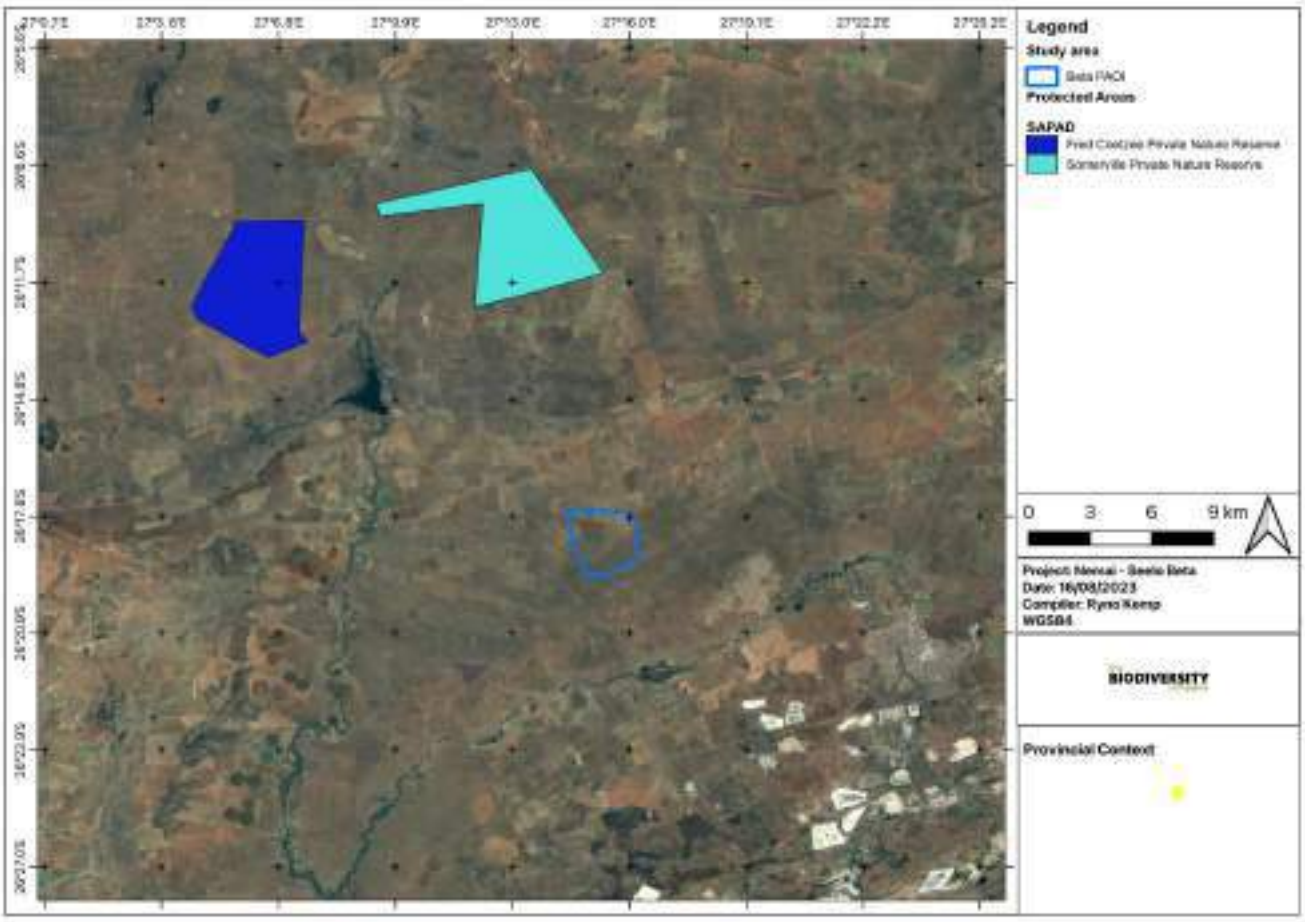

Figure 25: Protect Area in relation to Conservation and Protected Areas as per SAPAD and SACAD (Kemp, 2023).

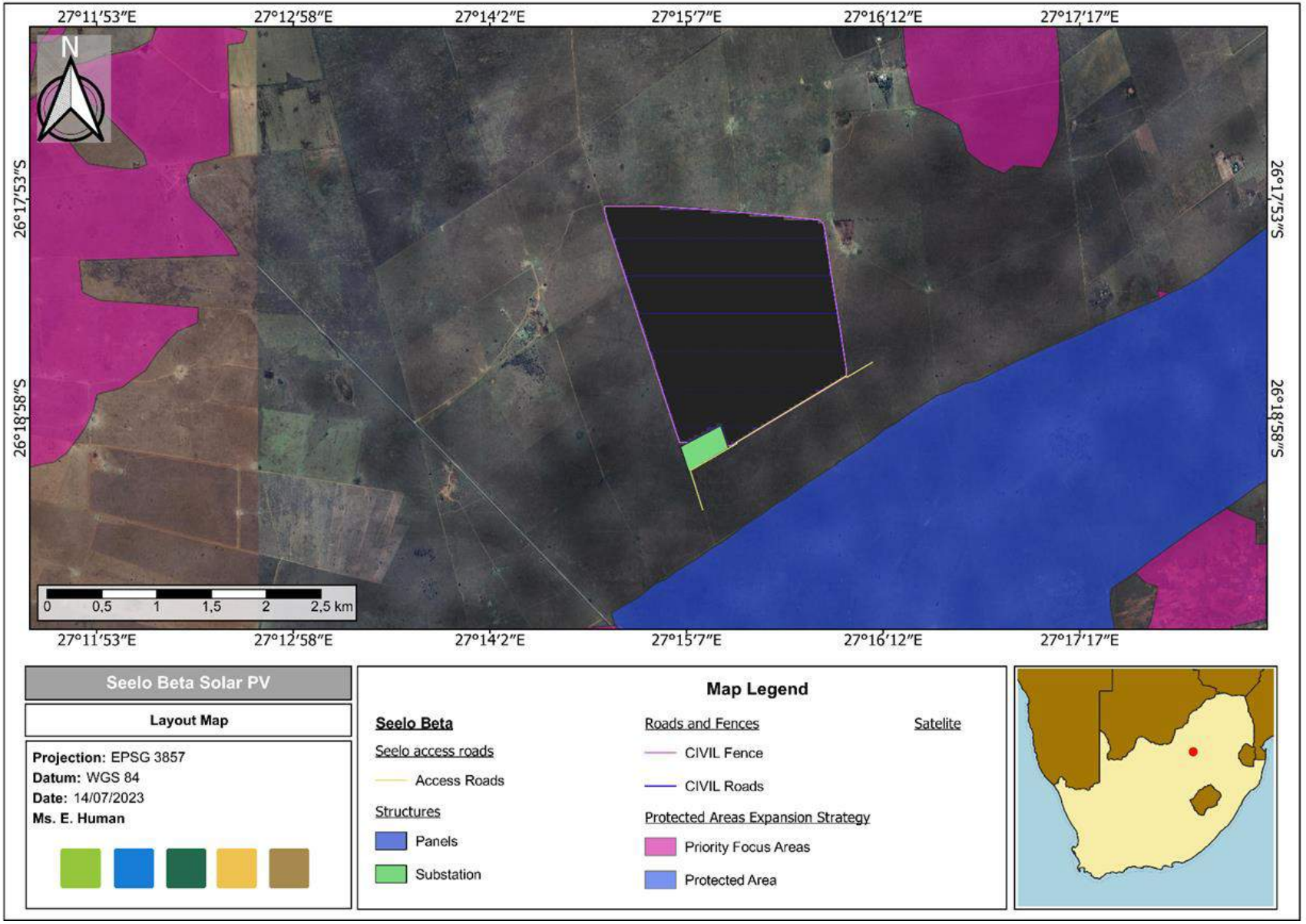

Figure 26: Protect Area in relation to the Protected Areas Expansion Strategy (Human, 2023).

11.8.5 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 27** 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.

11.8.5.2 Expected Flora Species

Based on the Plants of Southern Africa (BODATSA-POSA, 2019) database, three plant species have the potential to occur within the project area and its surroundings. None of these species are listed as being Species of Conservation Concern (SCC). Further to this, the DFFE Screening Tool identifies two sensitive plant species that possibly occur within the Project Area (refer to **Table 15** below).

Table 15: Predicted Flora species to occur within the Project Area (Human, 2023)

Family	Genus	Species	Ecology
Solanaceae	*Cestrum*	*parqui*	Not indigenous; Naturalised; Invasive
Amaryllidaceae	*Boophone*	*disticha*	Indigenous
Lobeliaceae	*Cyphia*	*persicifolia*	Indigenous; Endemic
Orchidaceae	*Sensitive species*	*1147*	Indigenous; Endemic, Endangered
Hyacinthaceae	*Sensitive species*	*1248*	Indigenous, Vulnerable

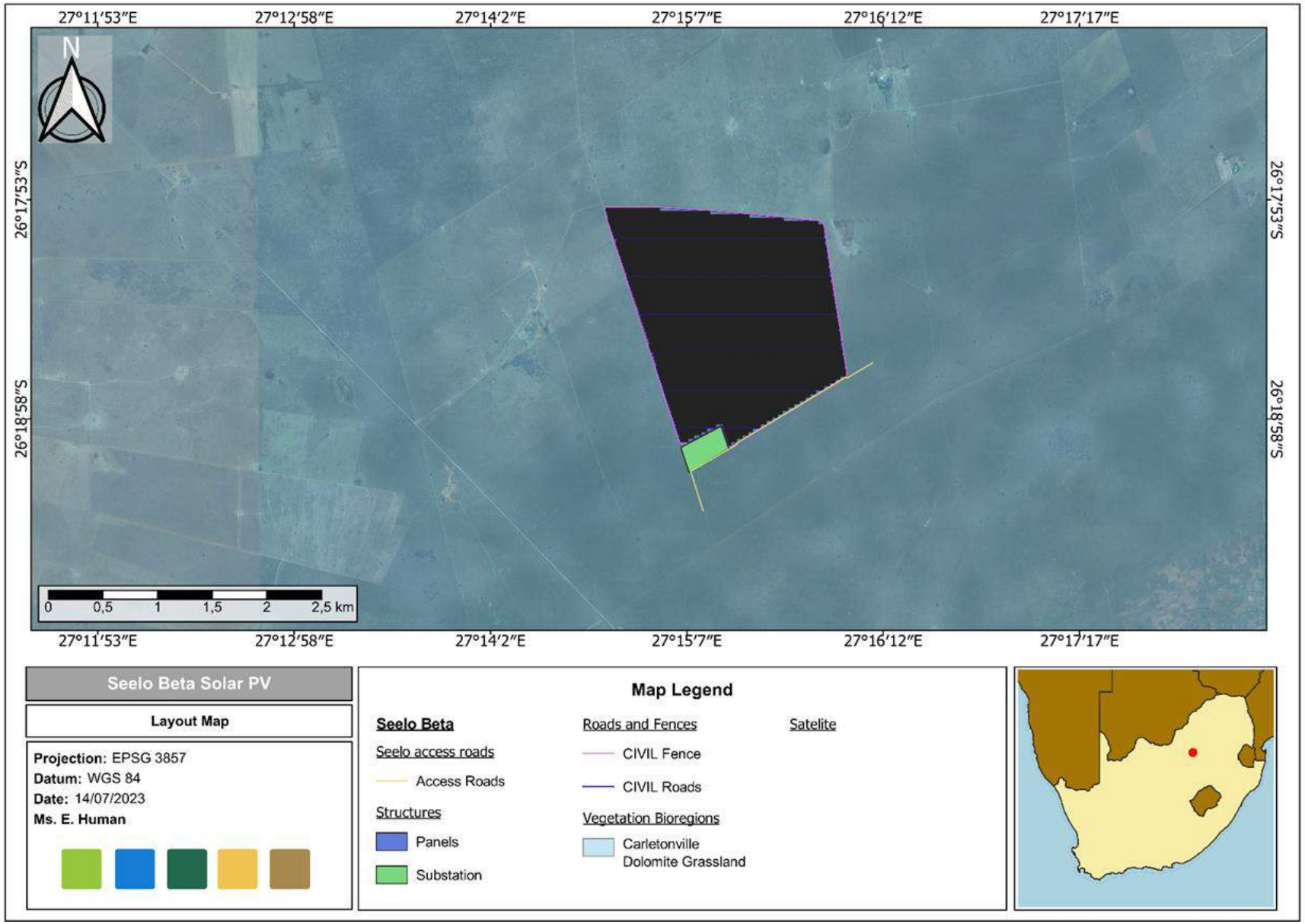

Figure 27: Vegetation region of the Project Area (Human, 2023).

11.8.6 Baseline Faunal Assessment

Table 16 below summarises the total number of animal species that have the potential to occur on and/or around the Project Area and the corresponding number of SCC based on the IUCN Digital Distribution Maps and the Animal Demography Unit databases. Of the 71 total mammal SCC listed, none of the mammal SCC are likely to be found resident within the project area. None of the herpetofauna SCC are likely to be found within the project area.

Table 16: Total number of potential fauna species present and corresponding SCC (Human, 2023)

Fauna type		Total potential number	Number of SCC
Mammals		71	8
Herpetofauna	Amphibians	11	0
	Reptiles	26	1

11.8.7 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 from the site (refer to **Figure 28** below).

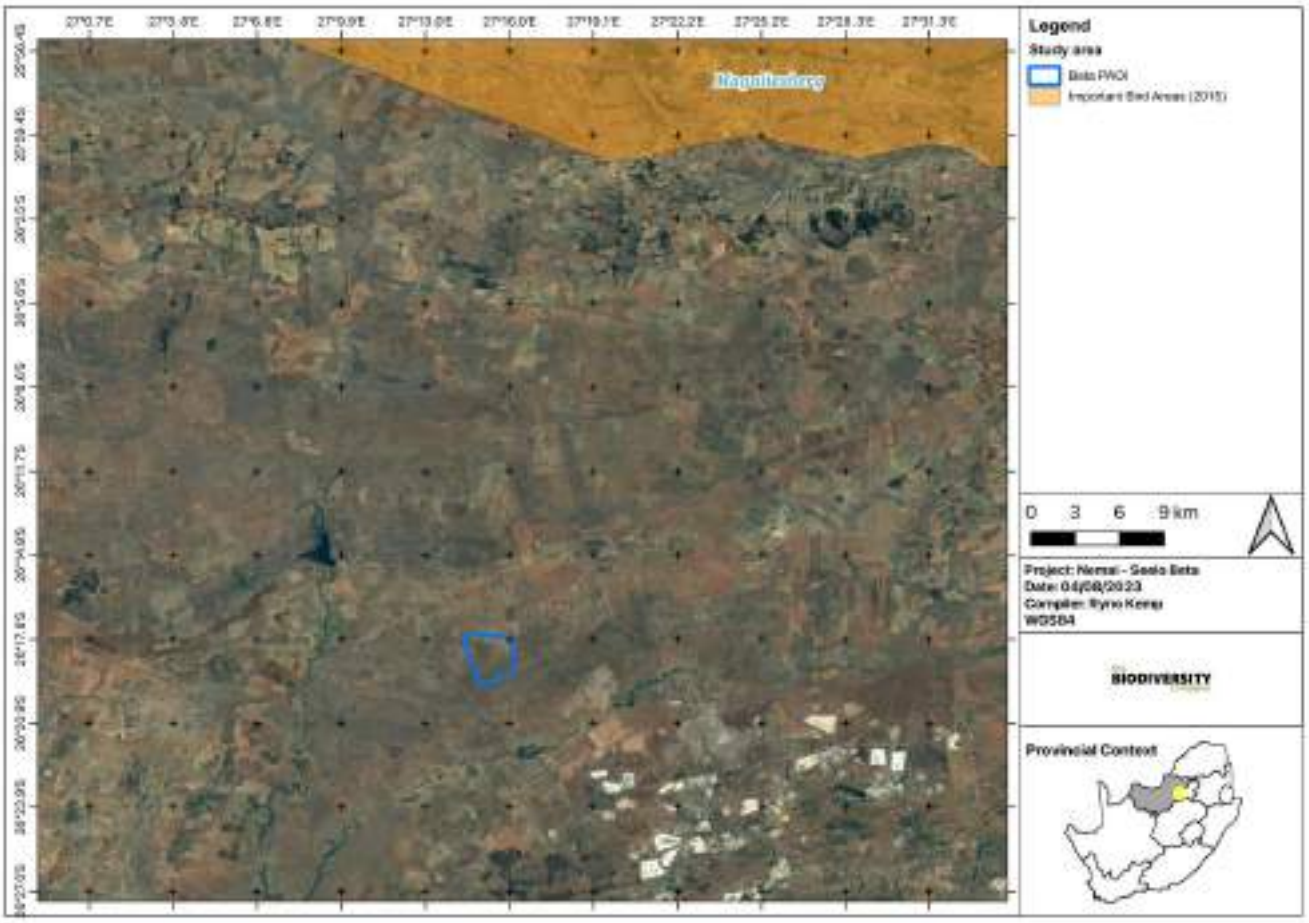

Figure 28: Map illustrating the locations of Important Bird and Biodiversity Areas in relation to the Project Area (Kemp, 2023).

11.8.7.2 Expected Species of Conservation Concern

The South African Bird Atlas Project Version 2 (SABAP2) data lists 320 indigenous avifauna species that could be expected to occur within the Project Area of Influence (PAOI) and surrounding landscape. Twenty (20) of these expected species are regarded SCC (refer to **Table 17** below).

Table 17: 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)	
Alcedo semitorquata	Half-collared Kingfisher	NT	LC	Low
Anthropoides paradiseus	Blue Crane	NT	VU	High
Aquila verreauxii	Verreaux's Eagle	NA	LC	Low
Calidris ferruginea	Curlew Sandpiper	LC	NT	Low
Ciconia abdimii	Abdim's Stork	NT	LC	Low
Circus macrourus	Pallid Harrier	NT	NT	Low
Circus ranivorus	African Marsh Harrier	EN	LC	High
Falco biarmicus	Lanner Falcon	VU	LC	Medium

Scientific Name	Common Name	Conservation Status		Likelihood of Occurrence
		Regional	Global (IUCN)	
Falco vespertinus	Red-footed Falcon	NT	VU	Low
Glareola nordmanni	Black-winged Pratincole	NT	NT	Low
Gyps africanus	White-backed Vulture	CR	CR	Low
Gyps coprotheres	Cape Vulture	EN	VU	High
Hydropogne caspia	Caspian Tern	VU	LC	Low
Mycteria ibis	Yellow-billed Stork	EN	LC	Medium
Oxyura maccoa	Maccoa Duck	NT	EN	Low
Phoeniconaias minor	Lesser Flamingo	NT	NT	Medium
Phoenicopterus roseus	Greater Flamingo	NT	LC	Medium
Sagittarius serpentarius	Secretarybird	VU	EN	High
Torgos tracheliotos	Lappet-faced Vulture	EN	EN	Low
Tyto capensis	African Grass Owl	VU	LC	Medium

Notes:

CR: Critically Endangered

EN: Endangered

LC: Least Concern

NT: Near Threatened

VU: Vulnerable

11.9 Socio-Economic Environment

The information contained in the sub-sections to follow was extracted from the Social Impact Assessment (Tanhuke and Duncan, 2023).

11.9.1 Project Locality Context

The North West Province, as the name implies, is situated in the north-west of South Africa. It came into existence in the year 1994 through the merger of Bophuthatswana and the Western boundaries of the Transvaal. It serves as the provincial capital and is divided into four district municipalities, which are subdivided into eighteen local municipalities; the four districts are, namely, the Bojanala Platinum District, Dr Kenneth Kaunda District, Dr Ruth Segomotsi Mompati District, and Ngaka Modiri Molema District (North West IDP, 2021).

North West Province covers an area of 105 238 square kilometres and in the year 2016 was recorded as having a population size of 3 748 435 people. The biggest cities in the province are Klerksdorp and Potchefstroom, and towns that can be found in the vicinity are Brits, Lichtenburg, and Rustenburg. It is located south of Botswana and is locally bordered by Limpopo, Gauteng, the Free State, and the Northern Cape. The province includes two universities: the University of Northwest and Potchefstroom University. Furthermore, tourist attractions have been established in the province, with Sun City, situated next to the Pilanesburg National Park, being the most popular. Sun City has a variety of entertainment facilities, including a casino, a golf course, theatres and performance halls, hotels, and beaches, to name a few (North West IDP, 2021).

The Dr Kenneth Kaunda District Municipality (DKKDM) lies in the south-east of the province, bordered by the Free State province to its south and Gauteng province to its east. It consists of three local municipalities, namely City of Matlosana Local Municipality, Maquassi Hills Local Municipality, and JB Marks Local Municipality. The Dr Kenneth Kaunda District Municipality is a category C municipality, with municipal executive and legislative authority. The district includes the N12 Treasure Corridor, which connects Johannesburg and Cape Town, running from east to west across the district. The Treasure Corridor serves as a potential concentration point to attract future industrial, commercial, and tourism development (DKKDM DDM, 2021).

JB Marks Local Municipality (JBMLM) is the second largest local municipality in the Dr Kenneth Kaunda District Municipality, with the largest land mass by geographical area. It is situated furthest east in the district, also marking the border where the North West province meets Gauteng province. To its south-west is the City of Matlosana Local Municipality, and to the south-west of this is the Maquassi Hills Local Municipality. JBMLM is a category B municipality and was established in August 2016 when the former Ventersdorp Local Municipality and the Tlokwe City Council Local Municipality were amalgamated.

JB Marks is majorly composed of two towns – Potchefstroom and Ventersdorp. Potchefstroom is known as being an academic town because its chief feature is the Potchefstroom Campus of the North West University. In addition, its industrial zone consists of many large companies that operate in the steel, food, and chemicals industries. Ventersdorp focuses mainly on agricultural activity, with its other sectors including Community Services, manufacturing, trade finance, transport, and mining (JBMLM IDP, 2022).

Merafong City Local Municipality (MCLM) is situated to the east of JB Marks Local Municipality, which situates it in the West Rand District Municipality, a category C municipality at the most westerly end of the Gauteng province. MCLM is one of three local municipalities in the district, the other two being Rand West City Local Municipality to its east, and, to the north-east of this, Mogale City Local Municipality. MCLM is a category B municipality, with an Executive Mayor governance system. The towns in the local municipality most relevant to the project are Welverdiend, Khutsong, and Carletonville.

11.9.2 Population and Demographics

JB Marks Local Municipality is the fastest growing local municipality in the district; in 2011, it reported 219 463 people and by 2016, the number had risen to 243 527 people, marking a growth rate of 2.36 between the two periods. This makes it the fourth fastest growing local municipality across all the districts in the province for the same period. Refer to **Table 18** below for an overview of demographic data.

Table 18: Municipality Demographic Data (2016) (Tanhuke & Duncan, 2023)

	Census 2011	Community Survey 2016	Annual Population Growth
North West Province	**3 509 953**	**3 748 435**	**1.49**
Dr Kenneth Kaunda District Municipality	695 933	742 821	1.48
JB Marks Local Municipality	219 463	243 527	2.36

11.9.3 Population

Comparing the Census 2011 data to the Community Survey 2016 for the North West province reveals that only one age cohort in the population, that of ages 35 to 64, showed a decrease, going from 28.8% in 2011 to 26.2% in 2016. The other three cohorts, that of 0-14, 15-34, and 65+, all recorded an increase, with the greatest of those being the 65+ cohort, which recorded an increase of 2.4% between the two reporting periods.

A more comparative breakdown of the age groups in the three relevant administrative levels is presented in the Community Survey 2016. Increments of five years result in thirteen intervals, ending with the 60+ cohort. For the province and the district, the cohort with the largest representation is 0-4 years old, with a figure of 10.8% of the population for the province and 10.3% for the district. This is followed by the 5-9 years old bracket, with a figure of 9.9% of the population

for the province and 10% for the district. This trend is the case for City of Matlosana Local Municipality and Maquassi Hills Local Municipality, too; however, surprisingly, JB Marks Local Municipality has as its largest representation the 20-24 years old age bracket, with 10.7% of the population in its municipality.

Table 19: North West Distribution of Age Groups (Tanhuke & Duncan, 2023)

Age Cohort	North West	DKKDM	JBMLM
0-4	407 509	77 165	23 405
5-9	373 184	74 881	24 143
10-14	335 658	65 902	21 176
15-19	347 520	64 323	22 100
20-24	348 714	66 150	26 141
25-29	352 737	66 873	21 186
30-34	300 579	59 573	17 929
35-39	256 732	53 526	16 469
40-44	220 117	47 101	15 093
45-49	195 485	42 234	14 109
50-54	165 037	35 984	11 790
55-59	144 338	30 736	10 544
60+	300 825	58 375	19 442
Total	**3 748 435**	**742 821**	**243 527**

11.9.4 Household Characteristics

When considering the household statistics in the province, it is found that an increase in numbers is consistently seen across the relevant administrative areas between 2011 and 2016. For the North West Province, the population number increased from 3 509 953 in 2011 to 3 748 435 in 2016. The number of households increased from 1 061 998 in 2011 to 1 248 766 in 2016, while the household size decreased from 3.3 to 3. For the district, the population size increased from 696 933 people in 2011 to 742 821 people in 2016. The number of households increased from 208 045 to 240 543, and the household size decreased from 3.3 to 3.1. Finally, the local municipality recorded a population size of 219 463 in 2011, which increased to 243 527 in 2016. The number of households also increased from 67 098 to 80 572, and the household size decreased from 3.3 to 3.

Table 20: Household Characteristics (Tanhuke & Duncan, 2023)

Indicator	North West	DKKDM	JBMLM
2011			
Population number	3 509 953	696 933	219 463
Number of households	1 061 998	208 045	67 098
Household size	3.3	3.3	3.3
2016			
Population number	3 748 435	724 821	243 527
Number of households	1 248 766	240 543	80 572

Indicator	North West	DKKDM	JBMLM
Household size	3	3.1	3

Consistently, across the province, the heads of households are predominantly male. This applies for both reporting periods of 2011 and 2016. In 2011, the population of household heads who were male was reported as 63.4%. In 2016, 64.8% of the population of household heads were male. This illustrates a growth of 1.4% in households with males at the head.

There are four types of dwellings that are classified under the Community Survey: formal dwelling, traditional dwelling, informal dwelling, and a non-specific “other” category. For the North West province, 78.2% of houses are classified as formal dwellings. In comparison, 86.4% of houses in the Dr Kenneth Kaunda District Municipality are formal dwellings. The JB Marks Local Municipality has 82% formal dwellings. Across the province, this is followed by informal dwellings, with 18.3% at the provincial level, 11.3% at the district level, and 16.2% at the local level. The third most prominent dwelling type is “other,” but only at the district level, with a figure of 1.5%, and at the local level, with a figure of 1.1%. The provincial figure for this type of dwelling classifies it as the least prominent of the four, with 1.5%. Finally, traditional dwellings constitute 1.8% in the province, 0.7% in the district, and 0.3% in the local municipality.

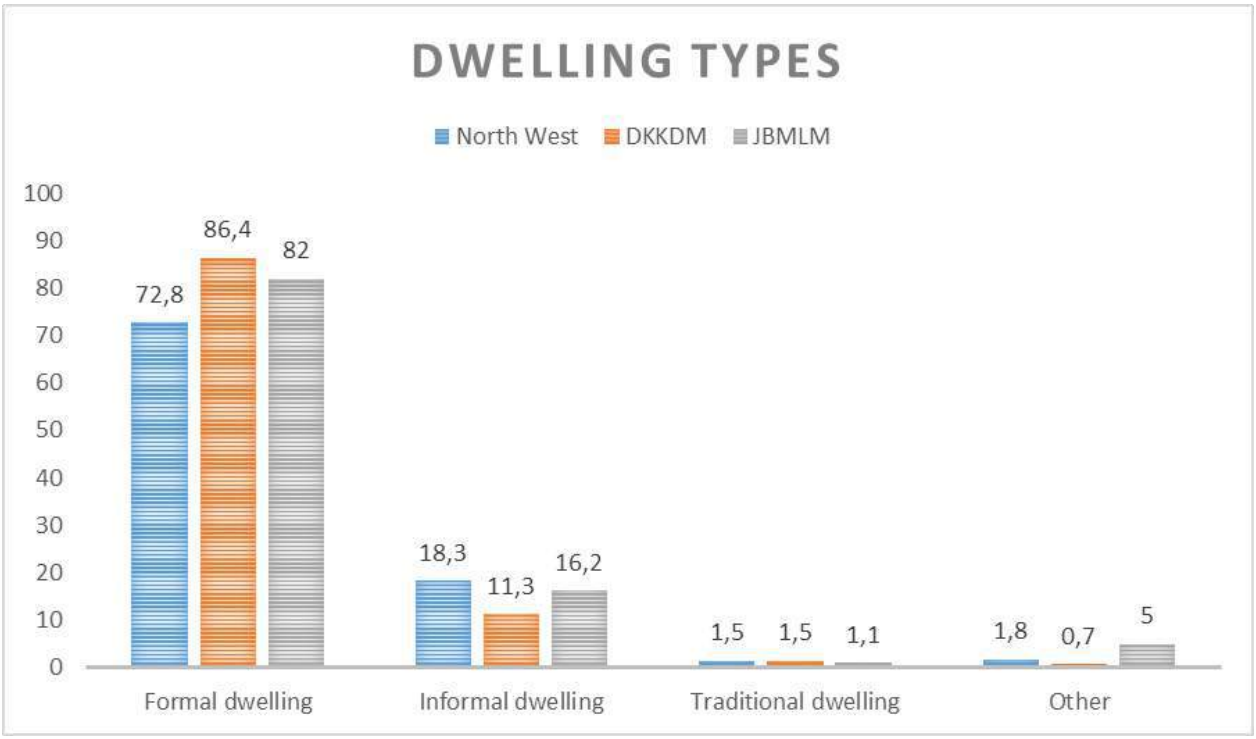

Figure 29: Dwelling Types (Tanhuke & Duncan, 2023).

The Reconstruction and Development Programme (RDP) funded houses in the North West Province constitute only 21.1% of homes. This places the province as fourth out of the nine provinces in terms of prevalence of RDP-funded housing. In comparison, 38.1% of houses in the district are RDP-funded, and 28.7% in the local municipality. Predominantly, across the province, the perceptions of the RDP housing are favourable. However, in the local municipality only 38.5%

of residents feel that the housing is good, with 37.1% feeling that it is poor. This later representation is considerably higher than the rest of the local municipalities, who are much closer to the provincial figure of 22.4%.

11.9.5 Spoken Language

The North West borders Botswana to the province's north. The prevalence of Setswana in both these regions suggests a commonality most likely related to the free movement of Bantu-speaking peoples throughout the Southern African region. In the province, there has only been one language that has seen an increase in the number of speakers between the two reporting periods of 2011 and 2016. Setswana has gone from 63.3% in 2011 to 71.5% in 2016. The second most widely spoken language in the province is Afrikaans, which decreased in representation from 9% in 2011 to 7.2% in 2016. This is followed by Sesotho, which saw no marked difference between the reporting years, staying steady at 5.8%. IsiXhosa is the fourth most widely spoken language, with a recorded 5.5% of speakers in 2011 decreasing to 5.1% in 2016. English features as the fifth most widely spoken language, with 3.5% of speakers in 2011 and 1.4% in 2016, marking the most significant decrease of all the languages in the province. In total, 14 categories were reported for languages in the province. Refer to **Figure 30** below for a breakdown of the languages spoken at home.

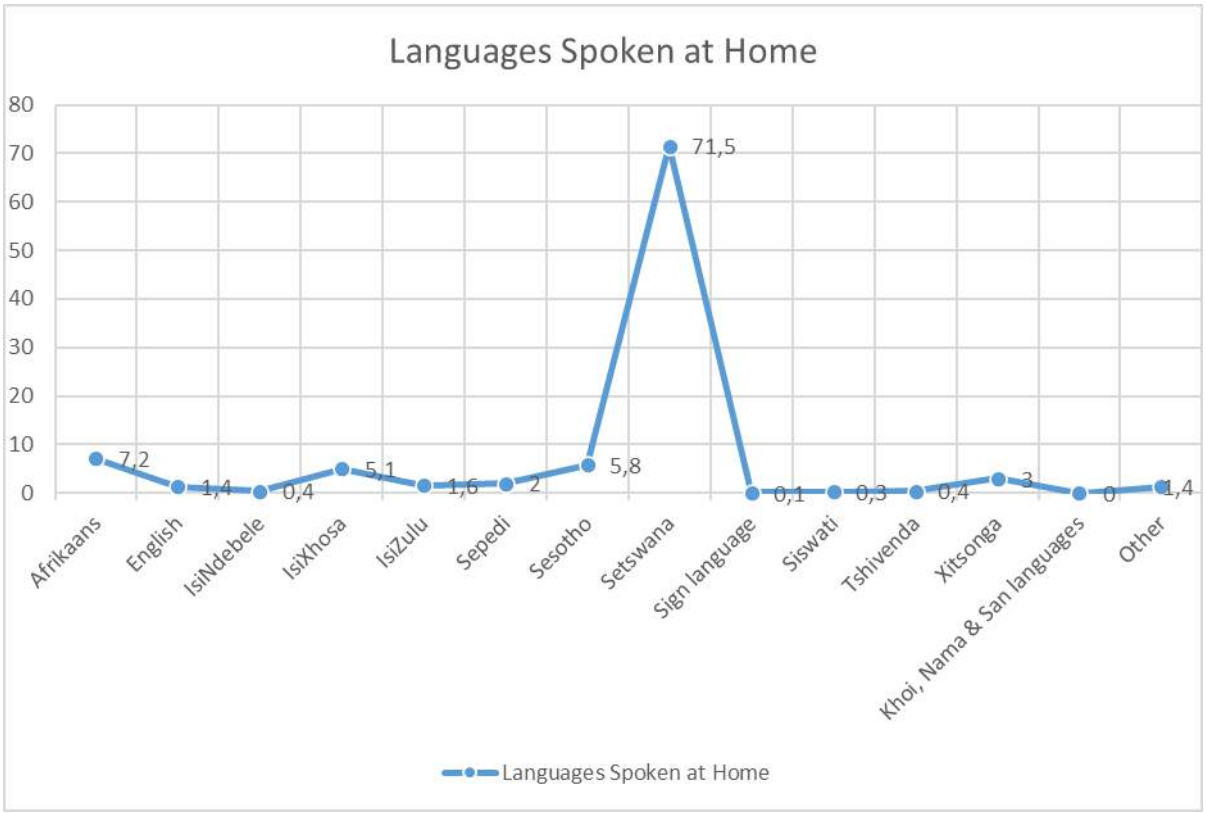

Figure 30: Spoken Language (Tanhuke & Duncan, 2023).

11.9.6 Education

The Constitution of the Republic of South Africa states that it is important that all citizens have access to good basic education, including adult basic education. This refers to primary, secondary, and tertiary education; however, the latter is less easily applicable because of the costs associated and the strict entry requirements. In order for children to be adequately ready to attend school from the ages of 7, it is important that their early development is properly facilitated. This happens between the ages of 0-4, as reported in the census studies. This early childhood development (ECD) is important for a child's ability to acquire perception-motor skills, which form the foundation for reading, writing, and numeracy later in life. The Dr Kenneth Kaunda District Municipality is the best performing district in the North West Province, with 37.2% of the population in this age bracket attending an ECD centre. Of the three local municipalities in the district, JB Marks Local Municipality performs the best, with 42.6% of appropriately aged children attending an ECD centre.

The population of individuals who are between the ages of 5 and 24 who are attending an educational institution in the North West Province has markedly improved during the two reporting periods of 2011 and 2016. In 2011, 880 621 people, 70.4% of the provincial population, were attending an educational institution, and by 2016, that number had increased to 1 037 694 people, accounting for 73.9% of the provincial population and marking an improvement of 3.5%. The representation for the Dr Kenneth Kaunda District Municipality indicates that in 2011, 71.6% of the provincial population were attending an educational institution, with that number rising to 76.1% in 2016. The JB Marks Local Municipality happened to record the lowest increase across the three local municipalities in the district, going from 73.2% in 2011 to 76.5% in 2016.

In terms of educational attainment across the three tiers of learning, secondary education remains the most prominent, with 65.1% of the provincial population at least attaining this level. Unfortunately, this is followed by those who have received no schooling, with a figure of 19.3%. This trend follows across the Dr Kenneth Kaunda District Municipality, which has 64.9% of its population at least attaining secondary level education, with 18.8% of the population without any schooling. JB Marks Local Municipality has 62.8% of its population having attained secondary level education, with 18.2% without any schooling. The highest proportion of the population in the district having attained higher education falls within the JB Marks Local Municipality at 9.8%, which also makes it the second best performing for this educational bracket in the province.

Table 21: Education Profile (Tanhuke & Duncan, 2023)

Education Level	North West	DKKDM	JBMLM
Primary School	114 215 (11%)	21 368 (9.8%)	6 837 (9.2%)
Some Secondary School	672 483 (65.1%)	141 400 (64.9%)	46 906 (62.8%)
Higher Education	47 384 (4.6%)	14 214 (6.5%)	7 322 (9.8%)
No Schooling	199 626 (19.3%)	41 031 (18.8%)	13 571 (18.2%)

11.9.7 Access to Healthcare

The Community Survey 2016, as well as the IDPs for the municipality were reviewed to acquire healthcare information. However, there was an absence of related information in these documents. In lieu of verified information in this regard, and in an attempt to provide a general illustration of the healthcare facilities recorded in the area, Google Earth was used. It is worth stating that the correctness of the information is dependent on the business owner as the party responsible for upkeeping this information on Google.

In JB Marks Local Municipality, there are a number of healthcare facilities that are available to service the particular needs of the community. They are spread across the five towns of Klerksdorp, Potchefstroom, Ventersdorp, Fochville, and Carletonville. In Klerksdorp, there is the Westvaal Hospital, Tshepong Hospital, the Life Anncron Hospital, and Duff Scott Hospital. In Potchefstroom, there are several hospitals, including hospital complexes, such as Witrand Hospital and Potchefstroom Hospital; private hospitals, such as Mediclinic, MooiMed Private Hospital, and M-Care, which deals specifically with physical and psychiatric rehabilitation; a private family medical centre, Cachet Park Medical Centre; and a military hospital, AMHU North West. In Ventersdorp is only the Ventersdorp Hospital. In Fochville are four hospitals, namely Leslie Williams Memorial Hospital, Sibanje Hospital, Fochville Hospital, and the Mponeng Mine Occupational Health Centre. In Carletonville, there appears to be only one hospital, named Carletonville Hospital.

11.9.8 Access to Electricity

Across the provincial, district, and local municipal levels, household energy is consistently supplied majorly by in-house prepaid meters. At the provincial level, 973 231 or 77.9% of households have this type of energy supply; at the district level, 177 094 or 73.6% of households account for this type of energy supply; and at the local level, 56 003 or 69.5% of households rely on this type of energy supply. Other sources of energy supply are the conventional in-house meter, connections to other sources that houses either do or do not pay for, solar home systems, generators or batteries, and a non-descript “Other” source.

In JB Marks Local Municipality, the second most popular source of energy supply comes through the conventional in-house meter, with 13 231 or 16.4% of homes connected to the electrical grid in this way. This amounts to 69 234 or 85.9% of homes in the local municipality connected to the grid. Unfortunately, the third largest percentage of homes in this demographic is those without any access to electricity, a figure of 7 768 or 9.6%, the highest in the district (Community Survey, 2016).

11.9.9 Water and Sanitation

Access to safe drinking water and sanitation is considered a human right by the United Nations. The Dr Kenneth Kaunda District Municipality ranks highest of all the districts in the North West, in terms of access to safe drinking water, with 87.6% of its population being in this favorable position. JB Marks Local Municipality grants access to safe drinking water for even more of its local

population, with 90.4% accounted for. In comparison, the provincial figure of those who have access to safe drinking water stands at 80.2%. Predominantly, at a rate of 68.9% for the province, 91.9% for the district, and 86.5% for the local municipality, water is provided by the municipality (Community Survey, 2016).

11.9.10 Economic Development Indicators

According to the JB Marks Local Municipality IDP, which records 2017 as its latest reporting period, the Gross Value Added (GVA) in Dr Kenneth Kaunda District Municipality comes from nine distinct sectors: Agriculture, Mining, Manufacturing, Electricity, Construction, Trade, Transport, Finance, and Community Services. Of these nine sectors, community services is the highest grossing sector for the district, contributing R14.5 billion to the GVA in 2017. This is followed by finance, which contributed R8.9 billion to the GVA. The trade sector contributed R8 billion to the GVA. The smallest contributor was the construction sector, with R1.7 billion.

In terms of contribution to the district municipality, the largest GVA contributing sector from JB Marks Local Municipality was agriculture, which constitutes 54.8% of the district. This is followed by manufacturing, which contributed 48.4% to the district. In a close third was electricity, which contributed 48.2% to the district. The smallest sector was mining, with 19% being contributed to the district. However, in terms of actual monies being created in the local municipality, the best performing sector was community services, with R6.4 billion or 33.3% of the total GVA, followed by finance, with R3.2 billion or 16.6%, and trade, with R2.8 billion or 14.5%. The weakest sector was construction, earning R600 million or 3.1% of the total GVA of the local municipality.

The best performing sectors over the period between 2007 and 2017 were finance, with an average growth of 3.24%, followed by agriculture, with 2.53%, and community services, with 2.51%. The worst performing sector over the ten-year period was mining, with an annual growth of -7.23%. Forecasting the next five years, from 2017 to 2022, the best performing sectors are expected to be finance, transport, and electricity. The worst performing is expected to be community services.

11.9.11 Labor Force

The labour force consists of people who are between the ages of 15 and 64. This age bracket is also sometimes referred to as the “economically active population”. According to the JB Marks Local Municipality IDP, those groups not included in this classification are students, retired people, stay-at- home parents, incarcerated individuals, people employed in jobs with unreported incomes, and discouraged workers (those who no longer seek work but who would form part of the workforece if given the chance). In the ten-year reporting period between 2007 and 2017, the largest demographic in the working age population for the North West Province falls in the 20-24 year group in 2007 and then in the 25-29 year group for 2017. For the Dr Kenneth Kaunda District Municipality, the same trend applies. It is only different in JB Marks Local Municipality, where the predominant working age population falls within the 20-24 year group for both reporting periods.

The economically active population is in reference to those individuals who fall within the working age of 15 and 64, in particular those who are able and willing to work. It also includes those who are unemployed but who are actively seeking work. Between the two reporting periods of 2007 and 2017, there was a positive average annual growth of the economically active population across the province. JB Marks Local Municipality grew by 1.24%, which is a better performance than both the district and the province, which grew by 0.16% and 1.17%, respectively. The labour force participation rate (LFPR), which "is the economically active population expressed as a percentage of the total working age population" (JBMLM IDP, 2022), stands at 55.4% for the local municipality, 55% for the district municipality, and 52.4% for the province.

11.10 Agriculture

The Project's PV Site is used currently for livestock farming and was historically used for agricultural purposes. Cultivated land was excluded from all infrastructure development. A portion of the project site was historically cultivated land. The portion was however last cultivated in 2004 after which it was withdrawn and left to recover for grazing.

Figure 31: Grazing land on rocky soils (Gouws, 2023).

Figure 32: Land last cultivated in 2004 and present situation (Gouws, 2023).

11.11 Air quality

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

- Fugitive dust emissions from agricultural activities and vehicles travelling on unpaved roads;
- Vehicle exhaust emissions from vehicles travelling on paved and unpaved roads, including on surrounding roads such as N14 and in the town of Carletonville;
- 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) and vehicles on the surrounding road network.

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 study area falls between two map sheets (2627AC and 2627AD). The first edition of both sheets dates to the 1950s, so it was not considered necessary to examine the later edition map sheets. Any heritage resources that are 60 years or older would be depicted on the 1950 edition sheets. The topographical maps were obtained from the Department of Agriculture Land Reform and Rural Development (DALRRD) in Cape Town.

The following two 1:50 000 map sheets were assessed for the Seelo Beta Solar PV footprint: 2627AC Rysmierbult Edition 1 1953 and 2627AD Carletonville Edition 1 1958. The maps were surveyed in 1953 and 1958 respectively and drawn in 1955 and 1959 respectively by the Trigonometrical Survey Office of the Union of South Africa, both from aerial photographs taken in 1948. **Figure 33** below depict one homestead (hut) and a ruin within the Seelo Beta Solar PV footprint. Another homestead is depicted just outside the northern boundary of the footprint area.

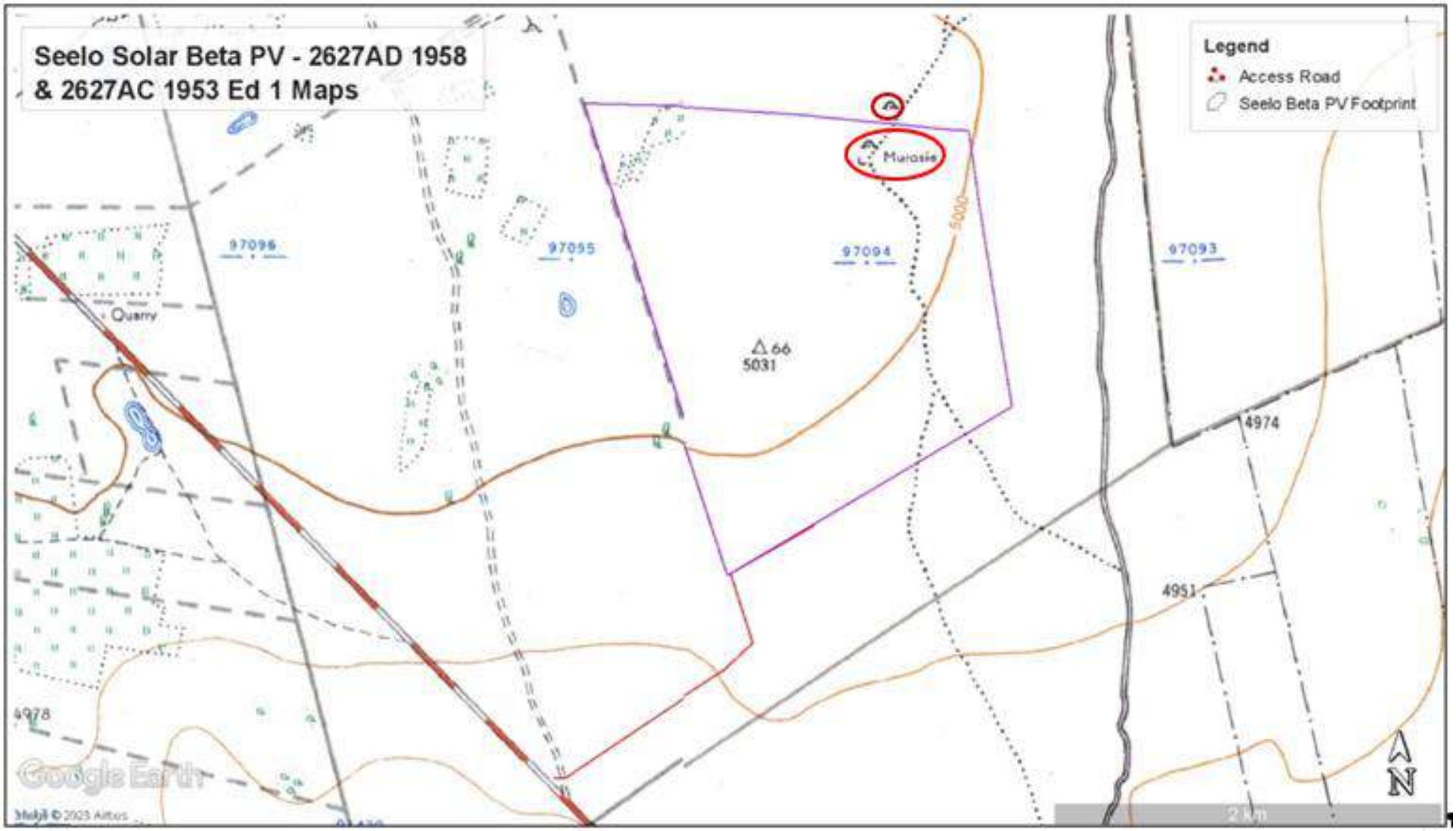

Figure 33: Enlarged view of topographic map sheets 2627AC Ed 1 1953 and 2627AD Ed 1958, depicting one homestead (hut) and a ruin within the Seelo Beta Solar PV footprint (Kitto, 2023).

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 (1953) of the 1:50 000 topographical maps produced by overlying the maps with satellite Imagery (Google Earth) has shown that only one homestead and a ruin are depicted within the project footprint.

11.13.2 Palaeontological Features

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

The Project Area is completely underlain by the Precambrian dolomites and associated marine sedimentary rocks of the of the Malmani Subgroup (Vmd, light blue; 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. The Palaeotechnical report of the North West Province further indicates that the Malmani Subgroup has a High Palaeontological Sensitivity.

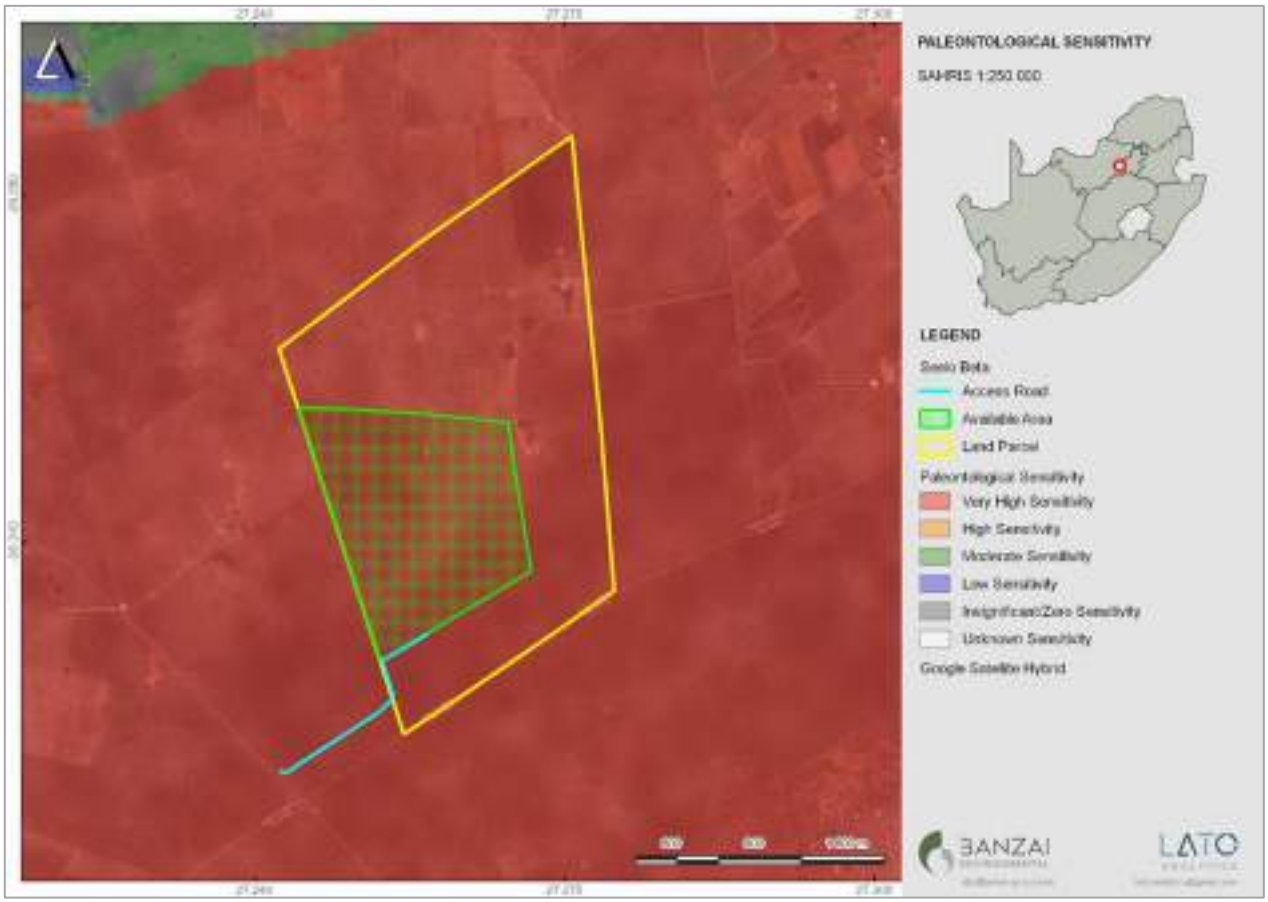

Figure 34: Extract of the 1:250 000 SAHRIS PalaeoMap map indicating the proposed development in yellow (Butler, 2023).

11.14 Planning

The following is noted from a planning perspective:

- The proposed PV Site 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.
- Other renewable energy applications have been made within a 30km radius of the PV Site, according to DFFE's REEA Database (Quater 1, 2023) (refer to **Section 6.9** above). The nearest approved PV facility is located approximately 28km to the east of the Project Area; and
- The proposed PV Site is located approximately 10.5km to the north-west of a civil aviation aerodrome. According to the findings from the National Web Based Environmental Screening Tool, the PV Site has a low sensitivity in terms of the relative civil aviation theme.

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 livestock farming operations. 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 transportation network in the Project Area is shown in **Figure 35** below. The D331 road is located 1.5km south-west of the site. The Site falls midway between the N14 (approx. 11km to the north) and the R501 (approx. 8km to the south). A railway line runs south-west of the site. All other roads in the immediate area are unsurfaced farm roads.

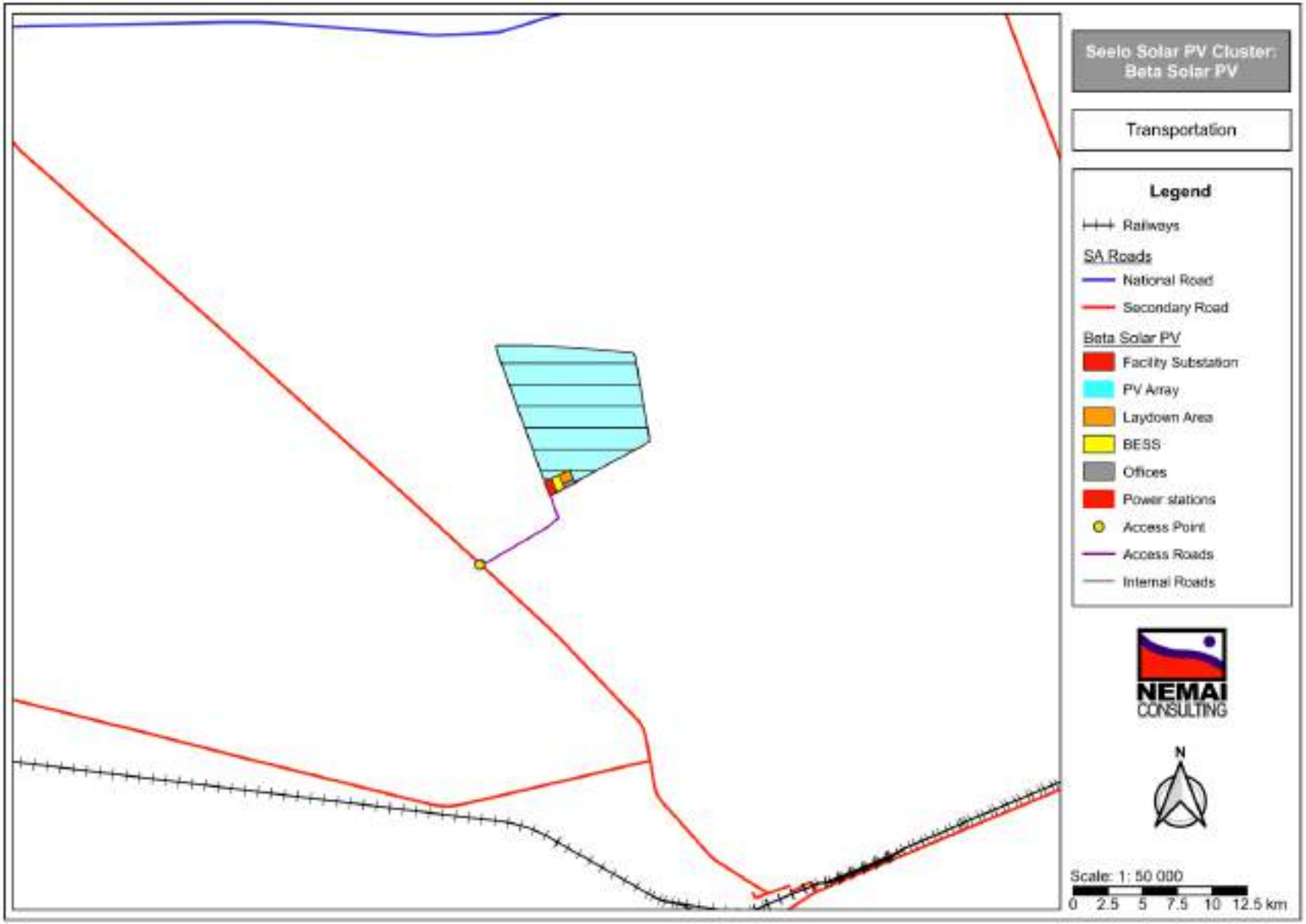

Figure 35: Transportation network

11.17 Health

All health care services are located within the municipal urban nodes of the surrounding areas, most predominantly in Carletonville. The nearest hospital is the Carletonville District Hospital to the south-east of the Project Area. The site is largely unserved, 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. Aquatic Biodiversity Compliance Statement;
2. Terrestrial Biodiversity Compliance Statement;
3. Avifaunal Impact Assessment;
4. Agricultural Compliance Statement
5. Geohydrological Assessment;
6. Heritage Impact Assessment;
7. Paleontological Impact Assessment;
8. Visual Impact Assessment;
9. Transport Impact Assessment; and
10. 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 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 Aquatic Biodiversity Compliance Statement

A summary of the Aquatic Biodiversity Compliance Statement (Van Rooyen, 2023) follows. The specialist report is contained in **Appendix E1.**

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 Field Survey and Results

The proposed site is situated in an agricultural landscape (small and large livestock). According to the NBA 2018 NWM 5 spatial data, two small depressions are located in the northern section of the footprint. However, during the site visit, this could not be verified and can rather be classified as terrestrial habitat. No plants indicative of a moisture gradient was recorded in the target areas. Therefore, the site does not contain any sensitive features in terms of watercourses. Refer to **Figure 36** below for an overview of the environment within the proposed footprint.

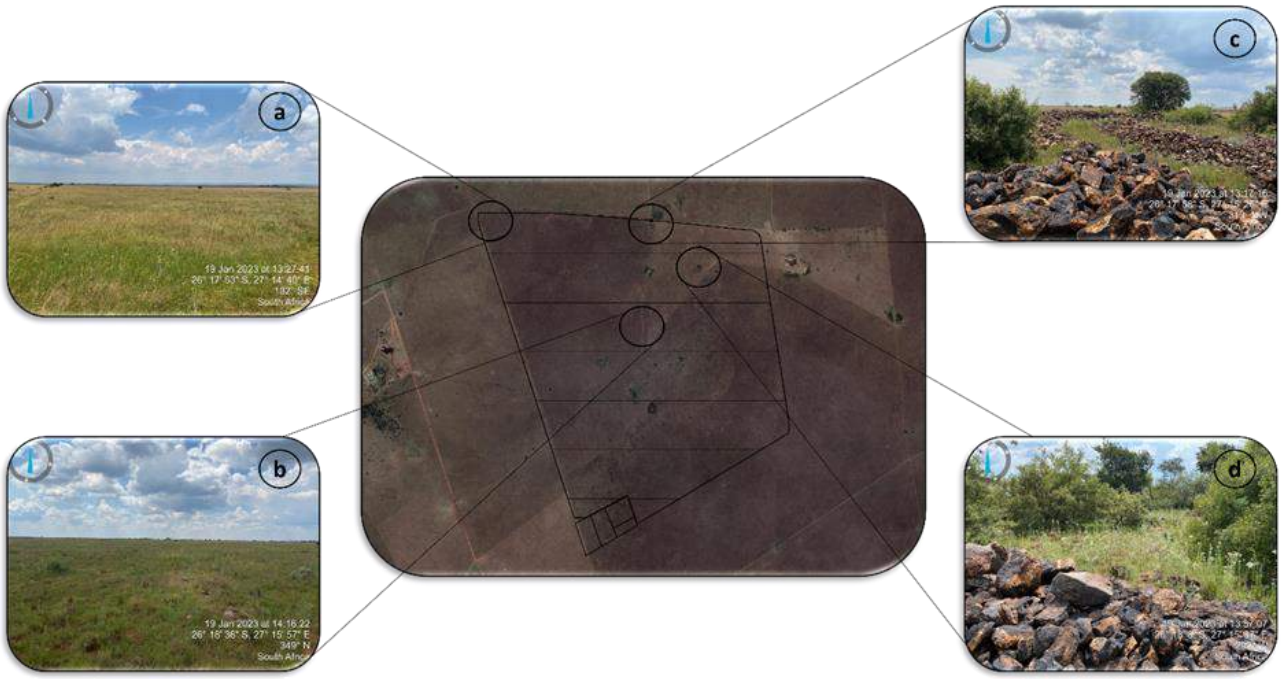

Figure 36: Photographs indicating the general environment within the proposed footprint of Seelo Beta Solar PV (Van Rooyen, 2023).

12.3.2.2 Environmental Sensitivity: Aquatic Biodiversity Theme

The 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 37** below). The area is classified as very high sensitivity due to the area being within a Strategic Water Source Area (SWSA) (groundwater SWSA, i.e. Westrand Karst Belt) with potentially sensitive groundwater interactions[4]. No sensitive freshwater hydrological features were identified and therefore the proposed study area can be classified as low sensitivity to freshwater hydrological features.

[4] Note that groundwater features and sensitivity are discussed in a separate Geohydrological Assessment Report.

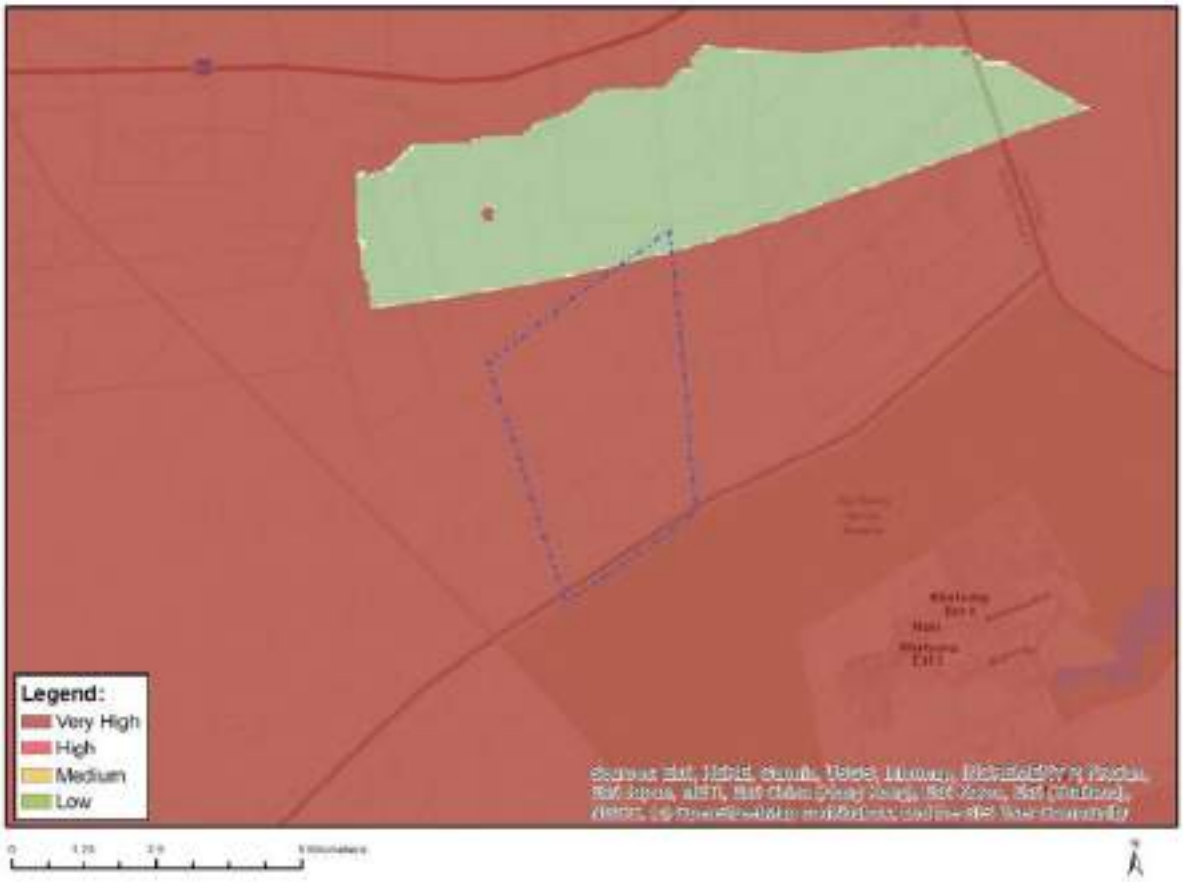

Figure 37: Aquatic Biodiversity Sensitivity of the land parcel as per the National Web-based Environmental Screening Tool.

12.3.3 Conclusion

The following main conclusions are made:

- No wetland exists within the footprint of the proposed PV facility and that no watercourses will be affected;
- Since no sensitive hydrological features were recorded the Project Area can be classified as having a low sensitivity with regard to surface water and wetlands; and
- It is recommended that the PV facility may proceed without impact to regional watercourses, given that best practise mitigation measures, particularly in terms of pollution control, are implemented.

12.4 Terrestrial Biodiversity Compliance Statement

A summary of the Terrestrial Biodiversity Compliance Statement (Human, 2023) follows. The specialist report is contained in **Appendix E2.**

12.4.1 Details of the Specialist

Organisation:	Nitai Consulting (Pty) Ltd
Name:	E. Human
Qualifications:	M. Tech Nature Conservation
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:
  - Flora and Vegetation Condition –

The project area was found in a heavily modified condition, mainly attributed to the agricultural practices and its impacts associated, resulting in the area being largely disturbed in some way. Grazing practices, old lands and biospheres have degraded the veld severely. These aspects further limit the functional capacity of the project area. Much of the development footprint is located within or along roads or transformed areas and their associated servitudes, which are considered with very low sensitivity. No protected trees or SCC flora species were observed.

  - Fauna –

Mammal activity was low, due to the extent of disturbance in general and cattle grazing the area, as well as the poor habitat condition. The species present are most likely not resident due to the modified state of the area. No SCC were observed during the field survey.

Figure 38: General condition of the study site (Human, 2023).

- ❑ Habitat Survey and Site Ecological Importance:

The main habitat types identified across the project area were initially identified and pre-delineated largely based on aerial satellite imagery. These habitat types were then refined based on the field coverage and data collected during the survey.

The disturbed habitat has been modified from its natural state, and it represents habitat that has been historically impacted, and has subsequently recovered to some degree. This habitat is largely limited to areas that have been impacted through effects from agricultural grazing practices and associated impacts, roads, and land use, as well as mismanagement and inadequate rehabilitation procedures. These habitats are not entirely transformed, but exist in a constant disturbed state, as they cannot recover to a more natural state, due to the ongoing disturbances and impacts received.

Transformed habitat was present in the form of the existing road, existing infrastructure, or any other areas devoid of vegetation, artificially. Due to the transformed nature of this habitat, it is regarded as having a very low sensitivity. The two delineated habitat types have each been allocated a sensitivity category or Site Ecological Importance (SEI) as presented in **Table 22** below. To identify and spatially present sensitive features in terms of the relevant specialist discipline, the sensitivities of each of the habitat types delineated within the project area are mapped as per **Figure 39** below.

Table 22: Site Ecological Importance assessment summary of the habitat types delineated within the project area (Human, 2023).

Habitat Type	Conservation Importance	Functional Integrity	Biodiversity importance	Receptor resilience	Site Ecological Importance
Disturbed Grassland	Low	Medium	Low	Medium	Low
Transformed	Low	Medium	Low	Medium	Low

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 ‘Low’ (refer to **Figure 40** below). The completion of the terrestrial desktop and field studies confirms the ‘Low’ sensitivity presented by the screening report. As discussed above, the project area is largely modified and as such is assigned a sensitivity rating of ‘Low’.

The screening report classified both the animal and plant theme sensitivity as ‘medium’. Following the field survey findings, both the animal and plant species themes may be re-classified as having ‘Low’ sensitivities. This is since there is limited suitable habitat available to support the regular occurrence of any faunal or floral SCC within the project area.

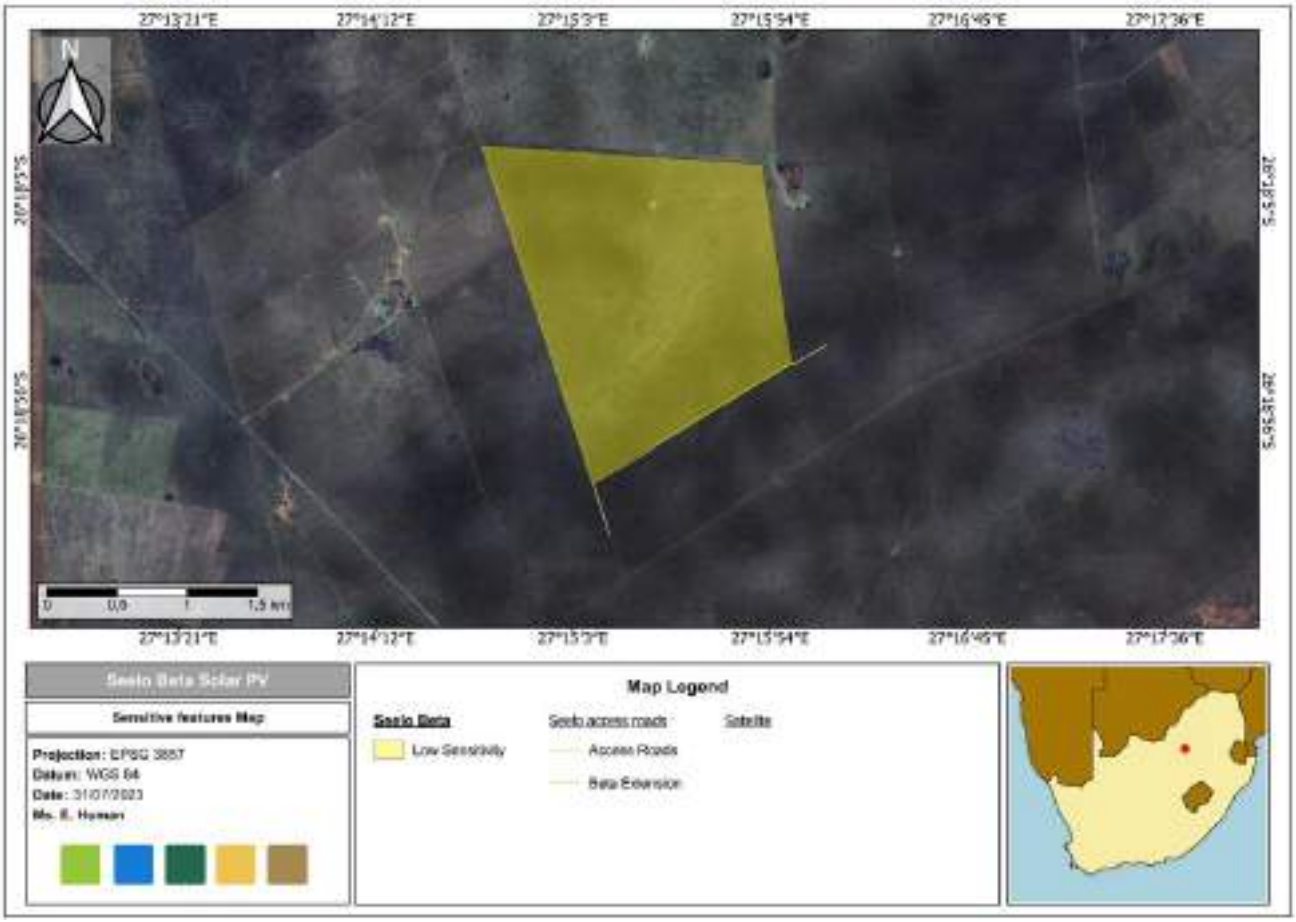

Figure 39: Biodiversity SEI delineation relevant to the Project Area (Human, 2023).

12.4.3 Conclusion

The following main conclusions are made:

- The area has experienced long-term and continuous disturbance, mostly due to the agricultural grazing practices and associated impacts. The project area is modified and as such is assigned a sensitivity rating of 'Low';
- The development of the project area is likely to result in negligible negative impacts, especially considering the extent of 'Low' sensitivity areas confirmed; and
- The development of the project area may be favourably considered for environmental authorisation, provided that the mitigation measures and recommendation presented are adhered to.

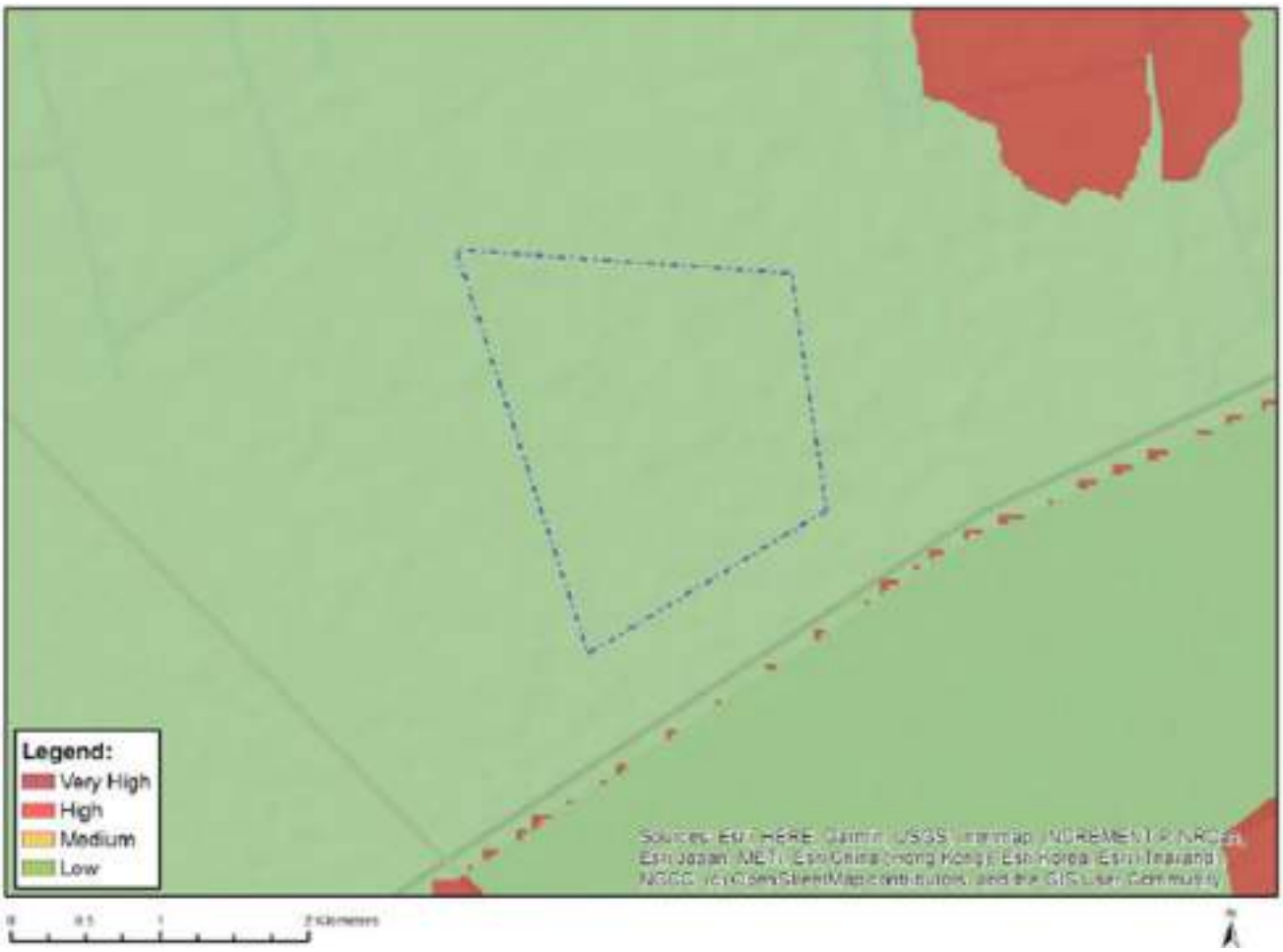

Figure 40: Terrestrial Biodiversity Sensitivity of the land parcel as per the National Web-based Environmental Screening Tool.

12.5 Avifaunal Impact Assessment

A summary of the Avifaunal Impact Assessment (Kemp, 2023) follows. The specialist report is contained in **Appendix E3.**

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

A total of 103 species were recorded during the field survey that was undertaken over two site visits. The total number of individual species accounts for approximately 32.19% of the total number of

expected species. Three (3) of the expected SCC was recorded within the Project Area of Influence (PAOI) and surrounding area during the survey period with point counts. The SCC recorded include *Anthropoides paradiseus* (Blue Crane), *Phoenicopterus roseus* (Greater Flamingo) and Sagittarius serpentarius (Secretarybird).

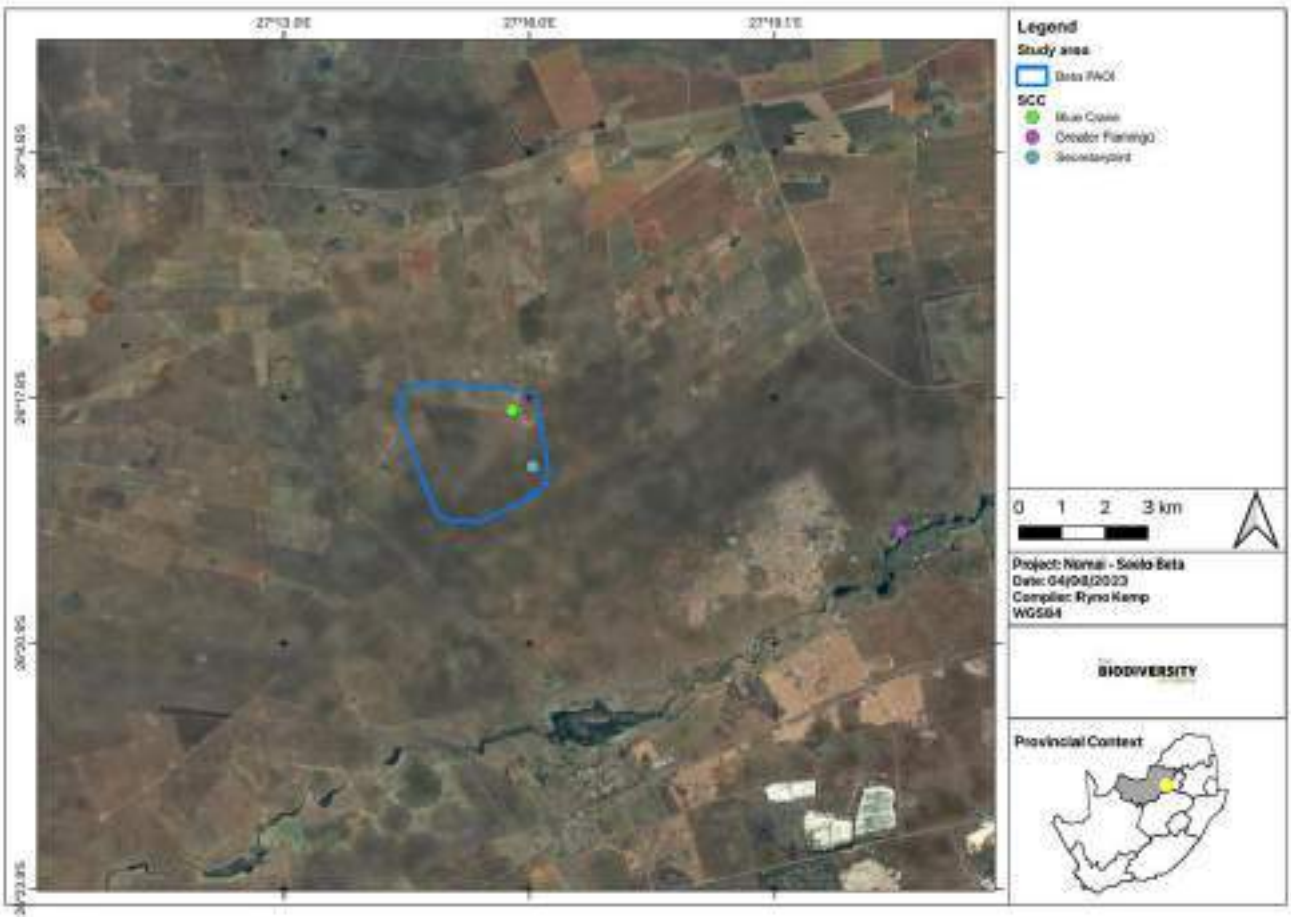

Figure 41: Map illustrating the location of recorded SCC within the PAOI (Kemp, 2023).

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

Two different habitat types were delineated within the PAOI, comprising of Degraded Grassland and Modified landscape (refer to **Figure 42** below).

- Degraded Grassland:

This habitat unit can be regarded as important, not only within the local landscape, but also regionally. The unit functions as remaining greenlands which supports viable indigenous plant species populations and is also used for foraging. The unit also serves as a movement corridor for fauna within a landscape mainly fragmented by agricultural practices. Avifauna species utilising this habitat type included, but not limited to *Sagittarius serpentarius* (Secretarybird), *Bubulcus ibis* (Western Cattel Egret), *Euplectes progne* (Long-tailed Widowbird), *Cisticola juncidis* (Zittign Cisticola), *Vanellus coronatus* (Crowned Lapwing), *Numida melaegis* (Helmeted guineafowl) and *Afrotis afraoides* (Northern Black Korhaan).

- Transformed Areas:

The Modified Area consisted primarily of urban development and existing electricity infrastructure and roads. These areas were mostly void of avifauna species, with the species recorded here being those resilient to disturbance. Species occurring here included *Vanellus armatus* (Blacksmith Lapwing), *Lamprotornis nitens* (Cape Glossy Starling), *Passer melanurus* (Cape Sparrow), *Streptopelia capicola* (Cape Turtle Dove), *Acridotheres tristis* (Common Myna), and *Dicrurus adsimilis* (Fork-tailed Drongo).

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 and high sensitivity for the avian theme due to the proximity of a Vulture restaurant (refer to **Figure 43** below). It should be noted that the avian theme is mainly used for wind farm developments with the animal species and terrestrial biodiversity themes applicable to PV projects.

- Site Ecological Importance (SEI)

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 44**. 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 was assigned a medium SEI and the modified area a very low SEI.

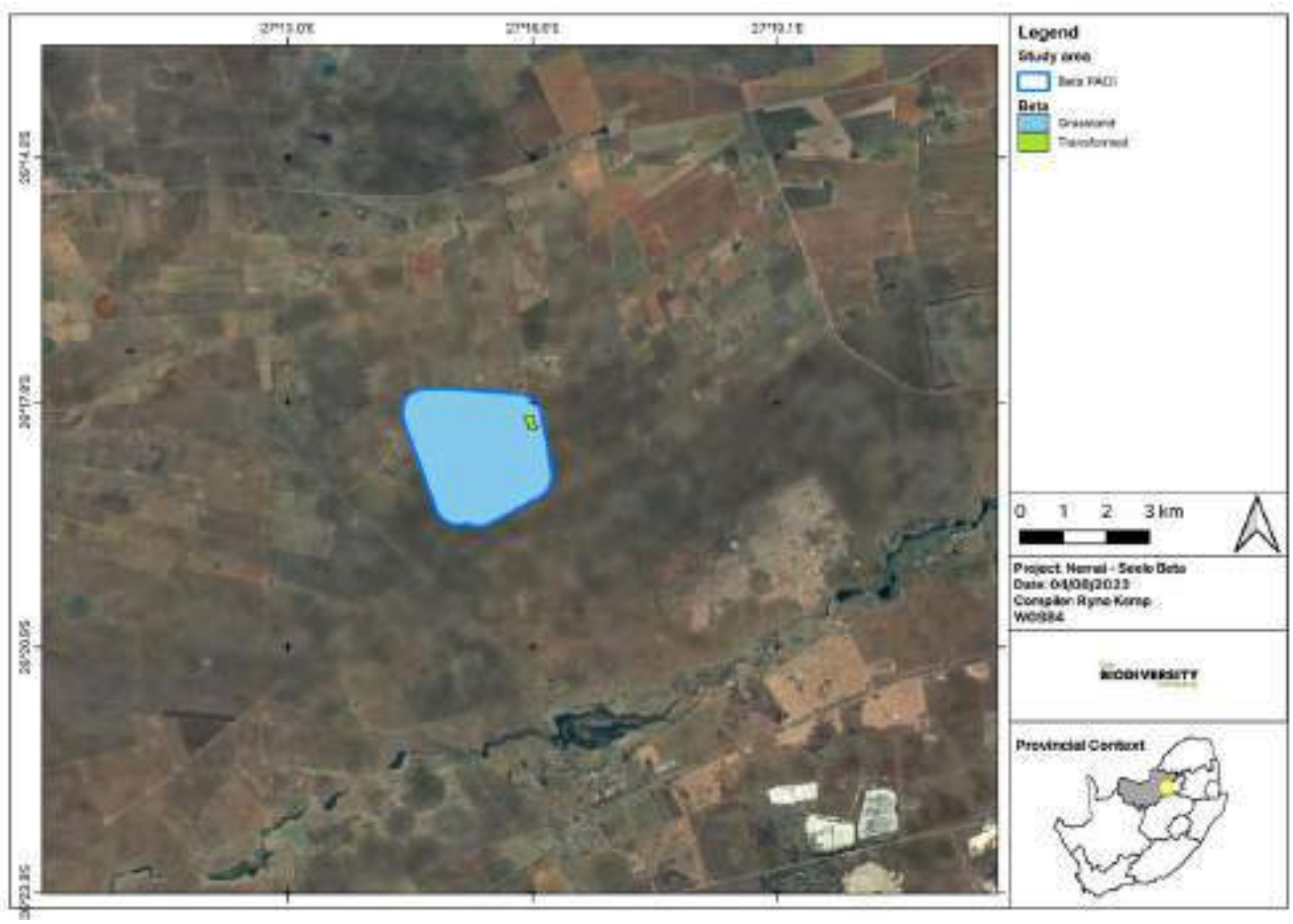

Figure 42: Map illustrating the habitat types delineated within the PAOI (Kemp, 2023).

Table 23: SEI summary of habitat types delineated (Kemp, 2023).

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Modified Grasslands	Medium	Medium	**Medium**	Medium	**Medium**
	Confirmed or highly likely occurrence of populations of NT species	Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity		Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality	
Transformed	Very Low	Very Low	**Very Low**	Very High	**Very Low**
	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.	Several major current negative ecological impacts.		Habitat that can recover rapidly	

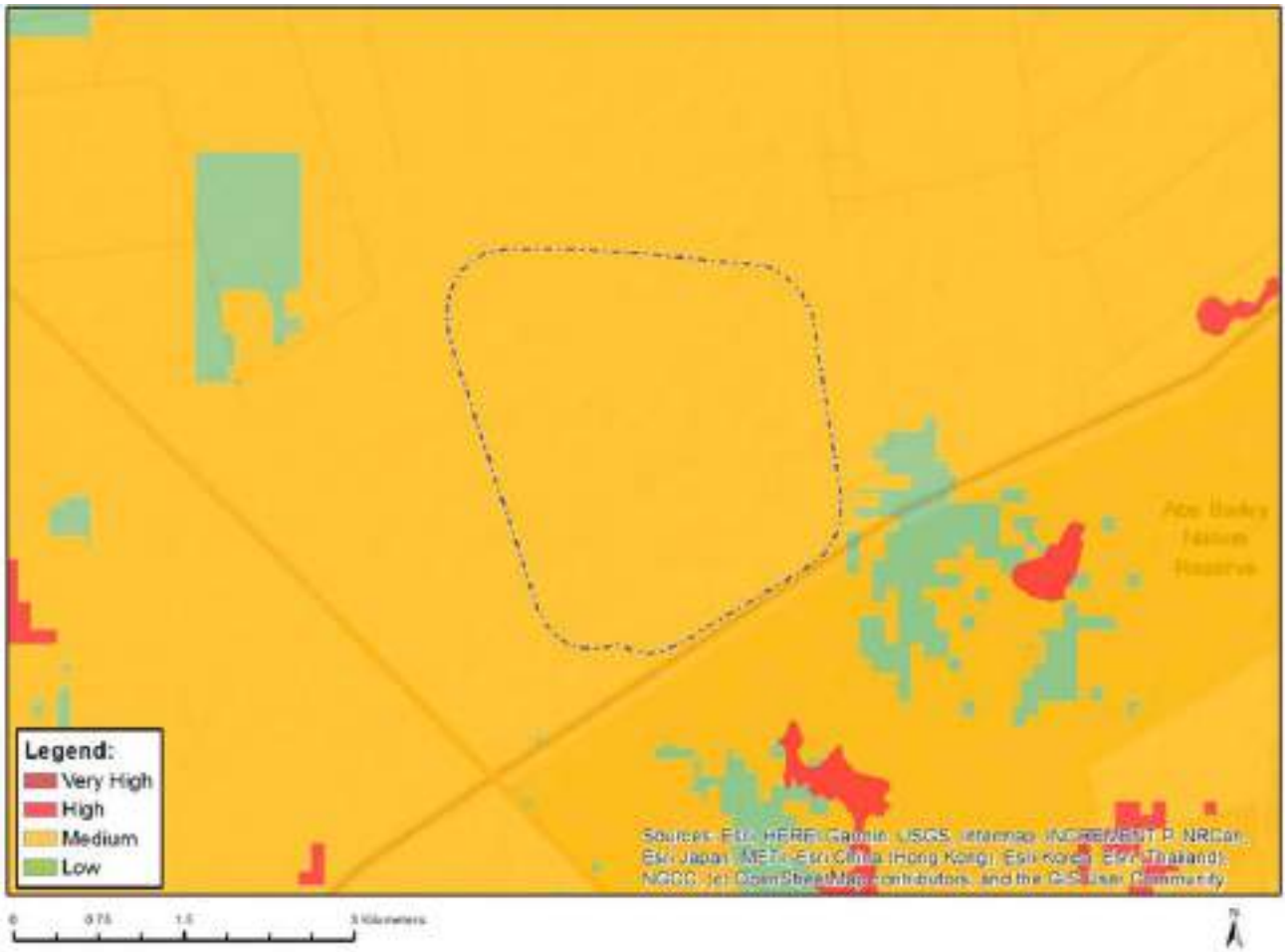

Figure 43: Animal Species Theme sensitivity for the PAOI as per the National Web-based Environmental Screening Tool (Kemp, 2023).

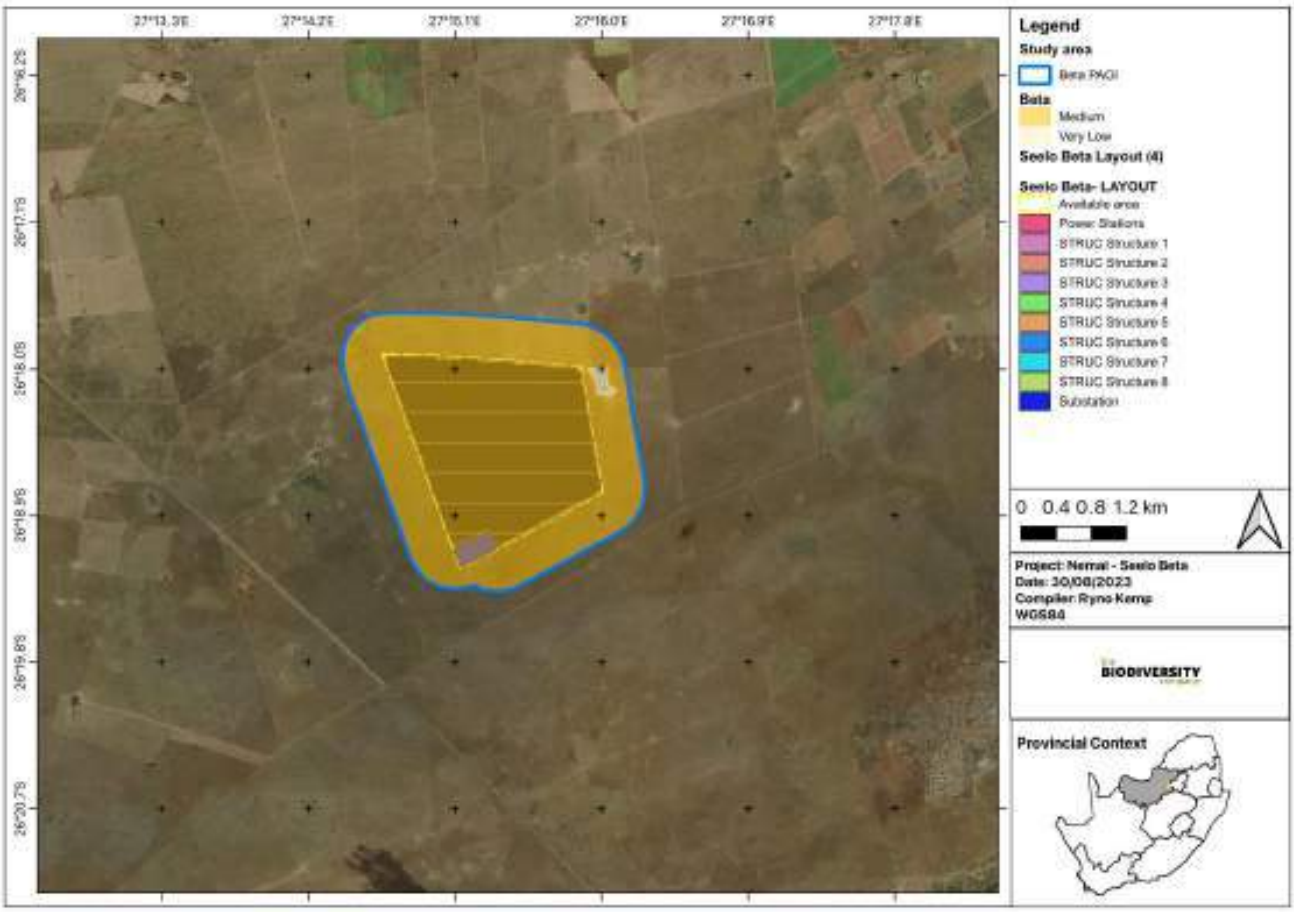

Figure 44: Map illustrating the Site Ecological Importance of the PAOI within an avifauna context (Kemp, 2023).

12.5.3 Conclusion

The following main conclusions are made:

- It is the opinion of the specialist that the project may be favourably considered provided that all the mitigation and recommendations provided are implemented.

12.6 Agricultural Compliance Statement

A summary of the Agricultural Compliance Statement (Gouws, 2023) follows. The specialist report is contained in **Appendix E4.**

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

Land capability classes are interpretive groupings of land with similar potential and limitations or similar hazards. Land capability involves consideration of difficulties in land use owing to physical land characteristics, climate and the risks of land damage from erosion and other causes. According to the guidelines in the Agriculture Geographic Information System (AGIS) from the Department of Agriculture, Land Reform and Rural Development (DALRRD), the land has low and low/moderate arable potential. This is because of shallow soils and rock outcrops. According to the criteria in AGIS the land is not arable and more suitable for livestock grazing.

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 70 LSU.

12.6.2.3 Environmental Sensitivity: Agricultural Theme

According to the National Web-based Environmental Screening Tool, the site in general has a high sensitivity (refer to **Figure 45** below). This grading applies to all land that was previously cultivated, regardless of the land use potential. Grazing land is indicated as medium sensitivity. A site sensitivity verification was undertaken by desktop analysis using satellite imagery and a site visit concluded that the site has a low agricultural sensitivity due to presence of shallow soils and rock outcrops (refer to **Figure 46** below).

12.6.3 Conclusion

The following main conclusions are made:

- There is no high potential sensitive land on the PV site;
- The land on which the development is proposed is low potential cropping land that has a low sensitivity; and
- It is recommended by the specialist that construction be approved.

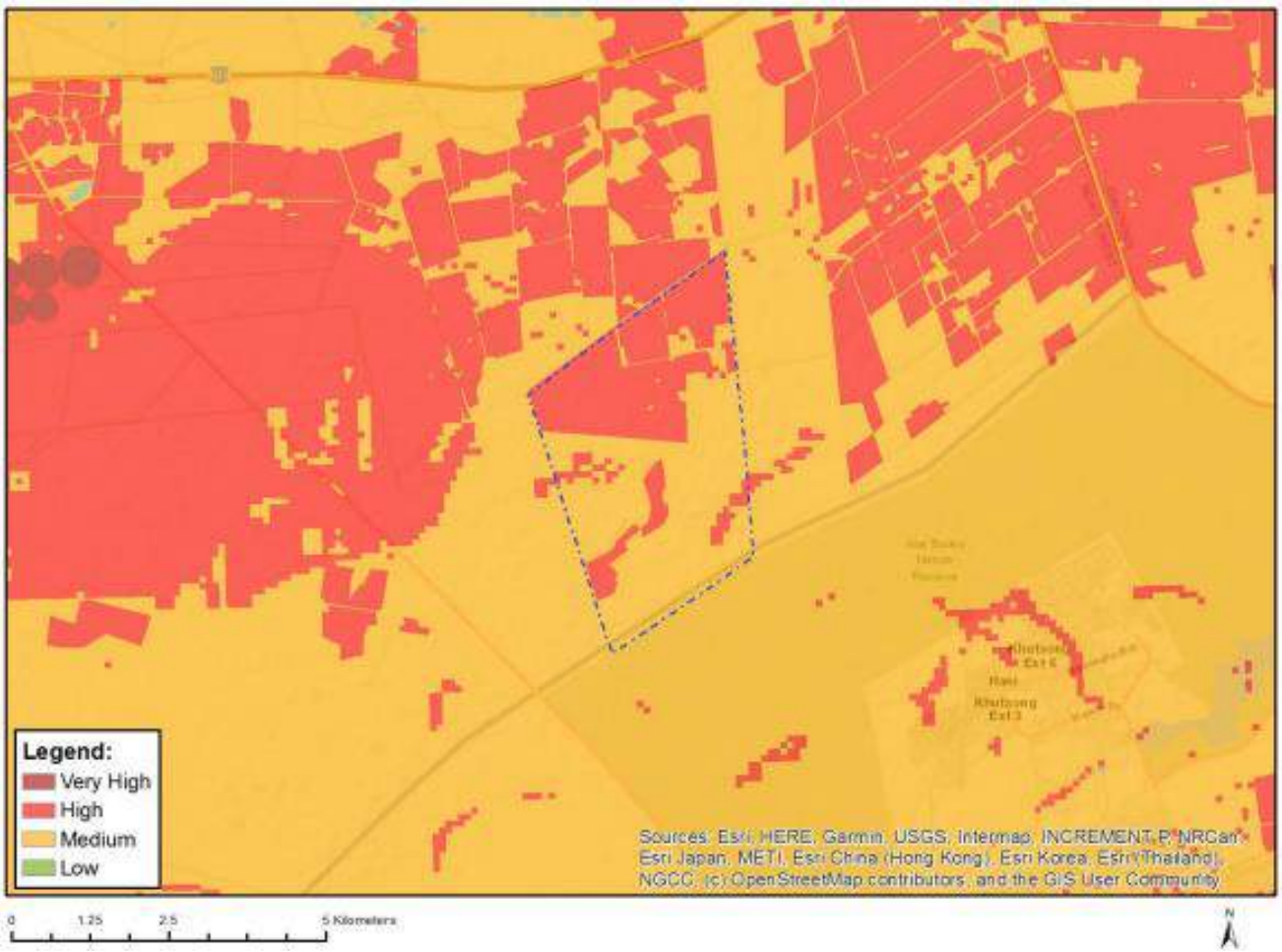

Figure 45: Agricultural Sensitivity of the land parcel as per the National Web-based Environmental Screening Tool.

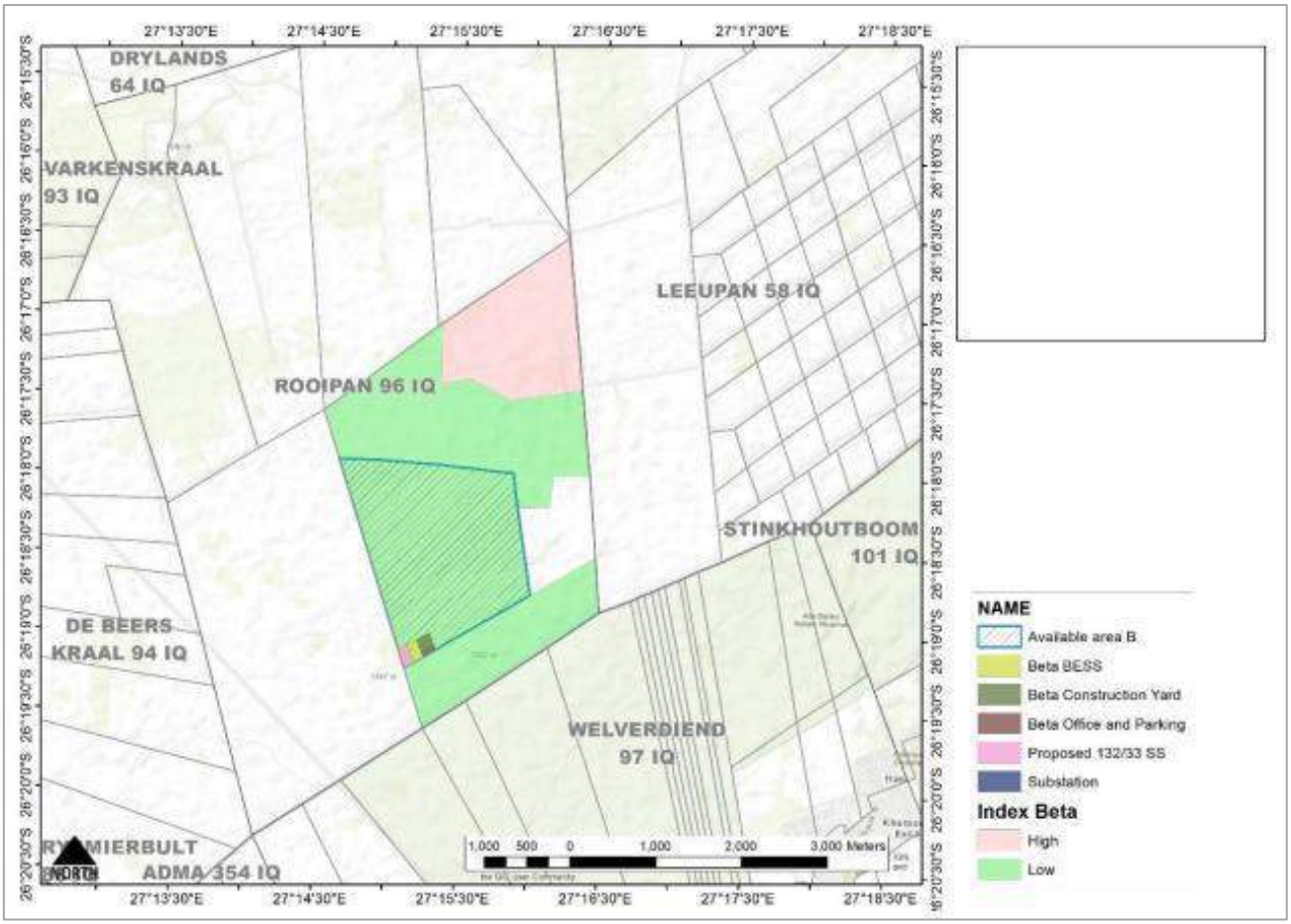

Figure 46: Specialist Sensitivity Analysis (Gouws, 2023).

12.7 Geohydrological Assessment

A summary of the Geohydrological Assessment (Botha, 2023) follows. The specialist report is contained in **Appendix E5.**

12.7.1 Details of the Specialist

Organisation:	GCS Water & Environmental Consultants
Name:	H. Botha
Qualifications:	M.Sc Geohydrology and Hydrology
Affiliation (if applicable):	SACNASP Professional Natural Scientist (Registration No.: 400139/17)

12.7.2 Key Findings of the Study

12.7.2.1 Aquifer characteristics, classification and groundwater recharge

The general aquifer characteristics and aquifer classification are summarised in **Table 24** below.

Table 24: Aquifer characteristics and classification (Botha, 2023).

Aquifer Characteristics	Aquifer Classification
The aquifer host rock comprises predominantly carbonate rocks (dolomite) of the Chuniespoort Group, and meta-arenaceous rocks (quartzites). The aquifer has a medium to high hydraulic conductivity (K-value), 2% and 10% porosity (n-value) and transmissivities of 104 m2/d or higher. The aquifer is mainly secondary.The aquifer can be referred to as being primarily karst (King, et al., 1998). Groundwater is typically encountered in: • Solution channels and fractures occurring in the carbonate rocks of the Chuniespoort Group; and • Joints and fractures in competent arenaceous rocks related to tensional or compressional stresses and offloading (King, et al., 1998). Recharge to the underlying aquifer is estimated to range from 6.2 to 7.2 % (average 6.7% = 41.14 mm/a) of the MAP (614 mm) which falls within quaternary catchment C23E and C23G (DWAF, 2006). The aquifer's (Turffontein Compartment) weathered zone is reported to be approx. 7 – 45 m thick, with the fractured zone approx. 137 - 243 m thick (DWAF, 2006). The combined aquifer thickness is estimated to be in the order of 183 m. The aquifer is an important contributor to groundwater baseflow to streams and rivers (King, et al., 1998).	Available literature and site observation data suggest that two (2) aquifers exist in the area: 1. A shallow aquifer system associated with weathered dolomite as well as moderately to partially weathered chert, shale, limestone, and quartzite; and 2. A deeper intergranular and fractured aquifer network is associated with the Malmani Subgroup of the Chuniespoort Group within the Transvaal Sequence. The aquifer present is classified as a Major Aquifer system (Parsons, 1995). This aquifer underlying the site can be regarded as a high yielding aquifer, with reported yields of >0.5 l/sec - Class c5 aquifer. Northern areas of the site are underlain by a Class c2 aquifer, having a yield of 0.1 – 0.5 l/sec.

12.7.2.2 Depth to groundwater and flow directions

The groundwater levels within the region are expected to range from 12 to 505 mbgl (meters below ground level). The local hydrocensus boreholes indicate a water level range of 13 mbgl (measured) to 120 mbgl (according to owners). **Figure 47** plots available groundwater elevation data for the area. There is a good relationship the shallow water levels (R = 93.33%), between groundwater and topography elevation. Deeper water levels have a lower correlation of R = 65.44% which suggests that the deeper groundwater table does not mimic the topography as with the shallow water levels. Groundwater levels in dolomitic aquifers are characterised by low gradients bounded by steps.

Bayesian interpolation of available groundwater level data was applied to the area to conceptualize the groundwater flow. **Figure 48** indicates the generated Bayesian interpolated groundwater elevations for the area. The data suggest that the general groundwater movement is from NE to SW.

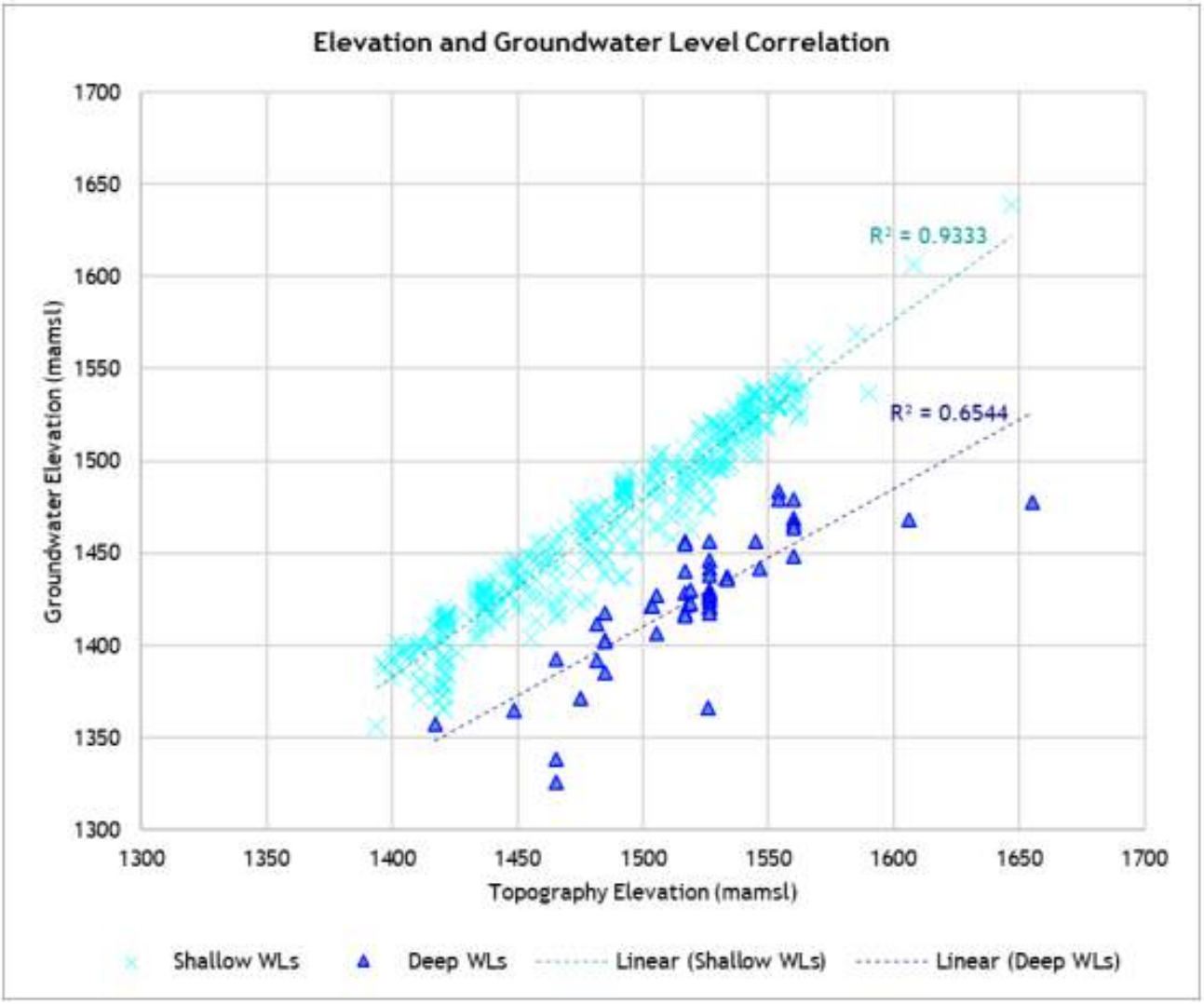

Figure 47: Groundwater elevation vs topography elevation correlation (Botha, 2023).

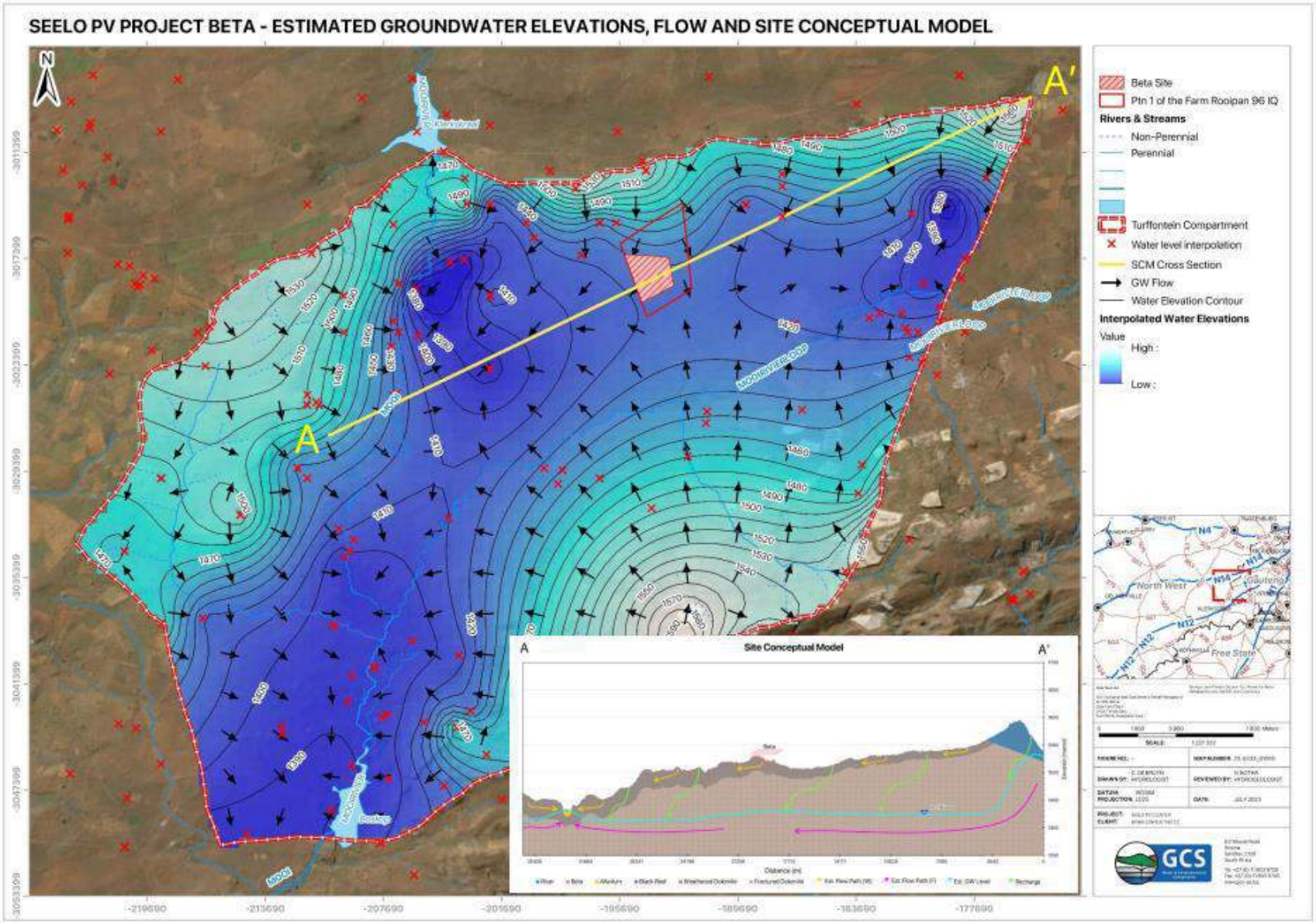

Figure 48: Estimated groundwater depth and flow directions (Botha, 2023).

12.7.2.3 Groundwater quantity and groundwater balance

The groundwater balance and reserve determination on a sub-catchment scale are summarised in **Figure 49** below. The GW balance indicates a surplus value of approx. + 183 511.30 m³/day available for abstraction on a sub-catchment scale.

$$GW_{available} = (Re) - (EU + BHN + BF + PU) \quad (3)$$

Where:

$GW_{available}$	=	Available groundwater for use.
Re	=	Effective recharge to the aquifer.
BF	=	Baseflow to surface water streams.
EU	=	Existing groundwater abstraction/use (identified on sub-catchment, excluding applicant).
PU	=	Proposed use / likely dewatering use.
BHN	=	Basic Human Needs.

Calculations:

Re (sub-catchment)	=	104.92 mm/a × 975.94 km²	
	=	102 396 087.77 m³/a	(280 537.23 m³/day)
BHN	=	479 628 m³/a	(1 314.05 m³/day)
EU	=	16 821 390 m³/day	(46 086.00 m³/day)
BF	=	18 113 446.40 m³/day	(49 625.88 m³/day)
$GW_{available}$	=	(280 537.23 - [46 086 + 1 314.05 + 49 625.88 + 0])	
	=	+ 183 511.30 m³/day	

Figure 49: Groundwater balance and reserve determination calculations (Botha, 2023).

12.7.2.4 Groundwater quality

Literature suggests that the electrical conductivity (EC) for the underlying aquifer generally ranges from 0 – 70 mS/m (Milli Siemens/metre) to 70 – 300 mS/m, with localised areas southwest of Carletonville above > 1000 mS/m. The pH ranges from 6 to 8. Groundwater abstracted from the aquifer can generally be used for domestic use.

No samples were collected for laboratory analysis during the hydrocensus, but in-field measurements were taken from seven (7) boreholes. All constituents are well within the target water quality ranges except BH8 has slightly elevated TDS levels. The results indicate water is of good quality for domestic use, which all the sampled boreholes are used for. Users have not noted any adverse health effects due to consumption. Refer to **Table 25** below for a summary of groundwater quality data.

Table 25: Summary of groundwater quality data (Botha, 2023).

Constituent	Unit	BH3	BH 4	BH 8	BH 9	BH 10	BH 14	BH 16	DWAF 1996 Domestic Use – TWQR
Temperature	**°C**	17.7	14	18	19	-	20.4	21	**ns**
pH in water	**pH units**	7.12	7.7	7.65	8.23	8.18	7.67	6.52	**6 - 9**
Conductivity in mS/m	**mS/m**	0.565	0.641	0.681	0.321	0.46	0.449	0.08	**0 - 70**
Total Dissolved Solids	**mg/ℓ**	391.55	443.49	469.46	227.74	308.65	311.64	54.04	**0 - 450**
ns = No Quality Range in Reference Guideline, Red = Above DWAF (1996) Ideal Water Quality Ranges									

12.7.2.5 Environmental Sensitivity: Aquatic Biodiversity Theme

The development site in question was classified as a sensitive area in terms of the National Web Based Screening Tool (Aquatic Biodiversity Theme). However, based on the field and desktop findings the site sensitivity from a geohydrological perspective is considered low. This is based on the following geohydrological factors:

- No groundwater-surface water interactions could be found during the site visit;
- Limited groundwater users exist in the proposed footprint;
- The water table is very deep (>120m for dolomitic aquifer zones); and
- The proposed development site falls within an area with low susceptibility to pollution.

12.7.3 *Conclusion*

The following main conclusions are made:

- Based on the proposed activities and the risk assessment undertaken, no geohydrological buffer areas or protected areas will be required;
- The current site plan and activities pose a low risk to the groundwater environment during the construction and operational phase; and
- The activities should be authorised provided that the project applicant implements the recommended mitigation measures.

12.8 Heritage Impact Assessment

A summary of the Heritage Impact Assessment (Kitto, 2023) follows. The specialist report is contained in **Appendix E6.**

12.8.1 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)

12.8.2 Key Findings of the Study

12.8.2.1 Field Survey and Results

The inspection of the area that was surveyed identified no heritage resources within the project footprint. The project footprint area has been disturbed extensively in the past as evidenced by the many large heaps of stone scattered all over the area, which are the result of stone clearing for past agricultural or possible past prospecting activities.

12.8.2.2 Environmental Sensitivity: Archaeological and Cultural Heritage Theme

According to the National Web-based Environmental Screening Tool, the Project Area has a low sensitivity for the archaeological and cultural heritage themes (refer to **Figure 50** below). The low sensitivity of the Project Area in terms of archaeological and cultural heritage was confirmed by the specialist during their field survey (refer to **Figure 51** below).

12.8.3 *Conclusion*

The following main conclusions are made:

- The proposed project should not impact on heritage resources as no archaeological, cultural (graves) or historical heritage resources were identified within or immediately adjacent to the project footprint area; and
- 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 and BESS project within the footprint can proceed.

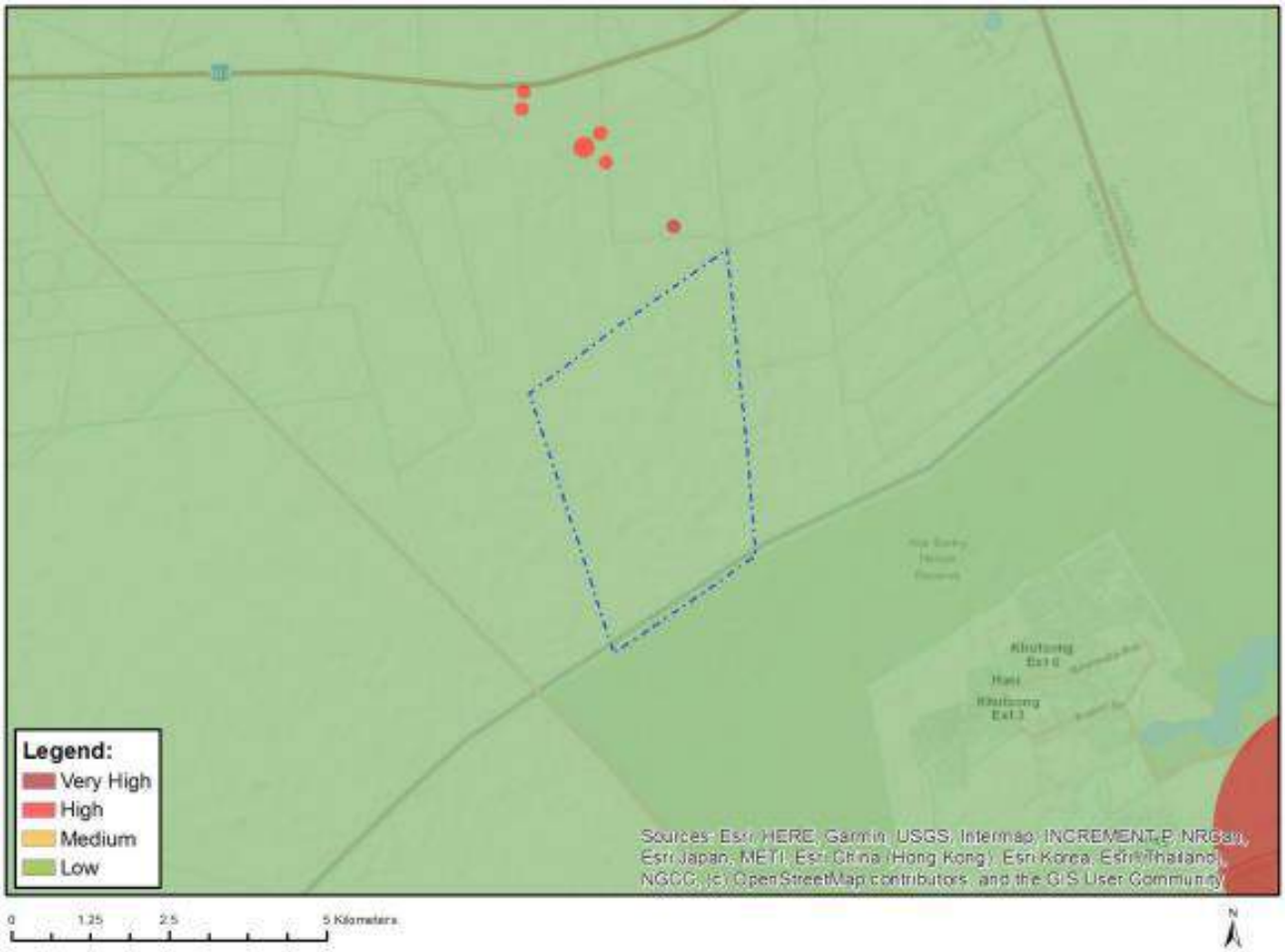

Figure 50: Archaeological and Cultural Heritage Sensitivity of the land parcel as per the National Web-based Environmental Screening Tool.

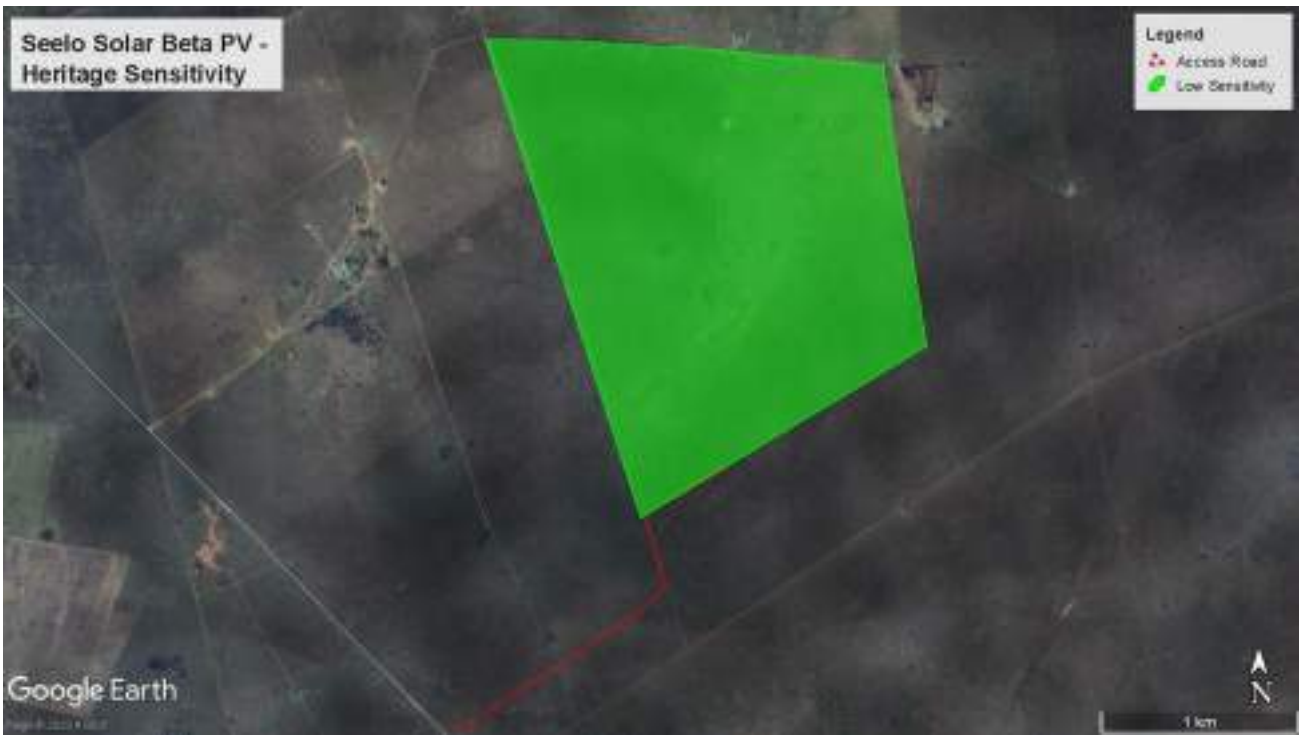

Figure 51: Site Sensitivity of the Project Area (Kitto, 2023)

12.9 Palaeontological Impact Assessment

A summary of the Palaeontological Impact Assessment (Butler, 2023) follows. The specialist report is contained in **Appendix E7.**

12.9.1 Details of the Specialist

Organisation:	Banzai Environmental
Name:	E. Butler
Qualifications:	M.Sc Zoology
Affiliation (if applicable):	Member of the Palaeontological Society of South Africa (PSSA)

12.9.2 Key Findings of the Study

12.9.2.1 Field Survey and Results

A site-specific field survey of the development footprint was undertaken. No fossiliferous outcrops were identified in the development site. Based on the site investigation as well as desktop research it is concluded that fossil heritage if scientific and conservational interest in the development footprint is rare.

12.9.2.2 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 (refer to **Figure 52** below). As the field survey did not detect any fossiliferous outcrops, the sensitivity designated in terms of the screening tool is contested based on the actual conditions recorded. A low Palaeontological sensitivity has thus been allocated to the development footprint.

12.9.3 *Conclusion*

The following main conclusions are made:

- The proposed development will not lead to damaging impacts on the palaeontological resources of the area; and
- The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

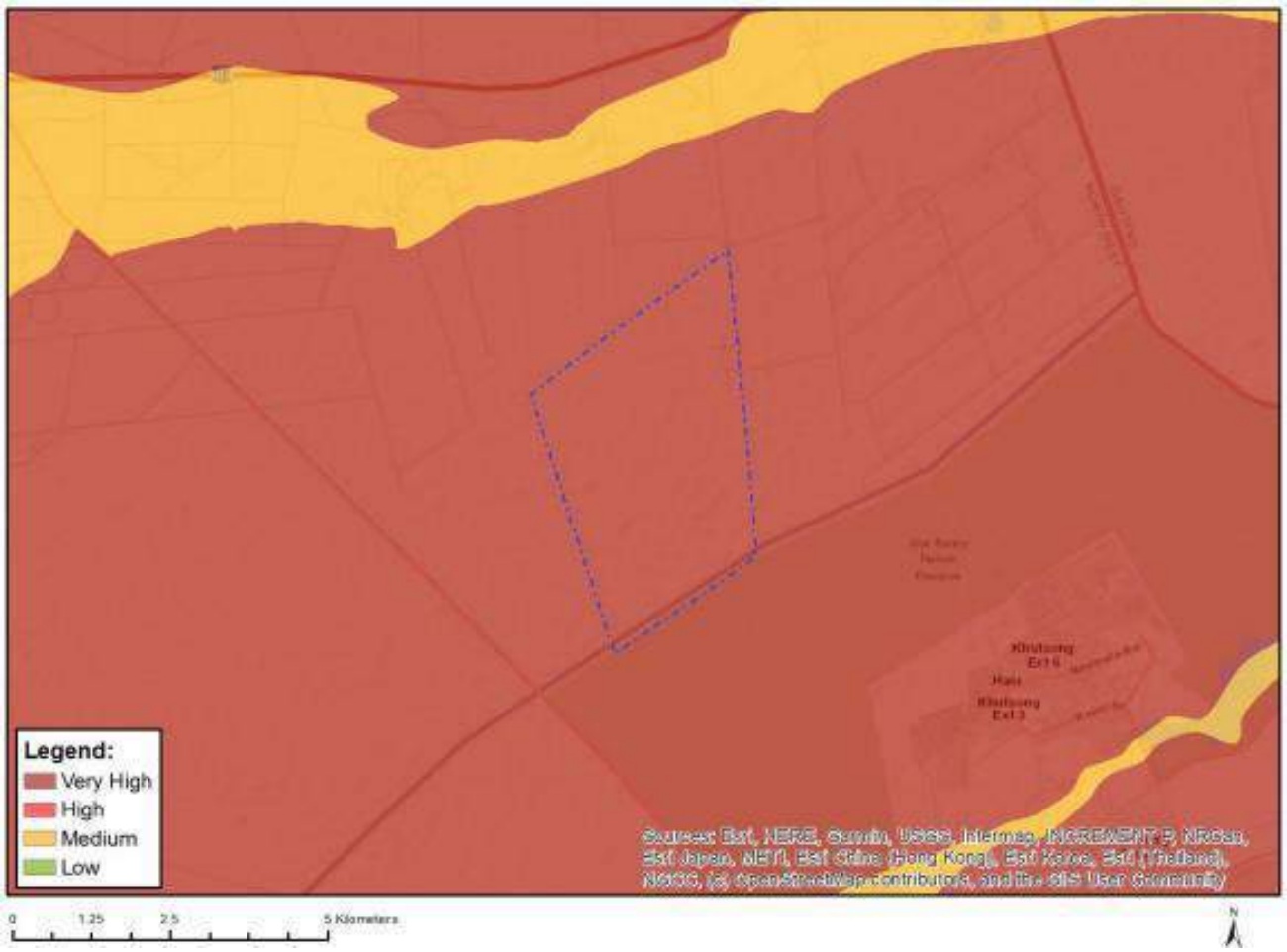

Figure 52: Palaeontological Sensitivity of the land parcel as per the National Web-based Environmental Screening Tool.

12.10 Visual Impact Assessment

A summary of the Visual Impact Assessment (Buys, 2023) follows. The specialist report is contained in **Appendix E8.**

12.10.1 Details of the Specialist

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

12.10.2 Key Findings of the Study

12.10.2.1 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; and
- 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 26** below. Based on the score ranges, the overall visual resource value of the study area is rated as **moderate** (8).

Table 26: Visual resource value determination (Buys, 2023).

Visual Baseline Attributes	Topography	Hydrology	Vegetation	Land Uses
Visual resource value score	2	2	2	2
			Total	**8**

12.10.2.2 Visual Absorption Capacity

Visual Absorption Capacity (VAC) can be regarded as the capacity of the landscape to absorb development without creating significant change in visual character or producing a reduction in scenic quality. 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.

12.10.2.3 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 level of visibility is

provided in **Table 27** below. When considering the viewshed analysis, the visibility rating is **moderate**.

Table 27: 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

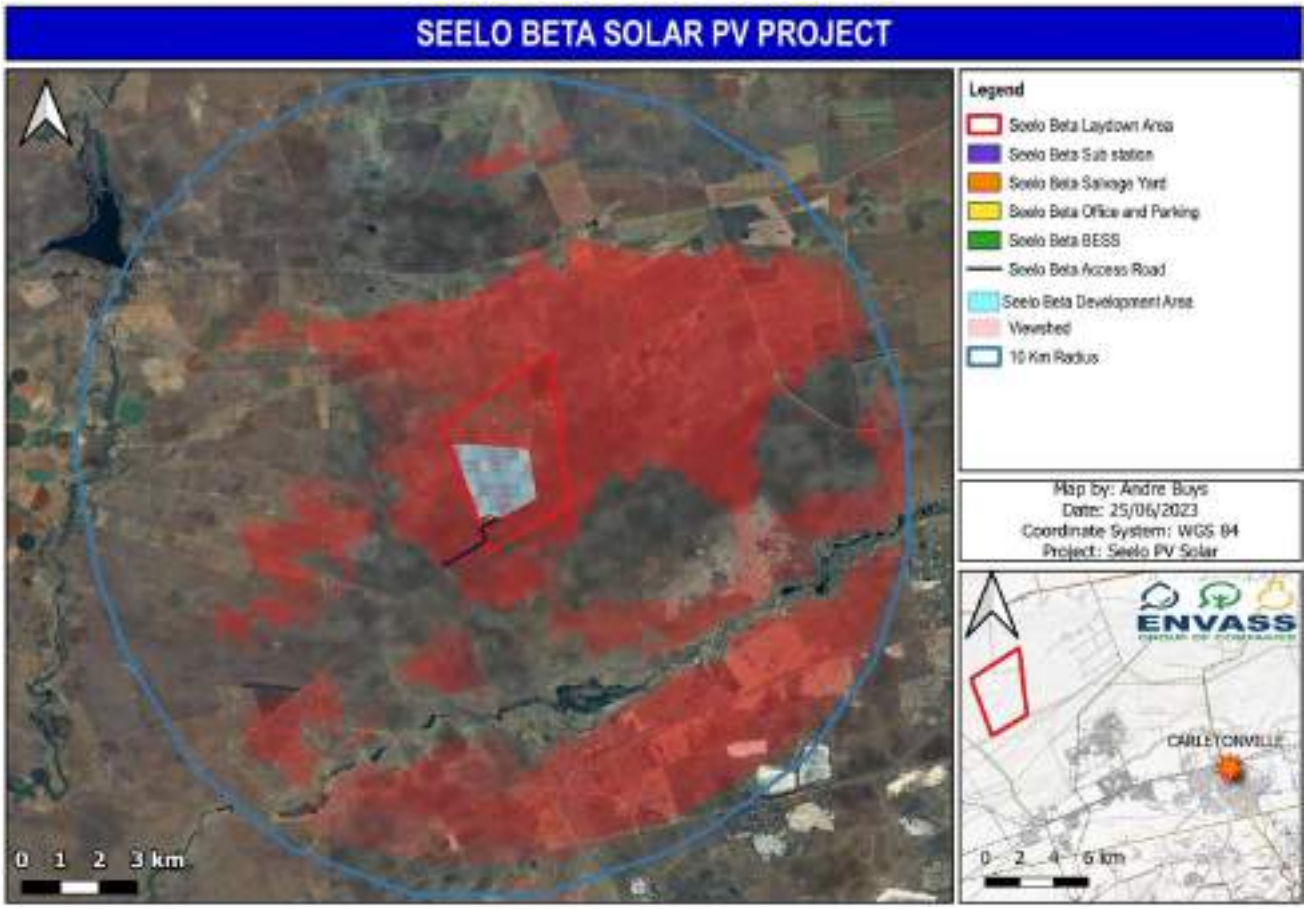

Figure 53: Viewshed analysis of the proposed Seelo Beta PV project (10km radius) (Buys, 2023).

12.10.2.4 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 moderate 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.

12.10.2.5 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.

12.10.3 *Conclusion*

The following main conclusions are made:

- 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; 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.

12.11 Transport Impact Assessment

A summary of the Transport Impact Assessment (Wink, 2023) follows. The specialist report is contained in **Appendix E9.**

12.11.1 Details of the Specialist

Organisation:	iWink Consulting (Pty) Ltd
Name:	I. Wink
Qualifications:	M.Sc Engineering (Civil & Transportation)
Affiliation (if applicable):	Professional Engineer registered with the Engineering Council of South Africa (No. 20110156)

12.11.2 Key Findings of the Study

- From a transport engineering perspective, the alternatives outlined for the development are equally acceptable as it does have a nominal impact on the traffic on the surrounding road network;
- Access to the project site will via a new access road from the D331 (refer to **Figure 54** below). The required minimum shoulder sight distances are met in both directions accessing the D331 from the proposed access point (refer to **Figure 55** below);
- The main impact on the external road network will be during the construction phase. This phase is temporary in comparison to the operational period;
- The number of abnormal loads vehicles was estimated to be found to be able to be accommodated by the road network; and
- During operation, it is expected that maintenance and security staff will periodically visit the facility and water be transported to site possibly twice a year for the cleaning of panels. The generated trips can be accommodated by the external road network.

12.11.3 Conclusion

The following main conclusions are made:

- The construction and decommissioning phases of a solar power facility are the only significant traffic generators and therefore noise and dust pollution will be higher during these phases. The duration of these phases is of temporary nature, i.e., the impact of the solar power facility on the external traffic on the surrounding road network is temporary and solar facilities, when operational, do not add any significant traffic to the road network; and
- The proposed development of the project is supported from a traffic engineering perspective provided that the recommended mitigation measures are adhered to.

Figure 54: Aerial view of proposed access road (Wink, 2023).

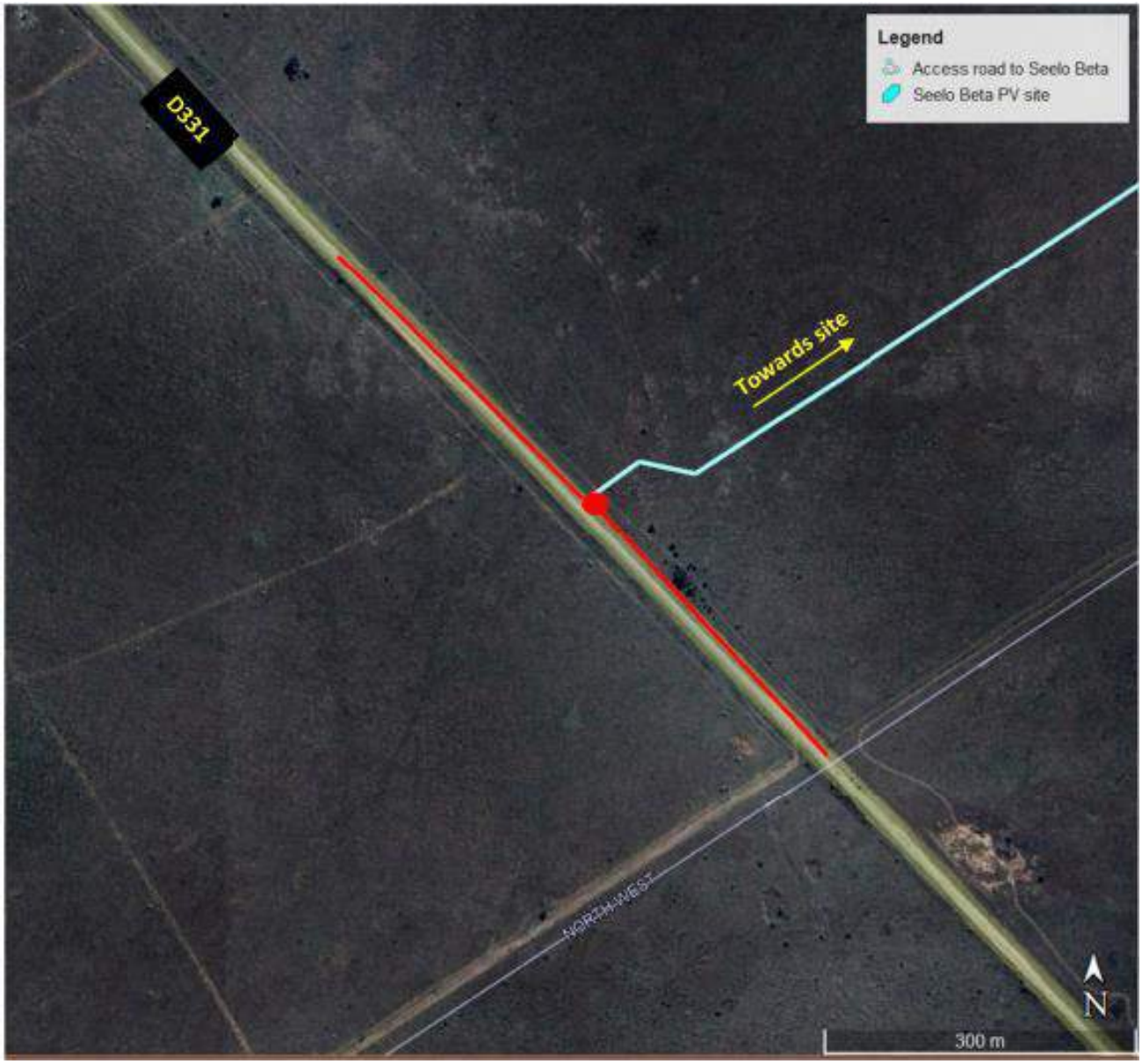

Figure 55: Required sight distances at proposed access point on D331 (Wink, 2023).

12.12 Social Impact Assessment

A summary of the Social Impact Assessment (Tanhuke & Duncan, 2023) follows. The specialist report is contained in **Appendix E10.**

12.12.1 Details of the Specialist

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

12.12.2 Key Findings of the Study

- The regional study area is a rural economy with a narrow base;
- 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 negative impacts are limited in nature and scope and can be successfully mitigated by management rules and practices;
- It is therefore found that the project, once the recommended mitigation measures have been implemented, has a net 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 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 28** 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 13.6 – 13.22** below.

Table 28: 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. Servitude restrictions.
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.	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 PV Site. Surface water pollution due to spillages and poor construction practices.	Sedimentation through silt-laden runoff, caused by inadequate stormwater management. Damage to the PV facility 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 (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 exposed 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.	Setbacks / conditions associated with surrounding land and infrastructure.
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 main access 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. Safe access to and from 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.
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.** 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.

13.3 Impact Assessment Methodology

The impacts and the proposed management thereof are first discussed in **Section 13.5** to **Section 13.22** 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 29** 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 29: 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. • **Rare/Remote** - the event may occur only in exceptional circumstances.

Criteria	Description
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 30*** *above*. However, the quantitative basis for these specialist evaluations of the impacts to specific environmental features still satisfied the intention of the EIA.

13.4 Impact Mitigation

13.4.1 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 H**) 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.

13.4.2 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 of substation infrastructure for the transmission and distribution of electricity (contained in **Appendix H1**); and
- Separate EMPr for the Solar PV Plant (contained in **Appendix H2**).

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.

13.5 Surface Water

13.5.1 Hydrology

13.5.1.1 Impact Description

The project site is not directly affected by any watercourses. The nearest watercourse (perennial Mooirivierloop) is located ± 5.45 km south east of the site. Construction activities and site clearance could result in concentrated stormwater flow which will lead to erosion and runoff carrying a high silt load and contaminants such as fuel, hydraulic fluids, degreasers, chemicals and cement.

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

- ❑ Altered drainage and increased runoff;
- ❑ Concentrated runoff;
- ❑ Stormwater pollution; and
- ❑ Damage due to major flood events.

13.5.1.2 Impact Assessment

Environmental Feature	**Surface Water**
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. • Concentrated runoff. • Stormwater pollution. • Damage caused by floods.	• Design suitable stormwater drainage system for the PV Site. • Implement a construction and operational stormwater Management Plan. • Identify appropriate protection measures during the design stage, taking into consideration foundation stability, access road stability, and electrical connections (amongst others). • Carry out earthworks in phases across the PV Site to reduce the total area of disturbed ground at any one time. • Undertake the rehabilitation and re-vegetation of areas affected by construction as soon as such areas become available. • See mitigation measures for hazardous substances and waste.

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

13.5.2 Wetlands

The findings from the Aquatic Biodiversity Compliance Statement (Van Rooyen, 2023) follow. The specialist report is contained in **Appendix E1**.

13.5.3 Impact Description

A site visit undertaken by the appointed Freshwater Specialist concluded that the project site and immediate surrounding area do not contain any sensitive freshwater hydrological features

(watercourses and wetlands) and that the project site is classified as having a low sensitivity with regard to freshwater hydrological features. Since no sensitive freshwater hydrological features were identified, no potential impacts are expected which would require the application of mitigation measures.

13.5.4 Impact Assessment

According to the Protocol for the specialist assessment and minimum report content requirements for environmental impacts on aquatic biodiversity (GN No. 320 of 20 March 2020), an Aquatic Biodiversity Compliance Statement was prepared for the Project as the desktop assessment and field survey confirmed that the Project Area is of a 'Low' sensitivity. This compliance statement does not include a quantitative assessment of the potential impacts to aquatic biodiversity.

13.6 Soils

13.6.1 Impact Description

According to Gouws (2023), the soil at the PV site is well-drained with moderately developed structure. 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). Valuable topsoil may also be lost as a result of site clearance and construction activities.

13.6.2 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. • Loss of valuable topsoil.	• Consider findings from geotechnical investigations during Project design phase and incorporate mitigation measures (as relevant). • Design suitable stormwater drainage system for the PV Site. • Implement a construction and operational stormwater Management Plan. • Erosion protection measures should be installed where there are possibilities of surface water sheet flow causing erosion. • Topsoil should be stripped during the site clearance of all areas that will be used for the construction site camp and construction activities. • Stripped topsoil should be separately stockpiled and protected for the duration of construction activities.

	• Carry out earthworks in phases across the PV Site to reduce the total area of disturbed ground at any one time. • Undertake the rehabilitation and re-vegetation of areas affected by construction as soon as such areas become available. • See mitigation measures for hazardous substances and waste.

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

13.7 Geohydrology

The findings from the Geohydrological Assessment (Botha, 2023) follow. The specialist report is contained in **Appendix E5**.

13.7.1 Impact Description

In terms of the proposed development several risks during the construction and operational phase of the development were identified. Based on the Source-Pathway-Receptor (SPR) model applied to the site the following potential geohydrological risks are identified:

- Construction phase:
  - Leakages from construction and contractor vehicles accessing the site may cause soil pollution (i.e., un-inspected vehicles dripping oils/hydrocarbons onto soils may cause contamination of soil and surface water resources); and
  - Disturbing soils (land capability) due to some vegetation clearing may promote sedimented runoff during storm events.
- Operational phase:
  - Oil spillage from parked vehicles (service vehicles) may seep into the aquifer via the vadose zone;
  - Seepage from ruptured sewer lines (only if ruptures occur);
  - Sedimentation runoff from areas where no stormwater management measures are implemented; or where vegetation is not maintained; and
  - Dewatering of dolomite aquifer.

In term of the groundwater reserve, as there are no new proposed groundwater abstraction activities, there will be minimal impact on the reserve. Small-scale impacts in terms of groundwater recharge reduction are anticipated due to the scale and changes to runoff coefficients of the development (landscape becomes slightly less permeable).

13.7.2 Impact Assessment

An SPR model was developed and considered to quantify and assess the potential hydrological risks and impacts. The potential impacts identified and environmental significance for the construction and operational phase are detailed under **Table 30** and **Table 31**.

Table 30: Geohydrological Impact Assessment – Construction Phase (Botha, 2023)

Component Being Impacted On	Activity Which May Cause the Impact	Activity	Pre- Mitigation							Recommended Mitigation Measures	Post Mitigation						
			Duration (D)	Extent (E)	Potential for impact on irreplaceable resources (I)	Severity (S)	Consequence (C)	Probability (P)	Significance		Duration (D)	Extent (E)	Potential for impact on irreplaceable resources (I)	Severity (S)	Consequence (C)	Probability (P)	Significance
Vadose zone soils	Hydrocarbon/oil spillages onto soils have the potential to contaminate the soils. Removal of soils along with deconstructed building material. Stripping of concrete laydown areas and placing of building material on soils where there may be leaching of contaminants into the soil.	Earthworks and deconstruction activities	Short-term (2)	Site (2)	Yes (1)	Medium (-2)	Slightly detrimental (-7 to -12) (-10)	Definite (2)	Low (-20)	• Only excavate / clear areas applicable to the project area. • Keep the site clean of all general and domestic wastes. • Have fuel/oil spill clean-up kits on site. • Exposed soils are to be protected using a suitable covering or sandbags or berms to control erosion.	Short-term (2)	Site (2)	Yes (1)	Low (1)	Negligible (0 to -6) (-5)	Definite (2)	Very Low - neutral (0 to -12) (-10)
Primary Surface Water Receivers – > Perennial streams	Erosion and sedimentation of watercourses due to unforeseen circumstances (i.e., bad weather).	Earthworks and deconstruction activities	Short-term (2)	Site (2)	Yes (1)	Medium (-2)	Slightly detrimental (-7 to -12) (-10)	Definite (2)	Low (-20)	• Cover building material and stockpiles with a temporary liner to prevent contamination (where required and visually determined). • Ensure a stormwater management plan is in place.	Short-term (2)	Site (2)	Yes (1)	Low (1)	Negligible (0 to -6) (-5)	Definite (2)	Very Low - neutral (0 to -12) (-10)
Regional groundwater table	Oil/fuel spillages may enter the regional groundwater table if prolonged percolation via the vadose zone takes place. Declining water table due to abstraction could form sinkholes.	Earthworks and deconstruction activities	Short-term (2)	Site (2)	Yes (1)	Low (-1)	Negligible (-6 to 0) (-5)	Improbable (0)	Very low (0 to -12) (0 - ZERO)	No mitigation is possible. Impact projected to be zero.							
Groundwater users	Poor quality seepage from oil/fuel spills during the construction phase, at any point in the project area, may impact the shallow groundwater table. Identified groundwater boreholes are not in	Earthworks and deconstruction activities	Short-term (2)	Site (2)	Yes (1)	Low (1)	Negligible (0 to -6) (-5)	Improbable (0)	Very Low - neutral (0 to -12) (0 - ZERO)	No mitigation required							

Component Being Impacted On	Activity Which May Cause the Impact	Activity	Pre- Mitigation							Recommended Mitigation Measures	Post Mitigation						
			Duration (D)	Extent (E)	Potential for impact on irreplaceable resources (I)	Severity (S)	Consequence (C)	Probability (P)	Significance		Duration (D)	Extent (E)	Potential for impact on irreplaceable resources (I)	Severity (S)	Consequence (C)	Probability (P)	Significance
	the same drainage area.																

Table 31: Geohydrological Impact Assessment – Operational Phase (Botha, 2023).

Component Being Impacted On	Activity Which May Cause the Impact	Activity	Pre- Mitigation							Recommended Mitigation Measures	Post Mitigation						
			Duration (D)	Extent (E)	Potential for impact on irreplaceable resources (I)	Severity (S)	Consequence (C)	Probability (P)	Significance		Duration (D)	Extent (E)	Potential for impact on irreplaceable resources (I)	Severity (S)	Consequence (C)	Probability (P)	Significance
Vadose zone soils	There is a potential for some erosion if there are storm events. Hydrocarbon/oil spillages onto soils have the potential to contaminate the soils.	Earth Net results of the development and operational activities on the site	Short-term (2)	Site (2)	Yes (1)	Medium (-2)	Slightly detrimental (-7 to -12) (-10)	Definite (2)	Low (-20)	• Keep the site clean of all general and domestic wastes. • All development footprint areas to remain as small as possible, and vegetation clearing to be limited to what is essential. • Retain as much indigenous vegetation as possible / re-vegetate. • Have fuel/oil spill clean-up kits on site. • Exposed soils are to be protected using a suitable covering or sandbags or berms to control erosion.	Short-term (2)	Site (2)	Yes (1)	Low (1)	Negligible (0 to -6) (-5)	Definite (2)	Very Low - neutral (0 to -12) (-10)
Primary Surface Water Receivers – > Perennial streams	Erosion and sedimentation of watercourses due to unforeseen circumstances (i.e., bad weather). Alteration of natural drainage lines may lead to ponding or increased runoff patterns (i.e., may cause stagnant water levels or increase erosion).	Net results of the development and operational activities on the site	Short-term (2)	Site (2)	Yes (1)	Medium (-2)	Slightly detrimental (-7 to -12) (-10)	Definite (2)	Low (-20)	• Cover soil stockpiles with a temporary liner to prevent contamination (where required and visually determined). • Ensure a stormwater management plan is in place.	Short-term (2)	Site (2)	Yes (1)	Low (1)	Negligible (0 to -6) (-5)	Definite (2)	Very Low - neutral (0 to -12) (-10)
Regional groundwater table	Oil/fuel spillages may enter the regional groundwater table if prolonged percolation via the vadose zone takes place. Declining water table due to abstraction could form sinkholes.	Net results of the development and operational activities on the site	Short-term (2)	Site (2)	Yes (1)	Low (-1)	Negligible (-6 to 0) (-5)	Improbable (0)	Very low (0 to -12) (0 - ZERO)	No mitigation is possible. Impact projected to be zero.							
Groundwater users	Poor quality seepage from oil/fuel spills during the construction phase, at any point in the project area, may impact the shallow groundwater table. Identified groundwater boreholes are not in the same drainage area.	Net results of the development and operational activities on the site	Short-term (2)	Site (2)	Yes (1)	Low (1)	Negligible (0 to -6) (-5)	Improbable (0)	Very Low - neutral (0 to -12) (0 - ZERO)	No mitigation required							

13.8 Terrestrial Ecology

The findings from the Terrestrial Biodiversity Compliance Statement (Human, 2023) follow. The specialist report is contained in **Appendix E2**.

13.8.1 Impact Description

The Project Area was found to be in a heavily modified condition, mainly attributed to the agricultural practices and its impacts associated, resulting in the area being largely disturbed. Grazing practices, historical agricultural fields and biospheres have degraded the vegetation severely. No protected trees or flora SCC were observed. In terms of fauna, mammal activity was low, due to the extent of disturbance in general and cattle grazing the area, as well as the poor habitat condition. No faunal SCC were observed during the field survey.

Due to the above mentioned, as per the habitat survey and SEI assessment, the Project Area is deemed to have a 'low' sensitivity. Subsequently, the project area is likely to result in negligible negative impacts.

13.8.2 Impact Assessment

According to the Protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial biodiversity (GN No. 320 of 20 March 2020), a Terrestrial Biodiversity Compliance Statement was prepared for the Project as the desktop assessment and field survey confirmed that the Project Area is of a 'Low' sensitivity. This compliance statement does not include a quantitative assessment of the potential impacts to terrestrial biodiversity; however it provides impact management actions that have been included in the project EMPr.

The focus of mitigation measures is to reduce the significance of potential impacts associated with the development and thereby to:

- Prevent the further loss and fragmentation of vegetation communities within the CBA and ESA areas in the vicinity of the project area;
- Reduce the negative fragmentation effects of the development and enable the safe movement of faunal species; and
- Prevent the direct and indirect loss and disturbance of floral and faunal species and communities (including any potential Species of Conservation Concern nearby).

13.9 Avifauna

A separate Avifaunal Impact Assessment (Kemp, 2023) was undertaken and the findings from this study follow. The specialist report is contained in **Appendix E3**.

13.9.1 Impact Description

During the construction phase vegetation clearing for the associated infrastructure will lead to direct habitat loss. Vegetation clearing will create a disturbance and will therefore potentially lead to the displacement of avifaunal species. The operation of construction machinery on site will generate noise pollution. Increased human presence can lead to poaching and the increase in vehicle traffic and heavy machinery will potentially lead to roadkill.

The principal impacts of the operational phase are electrocution, collisions, chemical pollution due to chemical cleaning of the PV panels (should environmentally friendly or biodegradable products not be used) and habitat loss.

Fencing of the PV site can influence birds in six ways, namely:

- Snagging – occurs when a body part is impaled on one or more barbs or razor points of a fence;
- Snaring – when a bird's foot/leg becomes trapped between two overlapping wires;
- Impact injuries – birds flying into a fence, the impact may kill or injure the bird;
- Snarling – when birds try and push through a mesh or wire stands, ultimately becoming trapped (uncommon);
- Electrocution – electrified fence can kill or severely injure birds; and
- Barrier effect – fences may limit flightless birds including moulting waterfowl from resources.

13.9.2 Impact Assessment

Potential impacts were evaluated against the data captured during the fieldwork and from a desktop perspective to identify relevance to the project site, specifically the proposed development footprint area. The assessment of the significance of direct, indirect and cumulative impacts was undertaken. The assessment of impact significance considers pre-mitigation as well as implemented of post-mitigation scenarios. Refer to the sections and tables to follow for an assessment of the significance impacts to avifauna associated with the project.

13.9.2.1 Habitat destruction

Habitat destruction of the proposed development is inevitable. Pre-mitigation the significance of the impact is a Negative Very High Impact but with the implementation of mitigation measures can be reduced to a Negative Medium Impact.

Table 32: Impact significance of habitat destruction (Kemp, 2023).

Pre mitigation							
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**
Post mitigation							
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**

Mitigation Measures:

- If feasible 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 fossorial and epigeic biodiversity. If concrete foundations are used that would increase the impact of the project as there would be direct impacts to soil permeability and characteristics, thereby influencing inhabitant fauna.

In addition, stormwater runoff and runoff from cleaning the panels would be increased, increasing erosion in the surrounding areas;

- Indigenous vegetation to be maintained, if possible under the solar panels to ensure biodiversity is maintained and to prevent soil erosion;
- Vegetation clearing to commence only after the necessary permits have been obtained;
- Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities; and
- Vegetation clearance should remain within the approved development layout.

13.9.2.2 Destruction, degradation and fragmentation of surrounding habitats

Construction activities can lead to destruction of surrounding habitats. Pre-mitigation this impact has a Negative High significance, but with the implementation of mitigation measures the significance can be reduced to a Negative Low impact.

Table 33: Impact significance of destruction, degradation and fragmentation of surrounding habitats (Kemp, 2023).

Pre mitigation							
Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
2	4	3	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).	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.	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 moderate Impact**
Post mitigation							
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**

Mitigation Measures:

- Pre-construction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, remaining within demarcated construction areas etc;
- All solid waste must be managed in accordance with a Solid Waste Management Plan. Recycling is encouraged;
- All construction activities and roads to be within the clearly defined and demarcated areas;
- Temporary laydown areas must be clearly demarcated and rehabilitated with indigenous vegetation subsequent to end of use;
- Appropriate dust control measures to be implemented;
- Suitable sanitary facilities to be provided for construction staff as per the guidelines in Health and Safety Act;
- Cement must be mixed in a designated area on a liner away from water sources and buffers and that successful rehabilitation of the construction areas can take place; and
- All hazardous materials, if any, must be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner.

13.9.2.3 Displacement/emigration of avifauna community (including SCC) due to noise pollution

Noise pollution generated from construction activities will lead to the displacement/emigration of the local avifauna community including the proximal surrounding area. This will include SCC that occur or are likely to occur within the area.

Table 34: Impact significance of displacement/emigration of avifauna community (including SCC) due to noise pollution (Kemp, 2023).

Pre mitigation							
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**
Post mitigation							
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**

Mitigation Measures:

- ❑ No construction activity is to occur at night, as nocturnal species are highly dependent on sound and/or vocalisations for behavioural processes;
- ❑ All vehicles speed must be restricted to 40 km/h, to reduce the noise emitted by them; and
- ❑ If generators are to be used these must be soundproofed.

13.9.2.4 Direct mortality from persecution or poaching of avifauna species and collection of eggs

There is the possibility of construction staff poaching avifauna species and collecting eggs from the project footprint and proximal surrounding area. There is also the possibility of persecution of species that are deemed as negative in folklore. This impact was determined to have a Negative Medium Impact significance but can be reduced to a Negative Low Impact significance with the implementation of mitigation actions.

Table 35: Impact significance of direct mortality from persecution or poaching of avifauna species and collection of eggs (Kemp, 2023).

Pre mitigation							
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**
Post mitigation							
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	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**

		entirely negated (0 – 2 years).					

Mitigation Measures:

- ❑ All personnel must undergo environmental awareness training that includes educating on not poaching/persecuting species and collecting eggs;
- ❑ Prior to commencing work each day, two individuals should traverse the working area in order to disturb any avifauna and so they have a chance to vacate the area; and
- ❑ Any avifauna threatened by the construction activities that does not vacate the area should be removed safely by an appropriately qualified environmental officer or removal specialist.

13.9.2.5 Direct mortality from increased vehicle and heavy machinery traffic

The increased vehicle and heavy machinery traffic associated with construction activities will lead to roadkill. This impact was determined to have a Negative Medium Impact significance but can be reduced to a Negative Low Impact significance with the implementation of mitigation actions.

Table 36: Impact significance of direct mortality from increased vehicle and heavy machinery traffic (Kemp, 2023).

Pre mitigation							
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**
Post mitigation							
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**

Mitigation Measures:

- ❑ All personnel must undergo environmental induction with regards to awareness about speed limits and roadkill; and
- ❑ All construction vehicles must adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected.

13.9.2.6 Collisions with infrastructure associated with the PV Facility

The proposed Beta project comprises of components that pose a collision risk to avifauna species. This includes collisions with PV panels, and fences. This impact was determined to have a Negative Very High significance but can be reduced to a Negative Medium significance with the implementation of appropriate mitigation measures.

Table 37: Impact significance of collision with infrastructure associated with the PV Facility (Kemp, 2023).

Pre mitigation							
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**
Post mitigation							
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**

<u>Mitigation Measures:</u>

- ❑ Post-construction monitoring should follow the BirdLife South Africa best practice guidelines for solar energy facilities (BirdLife South Africa, 2017). If monitoring results indicate excessive

bird fatalities, then adaptive mitigations should be implemented. Before implementation, these should be discussed with the avifaunal specialist and ECO and could include the retrofitting/incorporation of additional visual cues/diverters to existing PV panels/infrastructure.

- ❑ The air space used by the gridlines /tie in lines must be minimised by placing them underground as far as possible;
- ❑ Fencing mitigations:
  - Top 2 strands must be smooth wire;
  - Routinely retention loose wires;
  - Minimum distance between wires is 300 mm; and
  - Place markers on fences.

13.9.2.7 Electrocution due to infrastructure associated with the PV Facility

Electrocution with SEF connections poses a lower risk than that of the powerlines that are generally associate with the SEF developments. This impact was determined to have a Negative Medium significance but can be reduced to a Negative Low significance with the implementation of appropriate mitigation measures.

Table 38: Impact significance of electrocution due to infrastructure associated with the PV Facility (Kemp, 2023).

Pre mitigation							
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**
Post mitigation							
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**

Mitigation Measures:

- Insulation where energised parts and/or grounded parts are covered with materials appropriate for providing incidental contact protection to birds. It is best to use suspended insulators and vertical disconnectors, if upright insulators or horizontal disconnectors are present, these should be covered; and
- Perch discouragers can be used such as perch guards or spikes. Considerable success achieved by providing artificial bird safe perches, which are placed at a safe distance from the energised parts.

13.9.2.8 Direct mortality from roadkills, persecution or poaching of avifauna species and collection of eggs

There is the possibility of operational staff poaching avifauna species and collecting eggs from the project footprint and proximal surrounding area. There is also the possibility of persecution of species that are deemed as negative in folklore. This impact was determined to have a Negative Medium Impact significance but can be reduced to a Negative Low Impact significance with the implementation of mitigation actions.

Table 39: Impact significance of direct mortality from roadkills, persecution or poaching of avifauna species and collection of eggs (Kemp, 2023).

Pre mitigation							
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**
Post mitigation							
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**

Mitigation Measures:

- ❑ All personnel must undergo environmental awareness training that includes educating on not poaching/persecuting avifauna species and collecting eggs;

- Signs must be put up to enforce this, should someone be caught an appropriate fine must be enforced;
- All personnel must undergo environmental induction with regards to awareness about speed limits and roadkill; and
- All vehicles must adhere to a speed limit of maximum of40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected.

13.9.2.9 Pollution of water sources and surrounding habitat due to cleaning products of the PV panels

It is likely that the panels will be cleaned with chemicals that is not environmentally friendly. This impact was determined to have a Negative High Impact significance but can be reduced to a Negative Low Impact significance with the implementation of mitigation actions.

Table 40: Impact significance of pollution of water sources and surrounding habitat due to cleaning products of the PV panels (Kemp, 2023).

Pre mitigation							
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**
Post mitigation							
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	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**

		negated (0 – 2 years).					

Mitigation Measures:

- ❑ Only environmentally friendly chemicals are to be used for cleaning of the panels.

13.9.2.10 Heat radiation from the BESS and PV panels

Heat radiation form the infrastructure can result in an overall increase of temperature in the surrounding area, it can also lead to veld fires. This impact was determined to have a Negative Medium Impact significance but can be reduced to a Negative Low Impact significance with the implementation of mitigation actions.

Table 41: Impact significance of heat radiation from the BESS and PV panels (Kemp, 2023).

Pre mitigation							
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**
Post mitigation							
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**

Mitigation Measures:

- ❑ The BESS must be enclosed in a structure with a non-reflective surface;
- ❑ A fire management plan needs to be put in place; and

- ❑ Grass must be kept under the panels to ensure that additional reflection is not taking place from the surface below the panels.

13.9.2.11 Encroachment of Invasive Alien Plants into disturbed areas

Invasive Alien Plants tend to encroach into disturbed areas and outcompete/displace indigenous vegetation. This will lead to a shift in the vegetation composition and structure, and consequently will cause a negative shift in the wellbeing of the avifauna community. This impact was determined to have a Negative Very High significance but can be reduced to a Negative Low Impact significance with the implementation of mitigation actions.

Table 42: Impact significance of encroachment of invasive alien plants into disturbed areas (Kemp, 2023).

Pre mitigation							
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**
Post mitigation							
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	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**

		period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).					

Mitigation Measures:

- An invasive alien plants management plan must be written and implemented for the development. The developer must contract a specialist to develop the plan and the developer is responsible for its implementation;
- Regular monitoring for invasive alien plants encroachment during the operation phase must be undertaken to ensure that no alien invasion problems have developed as result of the disturbance. This should be every 3 months during the first two years of the operation phase and every six months for the life of the project; and
- All invasive alien plant species must be removed/controlled using the appropriate techniques as indicated in the invasive alien plants management plan.

13.10 Agricultural

The findings from the Agricultural Compliance Statement (Gouws, 2023) follow. The specialist report is contained in **Appendix E4.**

13.10.1 Impact Description

The entire site proposed for the PV project and access road is currently used for grazing. The site has a low and low/medium arable potential and more suitable for livestock grazing. It was concluded that the sensitivity of the site is low. The following was noted by the Agricultural Specialist in terms of potential impacts:

- Loss of high potential agricultural land – no high potential land was found on the site;
- Loss of agricultural production – there is no land cultivated on the property. The site is used for animal grazing. There will be no loss of high potential soil with only a small impact on cattle production;
- Loss of agricultural infrastructure – there is no farming infrastructure that will be lost;
- Loss of agricultural resources - The soil is well-drained with moderately developed structure. It is also on evenly sloped land where erosion is not expected. Nevertheless, the PV projects creates areas that are cleared of vegetation, and that could be subject to erosion. Runoff from hard surfaces should be dealt with by a Stormwater Management Plan (SMP).

13.10.2 Impact Assessment

According to the Protocol for the specialist assessment and minimum report content requirements for environmental impacts on agricultural resources (GN No. 320 of 20 March 2020), an Agricultural Compliance Statement was prepared for the Project as the desktop assessment and field survey confirmed that the Project Area is of a 'Low' sensitivity. This compliance statement does not include a quantitative assessment of the potential impacts to agricultural resources; however, it provides impact management actions that have been included in the project EMPr.

13.11 Cultural Heritage

The findings from the Heritage Impact Assessment (Kitto, 2023) follows. The specialist report is contained in **Appendix E6**.

13.11.1 Impact Description

No archaeological, historical structures or graves were identified within or close to the Seelo Beta Solar PV project footprint area. Therefore, no impacts on heritage resources are anticipated. However, there is a possibility that some heritage resources were not identified, specifically, informal graves or burial sites.

13.11.2 Impact Assessment

As no impact on heritage resources are anticipated, no quantitative assessment of the potential impacts has been undertaken. Mitigation measures to management potential finds of heritage resources have however been include in the project EMPr.

13.12 Palaeontology

The findings from the Palaeontological Impact Assessment (Butler, 2023) follows. The specialist report is contained in **Appendix E7**.

13.12.1 Impact Description

A site-specific survey did not detect any fossiliferous outcrops. Based on the site investigation as well as desktop research, it is concluded that fossil heritage of scientific and conservational interest in the development footprint is rare. The apparent rarity of fossil heritage in the proposed development footprint suggests that the impact of the development will be of a Low significance in palaeontological terms. It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

13.12.2 Impact Assessment

The impact significance ratings detailed in **Table 43** below were applied in determining the Project's impacts on fossil heritage (refer to **Table 44** below).

Table 43: Impact significance ratings used to evaluate impacts on fossil heritage (Butler, 2023).

Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive

Table 44: Impact significance of loss and destruction of fossil heritage during the construction phase (Butler, 2023).

Impacts	Extent	Duration	Magnitude	Reversibility	Irreplaceable loss	Cumulative effect	Impact
Pre-mitigation	1	4	3	4	4	2	**Negative medium (45)**
Post-mitigation	1	4	1	4	4	2	**Negative low (15)**

The construction phase will be the only development phase impacting palaeontological heritage and no significant impacts are expected for the operational phase. If palaeontological heritage is uncovered during surface clearing and excavations the Chance Find Protocol contained in the EMPr should be implemented immediately

13.13 Visual Quality

The findings from the Visual Impact Assessment (Buys, 2023) follow. The specialist report is contained in **Appendix E8**.

13.13.1 Impact Description

The following potential visual impacts were identified for the project:

- Construction phase -
  - Topographical alteration which will lead to increased visual instruction and potential impact on sense of place;
  - Removal of vegetation leading to increased visual contrast and loss of VAC and increase visual intrusion on sensitive receptors;
  - Visual intrusion due to the movement of construction vehicles and heavy machinery and the presence of laydown areas;
  - Alteration of current landscape features impacting on landscape character and sense of place;
  - Light pollution due to night lighting; and
  - Dust pollution due to site clearance and movement of construction vehicles and heavy machinery.

- Operational phase -
  - Topographical alteration which will lead to increased visual intrusion and potential impact on sense of place;
  - Increased vehicle and human activity in and around the Solar PV facility and associated infrastructure;
  - Night-time illumination due to security lighting and lighting associated with the Solar PV facility and associated infrastructure; and

- Potential visual impact of solar glint and glare as a visual distraction.

Results of the visual impact assessment indicated that from a visual perspective, the proposed project and related activities are the main project components that are expected to result in a visual impact. Receptors located within 2km of the proposed site will have the moderate (without mitigation) visual impact. Within a 5 km radius of the proposed project, residential areas and farming communities will have a low (without mitigation) visual impact. Beyond the 5 km study area, there are some areas where the development is discernible. However, the visual impacts are generally of moderate to low magnitude and impact. Local low and high-level vegetation will provide limited screening; however, the proposed solar PV facility and associated infrastructure can conceivably be visible to the sensitive receptors located near the proposed project boundary. The visual impacts associated with the Project and associated infrastructure will occur once construction has been completed and will be long term in nature.

13.13.2 Impact Assessment

Refer to **Table 45** and **Table 46** below for an assessment of the significance of visual impacts associated with the construction and operational phases.

Table 45: Impact 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 46: Impact 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
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.

13.14 Air Quality

13.14.1 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;
  - Influence of air quality and soiling on operational efficiency of Solar PV Plant.

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.

13.14.2 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. • Speed limits to be strictly adhered to. • 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

13.15 Noise

13.15.1 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.

13.15.2 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

13.16 Hazardous Substances & Waste

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.

13.16.1 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 47** below.

Table 47: 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

13.17 Traffic

The findings from the Transport Impact Assessment (Wink, 2023) follows. The specialist report is contained in **Appendix E9.**

13.17.1 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 (abnormal trucks transporting the transformers). 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.

13.17.2 Impact Assessment

Environmental Feature	**Traffic**
Relevant Alternatives & Activities	**All physical infrastructure that forms part of the project**
Project life-cycle	**Construction Phase**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Increase in development trips for the duration of the construction phase. • Associate noise, dust and exhaust pollution.	• Stagger component delivery to site. • Reduce the construction period where possible. • Stagger the construction Phase. • The use of mobile batch 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	Negative	National	Medium	Short term	almost certain	2
After Mitigation	Negative	National	low	Short term	almost certain	1

Environmental Feature	Traffic
Relevant Alternatives & Activities	**All physical infrastructure that forms part of the project**
Project life-cycle	**Operational Phase**
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 (water source to be clarified – borehole or transported to site / size of water tankers if water is to be delivered on site).	• 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	Negative	Local	low	Short term	Likely	1
After Mitigation	Negative	Local	low	Short term	Moderate	1

13.18 Civil Aviation

13.18.1 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 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.

The closest civil aviation aerodrome is located 10km south-east of the Project Area. The Johannesburg Skydiving Club, located at the aerodrome. According to the findings from the National Web Based Environmental Screening Tool, the PV site has a low sensitivity in terms of relative civil aviation theme (see **Figure 56** below). 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.

13.18.2 Impact Assessment

A quantitative impact assessment was not undertaken from a civil aviation perspective, due to the reasons provided in **Section 13.19.1** above.

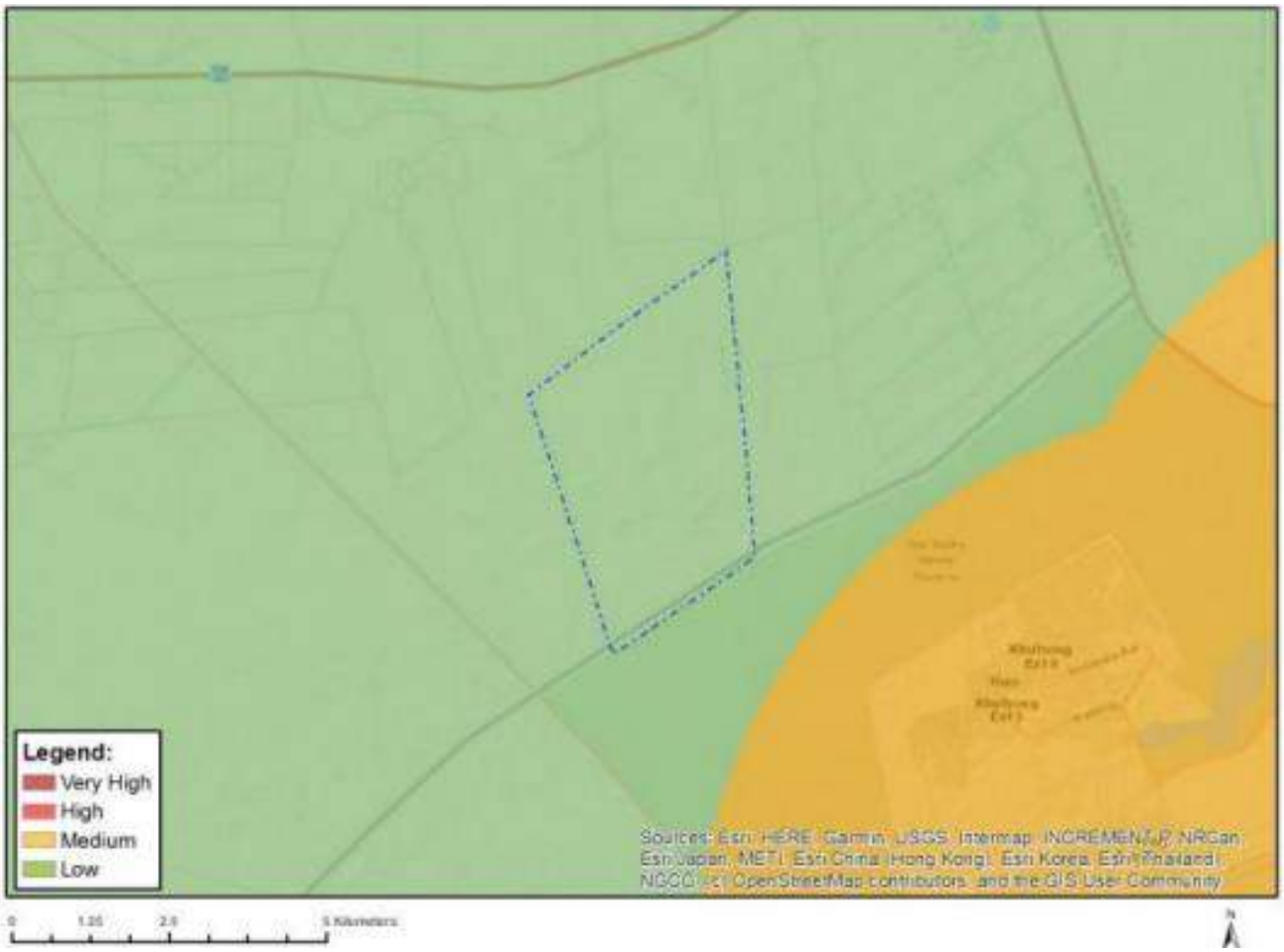

Figure 56: Map of relative civil aviation theme sensitivity for the project land parcel.

13.19 Existing Structures and Infrastructure

13.19.1 Impact Description

Access to the PV Site will be obtained from the D331 which runs west of the site. The setbacks / conditions required by the custodians of infrastructure will need to be adhered to.

Potential impacts of the Project to existing structures and infrastructure include:

- Disruptions to services or damage caused as a result of construction activities;
- Disruptions to traffic on D331 during construction (see Section 13.18 above); and
- Construction-related disturbances (e.g. noise, dust).

A detailed survey will be conducted to identify all physical features that are located within the final project footprint. Optimisation of the layout during the design phase will seek to avoid existing structures and infrastructure, where possible. Where avoidance is not possible, suitable compensation measures need to be established, as necessary.

13.19.2 Impact Assessment

Environmental Feature	Existing Structures and Infrastructure
Relevant Alternatives & Activities	**All activities that affect existing structures and infrastructure**
Project life-cycle	**Operational & 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, North West Department of Public Works and Roads 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	Negative	Local	Medium-high	Short term to permanent	Likely	3
After Mitigation	Negative	Local	low	Short term	Unlikely	1

13.20 Health and Safety

13.20.1 Impact Assessment

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.

13.20.2 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

Environmental Feature	Health and Safety
Relevant Alternatives & Activities	**Operation and maintenance activities**
Project life-cycle	**Operational phase**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Health and safety risks posed by operation and maintenance activities.	• Dedicated Occupational Health and Safety system to be implemented by the Operator of the PV Plant. • Conduct basic safety awareness training with all operational staff. • Temporary Contractors to adhere to Occupational Health and Safety requirements. • Provide potable water and sanitation services to operational staff. • Prepare an Emergency Response Plan. • 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

13.21 Socio-Economic Environment

The findings from the Social Impact Assessment (Tanhuke & Duncan, 2023) follows. The specialist report is contained in **Appendix E10**.

13.21.1 Impact Description

The activities, aspects and impacts associated with the social environment are captured in **Table 48** below.

Table 48: Activities, aspects and impacts related to the social environment (Tanhuke & Duncan, 2023).

Activity	Aspect	Potential Impact – Positive	Potential Impact – Negative
Planning Phase	Land Acquisition	N/A	Loss of agricultural production
		N/A	Loss of land through land acquisition for project infrastructure
	Servitude Rights	N/A	Some restrictions on use of productive land, owing to servitude rights being established
Construction Phase	Access into private property	N/A	Property Damage
		N/A	Risk of trespassing
	Solar Park Construction – piling, frame erection and solar panel mounting, electrical installation and rehabilitation	Employment of local staff	N/A
		Opportunity for local business	N/A
		Skills development	N/A
		N/A	Noise
		N/A	Dust
		N/A	Cultural Resistance to Women in the Workplace
		N/A	Injuries and poor workforce health
		N/A	Increased community conflicts due to employment of outsiders
		N/A	Influx of people seeking employment and associated impacts (e.g., cultural conflicts, squatting, demographic changes, anti-social behaviour, and incidence of HIV/AIDS)
		N/A	Livestock and game animal theft
	Transport of goods to site and employment of staff	N/A	Increased traffic
	Rehabilitation	N/A	Damage or wear to access roads
		N/A	Security
		N/A	Damage to property or equipment
Scheme Operations	Electricity generation	Economic growth and induced impacts	N/A
	Supply of goods and services to the project	Opportunity for local business	N/A
		Employment of local staff	N/A
	Administration and Technical Input	Employment of local staff	N/A
		Skills development	N/A

13.21.2 Impact Assessment

Environmental Feature	Socio-Economic: Land Acquisition and Servitude Rights
Project life cycle	**Planning Phase**
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Loss of agricultural production	• This impact has been considered by a dedicated specialist study. The SIA defers to the opinions of the agricultural specialists in this regard and their mitigation measures should be adopted.
Loss of land through acquisition for project infrastructure	• Any land acquisition should be conducted on a willing buyer, willing seller basis and that the owner is not treated unfairly in the process.
Some restrictions on use of productive land, owing to servitude rights being established	• Any servitude establishment should result in fair compensation for land owners. • The establishment of servitude rights should not reduce the existing productivity of land owner's land holdings.

	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Site	Moderate	Long Term	High	2
After Mitigation	Negative	Site	Low	Long Term	High	1

Environmental Feature	Socio-Economic: Economic Opportunities
Project life-cycle	**Construction phase**
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Employment of people locally	• 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.
Opportunity for local business	• Local SMMEs should be given an opportunity to participate in the construction of the project through the supply of services, material or equipment.
Skills development	• 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	Medium	Short Term	Likely	1
After Mitigation	Positive	Regional	Large	Short Term	Likely	3

Environmental Feature	Socio-Economic: Noise, Dust and Traffic
Project life-cycle	**Construction phase**
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Increase in Dust	• Dust can be mitigated using appropriate dust suppression mechanisms. • Limit road speeds on site through the erection of speed limits signage
Noise impacts	• Prior notice should be given to surrounding communities of noisy events 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, notice should be given to the affected community or landowners.

Increase in Traffic	• This impact has been considered by a dedicated specialist study. The SIA defers to the opinions of the traffic specialists in this regard and their mitigation measures should be adopted
Damage or wear to access roads	• This impact has been considered by a dedicated specialist study. The SIA defers to the opinions of the traffic specialists in this regard and their mitigation measures should be adopted

	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Short Term	Likely	2
After Mitigation	Negative	Local	Low	Short Term	Moderate	1

Environmental Feature	**Socio-Economic: Cultural resistance towards women**
Project life-cycle	**Construction Phase**
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 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 phase
	• Employment practises should be demonstrated free of coercion or harassment.
	• Develop a grievance procedure to specifically address gender matters. There should be a policy on harassment that is well understood by all.
	• There should be separate changing and ablution facilities for men and women, and they should be clearly marked as such.

	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Site	Moderate	Short term	High	2
After Mitigation	Positive	Site	Low	Short term	High	1

Environmental Feature	**Socio-Economic: Injuries and Poor Workforce Health**
Project life cycle	**Construction Phase**
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Injuries and poor workforce health	• 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 access road • Contractors should establish HIV/AIDS awareness programmes at their site camps. • Measures should be taken to provide condoms and, where necessary, access to counselling to address any risks to health

	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Short Term	Likely	2
After Mitigation	Negative	Local	Low	Short Term	Moderate	1

Environmental Feature	Socio-Economic: Influx of Job Seekers
Project life cycle	**Construction Phase**
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Influx of people seeking employment and associated impacts (e.g., cultural conflicts, squatting, demographic changes, anti-social behaviour, and incidence of HIV/AIDS)	• 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. • The risk exists that un-controlled 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 municipal by-laws are complied with.
Increased community conflicts due to employment of local and non-local labourers	• Programmes should be developed to boost the local economy. These should be in the form of Corporate Social Responsibility (CSR) that will favour local empowerment.

	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Site	Moderate	Short term	High	2
After Mitigation	Negative	Site	Low	Short term	High	1

Environmental Feature	Socio-Economic: Property and Security Impacts
Project life-cycle	**Construction phase**
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Risk of trespassing	• A project policy on management of workers should be developed. This would include education and awareness to be conducted with regards trespassing.
Livestock and game animal theft	• There should be clear demarcation of the area in development so that livestock and game animals are prevented from wandering nearby.
Security	• The camp site and the project 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. • Security staff alone should be allowed to reside at contractor camps and no other employees.
Damage to property or equipment	• If a risk exists of damage taking place on a property owing to construction, a condition survey should be undertaken prior to work commencing. • The contractor is to acknowledge and make good any damage that occurs on any property as a result of construction work; • Where crops 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 on account of the contractor.

	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Local	Medium	Short Term	Likely	2
After Mitigation	Negative	Local	Low	Short Term	Moderate	1

Environmental Feature	**Socio-Economic: Economic Impacts (positive)**
Project life-cycle	**Operational Phase**
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Economic growth and induced impacts	• 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
Opportunity for local business	• 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.
Employment of local staff	• Women should be given equal employment opportunities and encouraged to apply for positions.
Skills development	• 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

13.22 "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 this regard, the Applicant intends to bid for the current and future REIPPPP bid windows.

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 13.22** 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.

13.23 Cumulative Impacts

13.23.1 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.

13.23.2 Other Renewable Energy Project 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 1, 2023), a renewable energy application has been made for a property which are located within a 30km radius east of the PV Site. In addition to the above-mentioned application as per the REEA Database, applications for two (2) renewable energy projects are known to have been made immediately north east and south west of the proposed Beta Solar PV project. These two projects form together with the proposed Beta Solar PV project a cluster of proposed projects. Note that these projects are not captured within the REEA Database. The projects within 30km of the proposed Seelo Beta PV Facility are indicated in **Table 49** below.

Table 49: Renewable Energy Projects within 30km of the prosed Seelo Beta PV Facility.

Project Title	Distance	DFFE Reference	Status
200MW PV facility for Sibanye Gold Limited on Portion 1, 2, 4, 5 and 6 of the Farm Uitval 280 within the Westonaria Local Municipality in the Gauteng Province	27km east	14/12/16/3/3/2/919	Approved
Proposed Seelo Alpha 240MW Solar PV and BESS project located on Portion 2 of Farm 96 (Rooipan) IQ	Directly adjacent (south west)	14/12/16/3/3/2/2343	Application in Process
Proposed Seelo Charlie 140MW Solar PV and BESS project located on Portion 2 of Farm 58 (Leeuwpan IQ (Application Ref No.: 14/12/16/3/3/2/2341)	Directly adjacent (north east)	14/12/16/3/3/2/2341	Application in Process

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

- The long-term cumulative impacts due to extensive solar farm footprint, powerlines and substations can lead to the loss of endemic species and threatened species, loss of habitat and vegetation types and even degradation of well conserved areas. The PV panels and associated infrastructure are expected to have a low cumulative impact when considering the project in isolation, while the cumulative impacts associated with the proposed project as well as other projects in the area are moderate;
- As the sites becomes more impervious than it was pre-development, rainfall infiltration is decreased, and runoff increased. Increased runoff causes erosion of soils, and in turn, sedimentation of watercourses. The Seelo Beta PV project and the two proposed renewable energy project located immediately south west and north east fall within the same drainage area. The cumulative impact of these projects in terms of erosion and sedimentation of freshwater resources have been assessed to be of a low to very low significance. In terms of the approved PV project located 27km east of the project site, it should be noted that this project is located in a different drainage area as well as different geology setting. Therefore, it is not anticipated that this project would contribute to cumulative impacts on freshwater resources;
- As the site becomes more impervious than it was pre-development, rainfall infiltration is decreased, and runoff increased. Reduced infiltration due to high impermeability, decreases recharge to the underlying aquifer, therefore impacting the water table and other groundwater users. The net significance of all cumulative groundwater impacts is low;
- The cumulative heritage impact (possible damage to or destruction of identified heritage resources) for both the immediate project area and the general region are considered low to medium (before mitigation), and additional project impacts are not expected to increase the significance of the existing baseline impacts, where the cumulative unmitigated impact will probably be of a low to medium significance. The impact is going to happen and will be long-term in nature, however the impact risk class (after mitigation) will be of a low significance;
- The cumulative impact of the development and the other approved renewable energy development on palaeontological resources will be of a medium significance pre-mitigation and low significance post mitigation;
- In terms of traffic, there will be a further increase in development trips for the duration of the construction phase, should the proposed project and the other identified renewable energy development be constructed at the same time. The impact has a significance rating of negative medium after mitigation;
- 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;

- There will be an increase in localised impacts in terms of noise, reduction in air quality (dust) and traffic disruptions. This will be managed by the provisions of the EMPr for the respective renewable energy developments.

13.23.3 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;
- In terms of the potential cumulative impacts, the proposed site is surrounded by various commercial and agricultural activities. Most of the proposed site currently grassland vegetation and the clearance and subsequent development of the site will result in the alteration of this space. Consequently, the development of this site will add cumulatively to the loss of sense of place. While the result in a change in the sense of place for those areas that look onto the project site, the magnitude of the impact is likely to be low as most of the sensitive receptors are located more than 5km from the project site;
- 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.
- 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.

13.23.4 Cumulative Environmental Impact Statement

From a cumulative impact perspective, there are three (3) known renewable energy applications within a 30km radius of the Project's PV Site (refer to Section **13.23** above). 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 13.22** 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

As explained in **Section 10.3** above, an initial layout was proposed by the Applicant (see **Figure 22** above). Through the environmental screening process and with input from specialists, no environmental sensitivities were identified for the project site. Therefore, currently one layout alternative is presented for inclusion in the study. The layout was assessed and deemed acceptable by all specialists.

14.4 Technology Alternatives

14.4.1 PV Technology

As explained in **Section 10.4.1** both fixed and tracking system PV panel technologies are considered for the proposed Solar PV Facility. Bifacial and monofacial solar panels are further both considered. Bifacial solar panels are however preferred, as this technology optimise the Project's yield output. The preferred technology will however only be determined with a financial model during the more detailed design phase of the project.

14.4.2 BESS Technology

The BESS can be broken into solid state and flow battery systems. The preferred alternative is solid state lithium-ion technology. However, a single battery technology, or a combination of the two technology alternatives may be implemented for the project. The preferred technology will only be determined with a financial model during the more detailed design phase of the project.

15 PUBLIC PARTICIPATION

15.1 Introduction

The purpose of public participation includes the following:

- To provide I&APs with an opportunity to obtain information about the Project;
- To allow I&APs to express their views, issues, and concerns with regard to the Project;
- To grant I&APs an opportunity to recommend measures to avoid or reduce adverse impacts and enhance positive impacts associated with the Project; and
- To enable the Applicant to incorporate the needs, concerns, and recommendations of I&APs into the Project, where feasible.

15.2 Public Participation during the Scoping Phase

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

- Compiling a database of organs of state and I&APs;
- Announcing the Project and the availability of the Draft Scoping Report by placing notices in newspapers, erecting site notices and circulating a notification email and commenting 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 G**).

15.3 Public Participation during the EIA Phase

15.3.1 Maintenance of the Stakeholders' Database

The database of stakeholders (contained in **Appendix F**), 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 will be granted an opportunity to review and comment on the draft EIA Report from 06 September 2023 until 09 October 2023.

15.3.3 Notification of Review of Draft EIA Report

Organs of state and I&APs contained in the database (refer to **Appendix F**) will be notified via email of the review of the draft EIA Report.

15.3.4 Accessing the Draft EIA Report

The draft will made available for public review as follows:

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

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

- DFFE (including Biodiversity Conservation Unit);
- DEDECT;
- DWS: North West Region;
- DMRE;
- North West Department of Public Works and Roads (DPWR);
- NWPHRA;
- JB Marks LM; and
- Dr Kenneth Kaunda DM.

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 CONCLUSION

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 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:

- The project is located within the 1km buffer zone surrounding the Abe Bailey Nature Reserve. A small portion of the project is located within an area designated as medium use zone;
- Three (3) of the expected avifauna SCC were recorded within the Project Area of Influence (PAOI) and surrounding area. The SCC recorded include *Anthropoides paradiseus* (Blue Crane), *Phoenicopterus roseus* (Greater Flamingo) and *Sagittarius serpentarius* (Secretarybird); and
- The district road D331 runs approximately 1.5km from the western boundary of the PV site from where access will be obtained to the site.

The combined sensitivity map overlain with the Project’s BPEO is provided in **Figure 57** below. Key environmental features that contributed towards the sensitive areas shown in the map include the following:

- Avifaunal habitats (medium and low sensitivity).

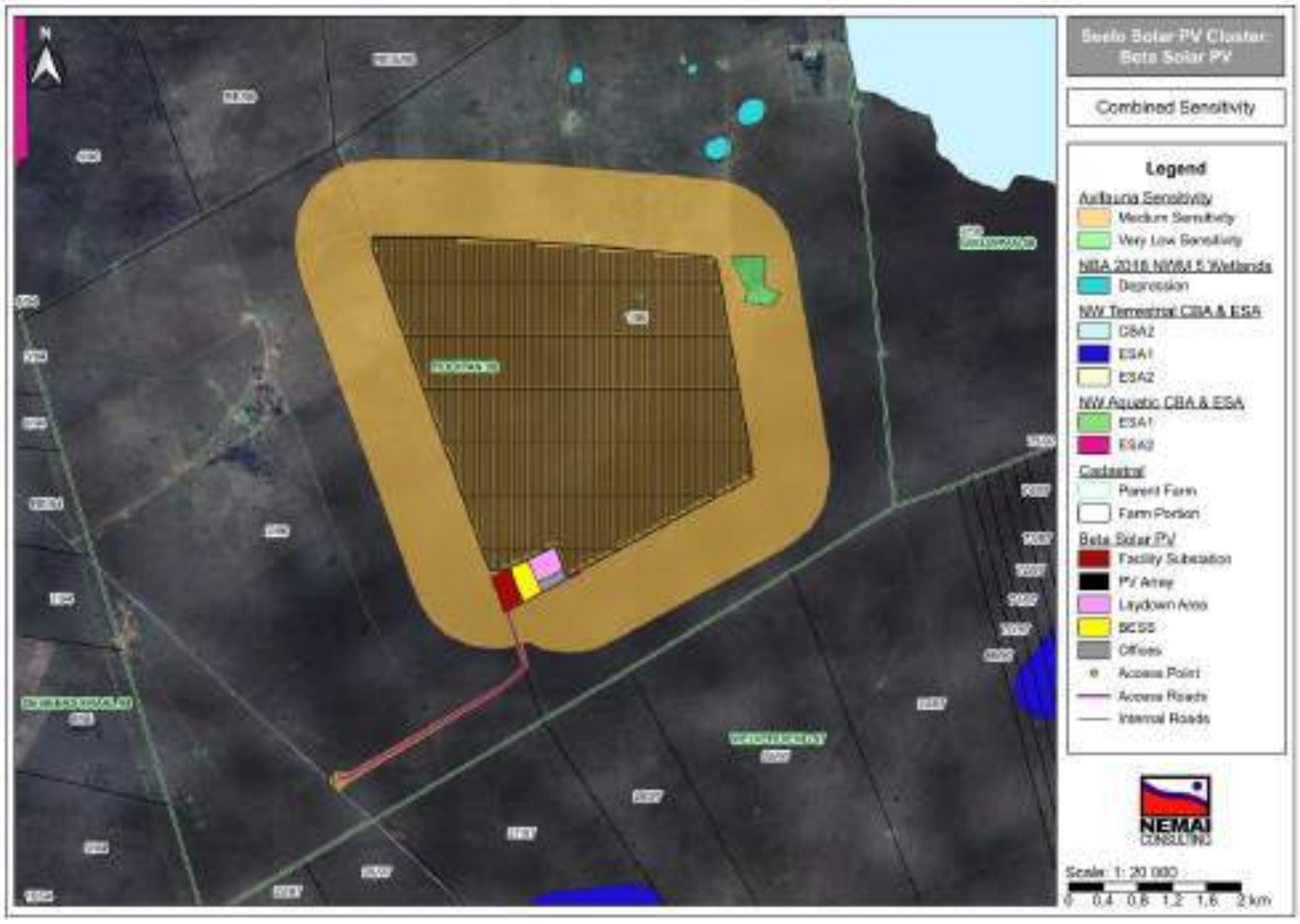

Figure 57: Combined sensitivity map of the Best Practice Environmental Option.

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.

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, sparsely populated land, grid connection, water supply and good transport infrastructure as well as the intended value that the Project will provide to the JB Marks LM and users of electricity/energy. Based on the environmental screening process and with input from specialists, no environmental sensitivities were identified for the project site which would have necessitated changes to the proposed layout. Based on the recommendations of the specialists and technical considerations the current proposed layout was 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. All 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:

- 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;
- Suitable measures need to be implemented to prevent erosion, manage site drainage and rehabilitate cleared areas during the project life-cycle;
- A stormwater management plan should be prepared and implemented for the project; and
- The requirements from the North West Department of Public Works and Roads should be adhered to in terms of access to the PV site from the D331.

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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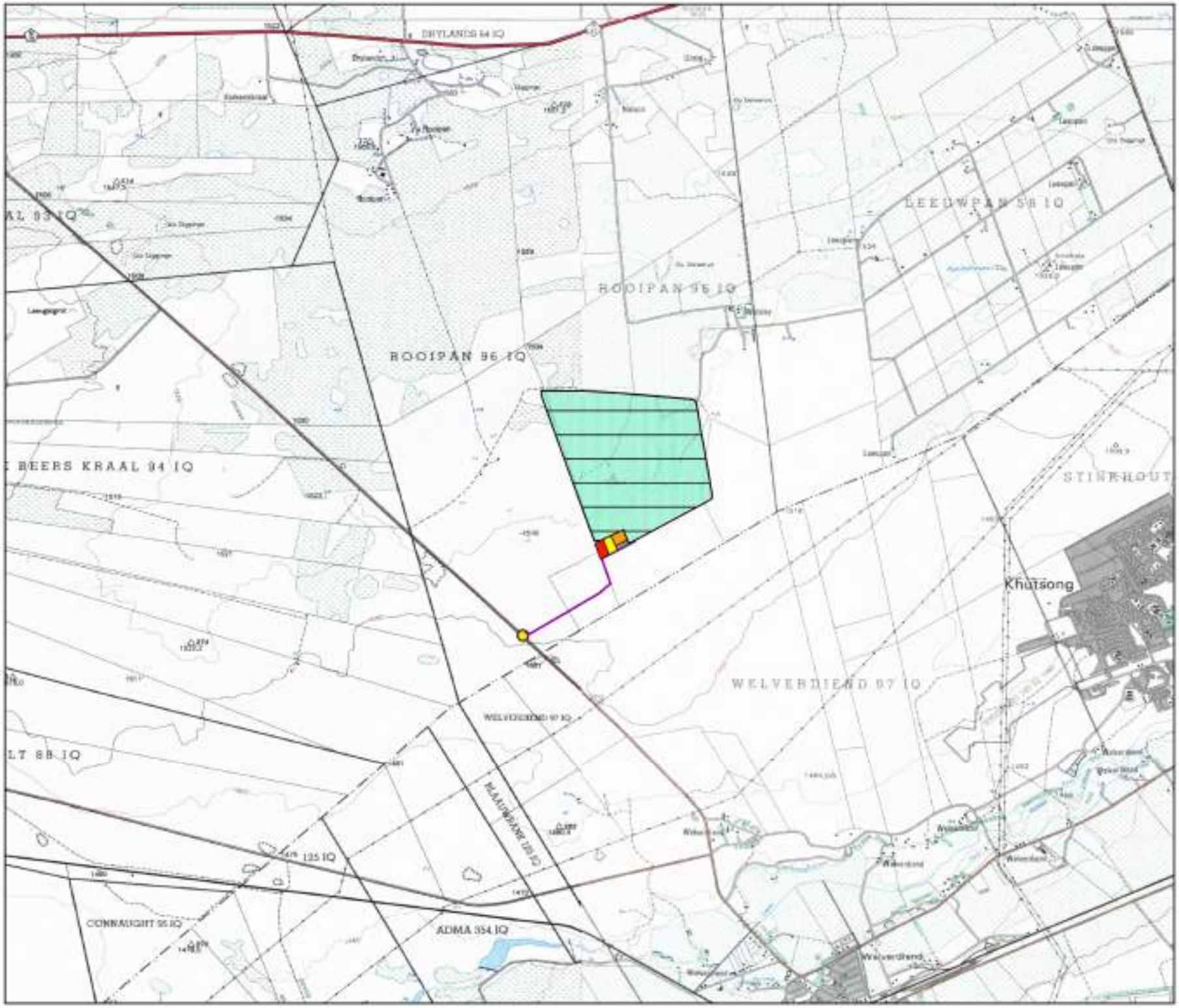
APPENDICES

APPENDIX A

LOCALITY MAPS



Seelo Solar PV Cluster: Beta Solar PV

Locality

Legend

Beta Solar PV

- Facility Substation
- PV Array
- Laydown Area
- BESS
- Offices
- Power stations
- Access Point
- Access Roads
- Internal Roads

NEMAI CONSULTING

N

Scale: 1: 50 000

0 2.5 5 7.5 10 12.5 km

Seelo Solar PV Cluster:
Beta Solar PV

Layout

Legend

Cadastral

- Parent Farm
- Farm Portion
- SA Roads

Beta Solar PV

- Facility Substation
- PV Array
- Laydown Area
- BESS
- Offices
- Power stations
- Access Point
- Access Roads
- Internal Roads

NEMAI CONSULTING

N

Scale: 1: 35 000

0 1.7 3.4 5.1 6.8 8.5 km

APPENDIX B

DFFE ACCEPTANCE OF SCOPING REPORT AND PLAN OF STUDY FOR EIA

forestry, fisheries & the environment
Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Private Bag X 447· PRETORIA 0001· Environment House 473 Steve Biko Road, Arcadia· PRETORIA

DFFE Reference: 14/12/16/3/3/2/2342
Enquiries: Trisha Pillay
Telephone: (012) 310 9406 **E-mail:** TPillay@dffe.gov.za

Mr Donavan Henning
Nemai Consulting (Pty) Ltd
PO Box 1673
SUNNINGHILL
2157

Telephone Number: (011) 781 1730
Email Address: donavanh@nemai.co.za

PER E-MAIL

Dear Mr Henning

ACCEPTANCE OF THE SCOPING REPORT FOR THE PROPOSED SEELO BETA 240MW SOLAR PHOTOVOLTAIC (PV) AND BATTERY ENERGY STORAGE SYSTEMS (BESS) PROJECT NEAR THE TOWN OF CARLETONVILLE IN THE JB MARKS LOCAL MUNICIPALITY IN THE NORTH WEST PROVINCE

The final Scoping Report (SR) and the Plan of Study for Environmental Impact Assessment dated May 2023 and received by the Department on 18 May 2023, refer.

The Department has evaluated the submitted final SR and the Plan of Study for Environmental Impact Assessment dated May 2023 and is satisfied that the documents comply with the minimum requirements of the Environmental Impact Assessment (EIA) Regulations, 2014, as amended. The final SR is hereby accepted by the Department in terms of Regulation 22(1)(a) of the EIA Regulations, 2014, as amended.

You may proceed with the environmental impact assessment process in accordance with the tasks contemplated in the Plan of Study for Environmental Impact Assessment as required in terms of the EIA Regulations, 2014, as amended.

In addition, the following amendments and additional information are required for the EIAr:

(a) <u>Specific Comments</u>

(i) The co-ordinates in the EIAr must be specific to each activity and infrastructure that is proposed on the site. The co-ordinates for each corner of the solar field, the substation, battery energy storage system (BESS) and laydown areas 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.
(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.

JCA

(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.
(iv) Comments must be obtained from this Department's Biodiversity Conservation Directorate at BCAdmin@dffe.gov.za.

(b) Listed Activities

(i) Please take note that the removal of indigenous vegetation cannot trigger both Activity 27 of Listing Notice 1 and Activity 15 of Listing Notice 2 of the EIA Regulations, 2014, as amended, as Activity 27 refers to the clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation and Activity 15 of Listing Notice 2 refers to the clearance of an area of 20 hectares or more of indigenous vegetation. The activity related to the clearance of indigenous vegetation cannot trigger both these activities as the activity's thresholds are mutually exclusive to each other. Kindly update the application form in the EIAr to include the applicable activity.
(ii) Please ensure that all relevant listed activities are applied for, are specific and that it can be linked to the development activity or infrastructure as described in the project description.
(iii) The EIAr must provide an assessment of the impacts and mitigation measures for each of the listed activities applied for.
(iv) The listed activities represented in the EIAr and the application form must be the same and correct.
(v) The EIAr must assess the correct sub listed activity for each listed activity applied for.

(c) Public Participation

(i) Please ensure that comments from all relevant stakeholders are submitted to the Department with the EIAr. This includes but is not limited to the North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT), the Dr Kenneth Kaunda District Municipality, the JB Marks Local Municipality, the Department of Water and Sanitation (DWS), the South African Heritage Resources Agency (SAHRA), BirdLife SA, the Department of Mineral Resources and Energy, and the Department of Forestry, Fisheries and the Environment: Directorate Biodiversity and Conservation.
(ii) 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. 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.
(iii) 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 application. 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 Annexure 1 of this comments letter. 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.
(iv) Comments from I&APs must not be split and arranged into categories. Comments from each submission must be responded to individually.
(v) The Public Participation Process must be conducted in terms of Regulation 39, 40, 41, 42, 43 and 44 of the EIA Regulations, 2014, as amended.

(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.

(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 field;
   b) Internal roads;
   c) All supporting onsite infrastructure such as laydown area, guard house and control room etc. (existing and proposed);
   d) Substations, transformers, switching stations and inverters;
   e) Battery Energy Storage System;
   f) Connection routes (including pylon positions) to the distribution/transmission network; and
   g) All existing infrastructure on the site, especially railway lines and roads.

(iii) Please provide an environmental sensitivity map which indicates the following:
   a) The location of sensitive environmental features identified on site, e.g. CBAs, protected areas, heritage sites, wetlands, drainage lines, nesting and roosting sites, 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) <u>Specialist assessments</u>

(i) Please provide a detailed description as well as any associated assessments related to the technology required for the Battery Energy Storage System (BESS) in the EIAr.

(ii) 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 Department's definition; this must be clearly indicated. The specialist must also indicate the 'no-go' area's buffer if applicable.
   e) **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.**
   f) **Bird specialist studies must have support from Birdlife South Africa.**
   g) Should a specialist recommend specific mitigation measures, these must be clearly indicated.

(iii) 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.

(iv) 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.**

(v) Please also ensure that the EIAr includes the Site Verification Report and Compliance Statements (where applicable) as required by the relevant themes.

(vi) 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.

(vii) 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.

(viii) The following Specialist Assessments will form part of the EIAr:

- Agricultural Compliance Statement
- Terrestrial Biodiversity Compliance Statement
- Aquatic Biodiversity Compliance Statement and Delineation
- Heritage Impact Assessment
- Avifaunal Impact Assessment
- Visual Impact Assessment
- Palaeontological Impact Assessment
- Social Impact Assessment
- Geohydrology Assessment

(f) Cumulative Assessment

(i) A cumulative impact assessment for all identified and assessed impacts must be conducted and must 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.

(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. A sample for the minimum information required is listed under Annexure 2 below.

(ii) The EAP must provide landowner consent for all farm portions affected by the proposed project i.e., all farm portions where the access road, solar field and associated infrastructure are to be located.

(iii) A construction and operational phase EMPr that includes mitigation and monitoring measures must be submitted with the final EIAr, including the Generic EMPr for substations.

The applicant is hereby reminded to comply with the requirements of Regulation 45 of GN R982 of 04 December 2014, as amendment, with regard to the time period allowed for complying with the requirements of the Regulations.

You are hereby reminded of Section 24F of the National Environmental Management Act, Act No. 107 of 1998, as amended, that no activity may commence prior to an environmental authorisation being granted by the Department.

Yours faithfully

Mr Sabelo Malaza
Chief Director: Integrated Environmental Authorisations
Department of Forestry, Fisheries and the Environment
Signed by: Mr Coenrad Agenbach
Designation: Deputy Director: Prioritised Infrastructure Projects
Date: 29 June 2023

cc:	Michael Mangnall	Seelo Beta Solar PV (RF) Proprietary Limited	Email: mangnall@wkn-windcurrent.com
	Lufuno Tshikovhi	North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT)	Email: Ltshikovhi@nwpg.gov.za

Annexure 1: Format for Comments and Response Trail Report

Date of comment, format of comment name of organisation/I&AP	Comment	Response from EAP/Applicant/Specialist
27/01/2016 Email Department of Forestry, Fisheries and the Environment: Prioritised Infrastructure Projects (John Doe)	Please record C&R trail report in this format Please update the contact details of the provincial environmental authority	EAP: (~~Noted~~)The C&R trail report has been updated into the desired format, see Appendix K EAP: Details of provincial authority have been updated, see page 16 of the Application form

Annexure 2: Sample of technical details for the proposed facility

Component	Description / dimensions
Location of the site	
The total area of the site	
Total disturbance footprint	
Maximum generation capacity for facility	
Height of PV panels	
Capacity of on-site substation and footprint	
Battery Energy Storage System (BESS) and footprint	
Cables and Overhead Power line	
Area occupied by both permanent and construction laydown areas	
Length of internal roads	
Width of internal roads	

forestry, fisheries & the environment
Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Pretoria, 0002 Tel: +27 12 399 9000, Fax: +27 86 625 1042

APPLICATION FORM FOR ENVIRONMENTAL AUTHORISATION – AUGUST 2023

Application submitted for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE (*This must include local municipality and/or district municipality and province*)

Proposed Seelo Beta 240 MW Solar Photovoltaic (PV) & Battery Energy Storage Systems (BESS) Project near the town of Carletonville, North West Province.

Indicate if the **DRAFT** report accompanies the application	*(tick/select one box)*	YES ☒ NO ☐

PRE-APPLICATION CONSULTATION

Was a pre-application meeting held	YES ☒	NO ☐
Date of the pre-application meeting	28 February 2023	
Reference number of pre-application meeting held	2023-01-0036	
Were minutes compiled and submitted to the Department for approval	YES ☒	NO ☐
A copy of the approved pre-application meeting minutes must be appended to this application as **APPENDIX 1.**		

IMPORTANT INFORMATION BEFORE COMPLETING THIS APPLICATION FORM:

1. General:

1.1. The appointed environmental assessment practitioner (EAP) **must be registered with Environmental Assessment Practitioners Association of South Africa (EAPASA)** in terms of Regulation 14 of Section 24H Registration Authority Regulations, 2016, as amended. Proof of such valid registration must be appended to this Application form. (**APPENDIX 6B**). This will be confirmed by the Competent Authority (CA) on the EAPASA website.

1.2. The EAP candidate may only **assist** the registered EAP and work under the supervision of a registered EAP (Regulation 14(6) in the S24H Registration Authority Regulations, 2016, as amended). The registered EAP takes full responsibility for the work conducted.

1.3. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Assessment Reporting where the Department of Forestry, Fisheries and the Environment (DFFE) is the Competent Authority (CA).

1.4. The required information must be typed within the spaces provided in the form. The sizes of the spaces provided are not necessarily indicative of the amount of information to be provided. Spaces are provided in tabular format and will extend automatically when each space is filled with typing. A legible font type and size must be used when completing the form. The font size should not be smaller than 10pt (e.g. Arial 10).

1.5. Unless protected by law, all information contained in and attached to this application, will become public information on receipt by the Competent Authority. Upon request during any stage of the application process, the Applicant / EAP must provide any registered interested and affected party with the information contained in and attached to this application.

1.6. This application form is current as of August 2023. It is the responsibility of the Applicant/Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are accessible at https://www.dffe.gov.za/documents/forms/legal

1.7. The onus is on the Applicant/EAP to confirm whether DFFE is the Competent Authority to which this application must be submitted (Section 24C of NEMA) and to determine all applicable listed activities that would require Environmental Authorisation prior to the commencement of the construction activities. Should any revision of your development comprise any other activities that constitute a listed activity/ies as defined in Listing Notice 1, 2, or 3 of the EIA Regulations, 2014 as amended, it must also form part of the Application for Environmental Authorisation.

1.8. An application for Environmental Authorisation lapses if the applicant fails to meet any of the timeframes prescribed in terms of the EIA Regulations, 2014, as amended.

1.9. An application for environmental authorisation **must** be accompanied by a report generated by the web based environmental screening tool (in **APPENDIX 14**). This has been stipulated as a requirement for the submission of applications for environmental assessment in the Environmental Impact Assessment Regulations. The Screening Tool allows for the generation of a Screening Report referred to in Regulation 16(1)(b)(v) of the Environmental Impact Assessment Regulations 2014, as amended, whereby a Screening Report is required to accompany any application for Environmental Authorisation.

1.10. If applicable, written confirmation that the CA has granted permission for the combination of application(s) for an environmental authorization in terms of the provisions of sub-regulation 11(1) of the EIA Regulations, 2014, as amended, must be attached to this application form (under **APPENDIX 15**).

2. Administrative Requirements:

2.1. An application fee is applicable (refer to 2. FEES). Proof of payment **must** accompany this application and be paid prior to the submission of this Application form **(APPENDIX 2)**. The application will not be processed without proof of payment unless one of the exclusions provided for in the Fee Regulations is applicable **AND** such information in the exclusion section of this application form has been confirmed by this Department.

2.2. A cover letter on your company letterhead indicating the nature of this application **must** be appended to this form for e.g. new application for Environmental Authorisation, revised updated application for Environmental Authorisation etc.

2.3. An electronic copy of the signed application form must be submitted of both the Applicant and EAP and the signature should not be older than 4 months. The relevant form(s) can be found on our website https://www.dffe.gov.za/documents/forms/legal

2.4. This form must be submitted to the CA in the format as prescribed in the process to upload documents form. Note, that this CA does not accept hard copy documents since June 2020.
2.5. Where required, select the box required. The empty box, once selected, will replace with a X.
2.6. The use of the phrase "not applicable" in the form must be done with circumspection. Where it is used in respect of material information that is required by the Competent Authority for assessing the application, this may result in the application being considered as incomplete as provided for in the EIA Regulations.
2.7. Should a specialist report or report on a specialised process be submitted at any stage for any part of this application, the terms of reference for such report and declaration of interest of the specialist must also be submitted. The form can be found on our website https://www.dffe.gov.za/documents/forms/legal
2.8. Please note that this form must be copied to the relevant Provincial Environmental Department(s). Ensure that correct details are found/confirmed/provided.

Competent Authority Details

Online Submission only:
https://sfiler.environment.gov.za:8443/.

Click **https://www.dffe.gov.za/documents/forms/legal** for guidance document which must be complied with in order to upload/submit files to this Competent Authority.

Physical address:
Department of Forestry, Fisheries and the Environment
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

For Submission enquiries: Contact the Directorate: IEA Strategic Support, Coordination and Reporting at:
Email: EIAApplications@dffe.gov.za

For EIA related implementation queries:
Email: EIAAdmin@dffe.gov.za

For EIA Related Interpretation queries in terms of the Listed Activities:
Email: IQ@dffe.gov.za

For SIP confirmation, please contact the SIP coordinator at the below contact details:

- Mr Alvino Wildschutt-Prins
  Programme Manager: Infrastructure Pipeline Development & Management
  SIP Programme Management Office
  Cell: 072 650 2249
  Email: alvino@presidency.gov.za
- Mr Avik Singh, Infrastructure Project pipeline (SIP Support)
  AvikS@idc.co.za

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1. COMPETENT AUTHORITY

Identified Competent Authority to consider the application:	Department of Forestry Fisheries and the Environment
Reason(s) in terms of S24C of NEMA:	This Application is for a Renewable Energy Hybrid Project (Large Scale Solar PV with BESS Energy Development). The Applicant intends to bid the project in either a future Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid window or generate electricity for private off-take. The REIPPPP programme was designed to respond to the call by the NDP & the IRP 2010 via renewable energy Sources. In line with GN 779 of July 2016, the Competent Authority for the consideration and processing of Environmental Authorisations for activities related to the IRP 2010-2030 is the Minister of the DFFE. Therefore, the DFFE is the Competent Authority in terms of S24C(2)(a)(i).
Attach proof of Section 24 C (3) agreement, where applicable	Proper motivation must be attached to the application (**APPENDIX 15**)

2. FEES

Applicants are required to tick the appropriate box below to indicate that either proof of payment is attached or that, in the applicant's view, an exclusion applies. Proof of payment or a motivation for exclusions must be attached as **APPENDIX 2** of this application form.

Proof of payment attached	YES ☒	NO ☐
Payment Reference Number	-26.308317/27.257549	
Exclusion in terms of Regulation 2(a) or 2(b) of GNR 141 of 28 February 2014 (Fee Regulations)	YES ☐	NO ☒

An applicant is excluded from paying fees if:

- The activity is a community based project funded by a government grant; or
- The applicant is an organ of state.

TYPE OF EXCLUSION	Tick where applicable. Proper motivation must be attached to the application (**APPENDIX 2**)
The activity is a community based project funded by a government grant	☐
The applicant is an organ of state	☐

FEE AMOUNT	**Fee**	
Application for an environmental authorisation for which basic assessment is required in terms of the Environmental Impact Assessment Regulations	R2 000	☐
Application for an environmental authorisation, for which S&EIR is required in terms of the Environmental Impact Assessment Regulations	R10 000	☒

Department of Forestry, Fisheries and the Environment banking details for the payment of application fees:

Payment/Refund Enquiries:
Email: EIAAdmin@dffe.gov.za

Banking details:

Bank	ABSA Bank
Branch code	632005
Account number	1044 2400 72
Account Type	Current account

Reference number: Reference number to be provided in the specific format indicating centre point coordinates of site in decimal degrees to 5 or 6 decimal places: latitude/longitude
e.g. -33.918861/18.423300
Status: Tax exempted

3. GENERAL INFORMATION

PROJECT TITLE (This must include local municipality and/or district municipality and Province)

Proposed Seelo Beta 240 MW Solar Photovoltaic (PV) & Battery Energy Storage Systems (BESS) Project near the town of Carletonville, North West Province.

Title	Mr
Name of the Applicant	Michael
Surname of the Applicant	Mangnall
Name of contact person for applicant (name and surname) (if other)	Michael Mangnall
Company/ Trading name (if any)	Seelo Beta Solar PV (RF) Proprietary Limited T/A WKN Windcurrent SA (Pty) Ltd
Company Registration Number	2010/022616/07
Physical address	Third Floor, Sunclare Building, 21 Dreyer Street, Claremont, Cape Town
Postal address	PO Box 762, Wilderness
Postal code	6560
Telephone	-
Cellphone	083 785 1492
E-mail	mangnall@wkn-windcurrent.com

Name of the Landowner	John Lightfoot (landowner of the PV Site)
Surname of the Landowner	Lightfoot
Postal address	24 Bee Eater Place
Postal code	1746
Telephone	-
Cellphone	082 446 8080
E-mail	jlightfoot@vodamail.co.za

Name of the Person in control of the land	*Same as above*
Surname of the Person in control of the land	-
Postal address	-
Postal code	-
Telephone	-
Cellphone	--
E-mail	-

In instances where there is more than one landowner, please attach a list of those landowners with their contact details as **APPENDIX 3**.

Unless the application is in respect of linear activities or Strategic Infrastructure Projects as contemplated in the Infrastructure Development Act (Act No. 23 of 2014) and Regulation 39 of the EIA Regulations, 2014, as amended, written consent of landowner/s must be submitted in **APPENDIX 3**.

The signed declaration undertaking by the applicant must be submitted as **APPENDIX 4** **(must not be older than 4 months)**.

Provincial Environmental Authority:	North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT)
Name of contact person in Environmental Section (name and surname)	Lufuno Tshikovhi
Postal address	Private Bag X15, Mmabatho
Postal code	2735
Telephone	018 389 5666
Cellphone	-
E-mail	Ltshikovhi@nwpg.gov.za

Local Municipality	JB Marks Local Municipality
Name of contact person in Environmental Section (name and surname)	Ishmael Moilwa
Postal address	35 Wolmarans Street, Potchefstroom
Postal code	2531
Telephone	018 299 5444 / 018 299 5111
Cellphone	-
E-mail:	elicityj@jbmarks.gov.za

In instances where there is more than one Local/Provincial Authority involved, please attach a list of those Local/ Provincial Authorities with their contact details as **APPENDIX 5**. Ensure that the details provided above are verified and valid.

4. ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP) INFORMATION

Company of Environmental Assessment Practitioner (EAP)	Nemai Consulting (Pty) Ltd
EAP name and surname	Donavan Henning
EAP Qualifications and Professional affiliations	• MSc Freshwater Ecology • Registered EAP (EAPASA Reg. no. 2020/1217) • Registered Professional Natural Scientist (SACNASP Reg no: 400108/17)
Physical address	No. 147 Bram Fischer Drive, Ferndale, 2194
Postal address	P.O. Box 1673, SUNNINGHILL
Postal code	2157
Telephone	011 781 1730
Cellphone	082 891 0604
E-mail	donavanh@nemai.co.za

In terms of section 24H of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), and the S24H Regulations as amended:

Are you a registered environmental assessment practitioner, registered with EAPASA in terms of Regulation 14 of Section 24H Registration Authority Regulations, 2016, as amended.	YES* ☒	NO** ☐
If "**No****" provide proof of appointment letter clearly depicting appointment before the 08 August 2022 as per GNR 1733, Amendment of Section 24H Registration Authority Regulations, 2016, 7 February 2022. If you do not attach this proof, you may not commence further with the application, kindly refer to Section 24H Registration Authority Regulations, 2016, as amended.	Attached as **APPENDIX 6A**	
If "**Yes***" please provide a **valid** certificate of registration (Please attach under **APPENDIX 6B**) Note that this will be verified with EAPASA.	Attached as **APPENDIX 6B**	
Please provide valid EAPASA Registration number.	2020/1217	

The appointed EAP must meet the requirements of Regulation 13 of the EIA Regulations, 2014 as amended and Regulation 15(1) of the Section 24H Registration Authority Regulations (Regulation No. 849, Gazette No. 40154 of 22 July 2016, of the National Environmental Management Act (NEMA), Act No. 107 of 1998, as amended. The declaration of independence of the EAP and undertaking under oath or affirmation that all the information submitted or to be submitted for the purposes of the application is true and correct must be submitted as **APPENDIX 6C**.

5. PROJECT DESCRIPTION

Please provide a **detailed** description of the project. Ensure to include all associated infrastructure related to the main facility (*note that the box will expand based on the text included)*:

. Introduction

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.

Seelo Beta Solar PV (RF) (Pty) Ltd (the Applicant) has proposed the development of the Seelo Beta 240MW Solar PV with 1140 MWh BESS Project near the town of Carletonville, in the North West Province. The complete extent of the study area is located in the Central Corridor of the Strategic Transmission Corridors. The electricity generated by the Project will be injected into the existing Eskom 132 kV distribution system.

The Applicant intends to bid for the current and future Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows.

B. Project Overview

PV technology produces direct current (DC) which is then converted to alternating current (AC) via power electronic inverters. **Figure 1** below provides an overview of a typical Solar PV Power Plant project.

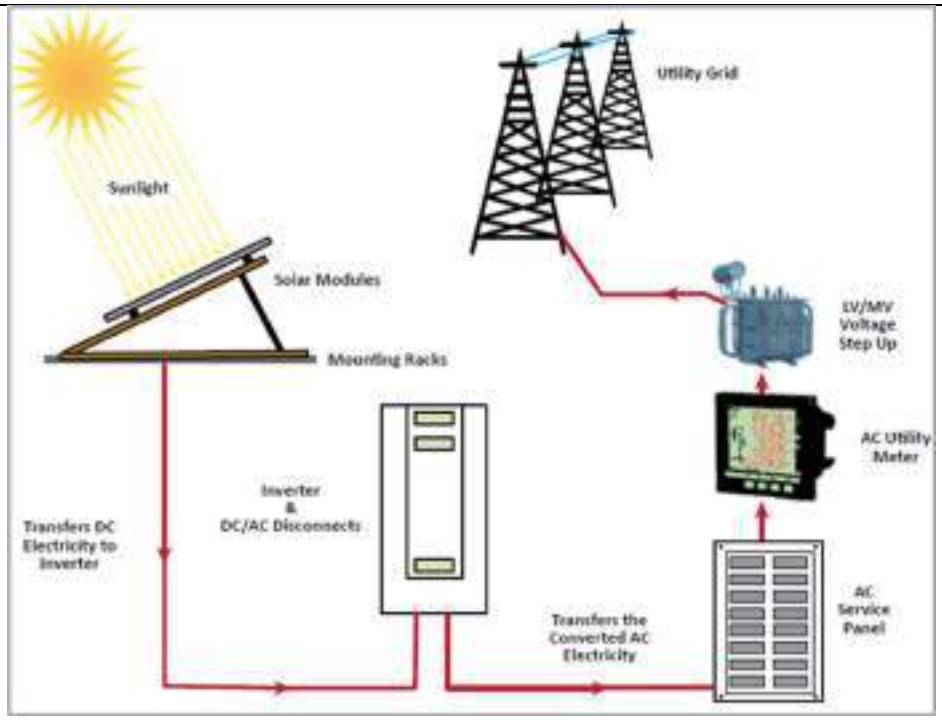


Figure 1: Overview of Solar PV Power Plant
(*International Finance Corporation, 2015. Utility-Scale Solar Photovoltaic Power Plants*)

The Project is located in the most eastern part of the North West Province (at the boundary between North West and Gauteng) and falls within the Dr Kenneth Kaunda District Municipality and JB Marks Local Municipality. The site is located approximately 13km north-west of the town of Carletonville.

The proposed Project consists of the following systems, sub-systems or components (amongst others) (refer to layout provided in **Figure 2** below):

- PV panel arrays, which are the subsystems which convert incoming sunlight into electrical energy;
- Mounting structures to support the PV panels;
- IPP substation;
- On-site inverters to convert DC to facilitate AC connection between the solar energy facility and electricity grid;
- BESS (preferred solution is Lithium Ion);
- Cabling between the Project's components, to be laid underground (where practical);
- Administration Buildings (Offices);
- Operation and Maintenance Building;
- Workshop areas for maintenance and storage;
- Temporary and permanent laydown areas;
- Internal access roads and perimeter fencing of the footprint;
- High Voltage (HV) Transformers; and
- Security Infrastructure.

Figure 2: Layout of proposed Project

The electricity generated by the proposed PV facility will be transferred to the existing Eskom 132 kV distribution system. To connect the proposed PV facility to the national distribution system, a dedicated grid connection will be required which will include the development of a 132/33 kV switching substation and a 132 kV powerline to a point of connection at the existing Carmel Major Transmission Substation. The existing substation is located approximately 12.5km south of the site. This grid connection will be subject to a separate application process for Environmental Authorisation (EA).

5a. RENEWABLE ENERGY DEVELOPMENT ZONES:

Does the project form part of a Renewable Energy Development Zone (REDZ) as per GN 114 ?	**YES*** ☐	**NO** ☒
If "YES*"		
• Confirm Technology	Large Scale Wind ☐	Large Scale Solar PV ☐
• Confirm Zone as per GNR 114 and GNR 142 and 144	Click or tap here to enter text.	
• A map showing the proposed development (100% of the proposed footprint) within the boundary of the zone mentioned above must be generated using the screening tool. Use the "*Print Map*" feature available in the Screening tool to create a map as required.	YES ☐	Attached as **APPENDIX 7A**

5b. ELECTRICITY GRID INFRASTRUCTURE (EGI):

Does the project form part of an Electricity Grid Infrastructure (EGI) as per GN 113?	**YES*** ☐	**NO** ☐
If "YES*"		

• Confirm Strategic Transmission Corridor (STC) as per GNR 113	Click or tap here to enter text.	
• A map showing the proposed development (greater than 50% of the proposed footprint) within the boundary of the STC mentioned above. Use the "*Print Map*" feature available in the Screening tool to create a map as required.	YES ☐	Attached as **APPENDIX 7B**
• Attach a pre-negotiated route with the landowner(s) as per Reg 5 of GNR 113. (*See template attached to this Application form*)	YES ☐	Attached as **APPENDIX 7C**
Does the project form part of the Standard as per GNR 2313	**YES*** ☐	**NO**** ☐
If "YES*" please complete the procedure for following the Standard to apply for registration.		
If "NO", see below and provide motivation (written and illustrative using maps and/or photographic evidence, to confirm why the Standard and the exclusions therein do not apply) as **APPENDIX 7D**.		
• Where any part of the infrastructure occurs on an area for which the environmental sensitivity for any environmental theme is identified as being *very high* or *high* by the national web based environmental screening tool and confirmed to be such through the application of the procedures set out in the Standard	YES ☐	NO ☐
• Where the site sensitivity verification for a specific theme identifies that the *low* or *medium* sensitivity rating of the national web based environmental screening tool is in fact *high* or very high;	YES ☐	NO ☐
• Where the greater part of the proposed infrastructure falls outside any strategic transmission corridor.	YES ☐	NO ☐
Motivation for the development not falling within the Standard supplied as **APPENDIX 7D**	YES ☐	NO ☐
Regulation 7 of GNR 2313 states: 'Where this Standard does not apply, either the requirements of the EIA Regulations or Government Notice No. 113, read with the EIA Regulations, where relevant, apply to the relevant theme for which the very high or high sensitivity has been identified in respect of the portion of the development or expansion which occurs on the area where the environmental sensitivity is confirmed to be very high or high, or to the entire development or expansion where the greater part of the infrastructure falls outside of the strategic transmission corridor.		
Does the project form part of the Electricity Grid Infrastructure (EGI) in a REDZ as per GN 145?	**YES*** ☐	**NO** ☐
If "YES*":		
• Confirm Zone as per GNR 145	Click or tap here to enter text.	
• A map showing the proposed development (greater than 50% of the proposed footprint) within the boundary of the zone mentioned above must be generated using the screening tool. Use the "*Print Map*" feature available in the Screening tool to create a map as required.	YES ☐	Attached as **APPENDIX 7E**

• Attach a pre-negotiated route with the landowner(s) as per Reg 5 of GNR 145. (*See template attached to this Application form)*	YES ☐	Attached as **APPENDIX 7F**

5c. GAS TRANSMISSION PIPELINE INFRASTRUCTURE:

Does the project form part of a Gas Transmission Pipeline Infrastructure as per GN 143?	**YES*** ☐	**NO** ☒
If "YES*"		
• Confirm Strategic Gas Pipeline Corridor (SGPC) as per GNR 143	Click or tap here to enter text.	
• A map showing the proposed development (greater than 50% of the proposed footprint) within the boundary of the SGPC mentioned above. Use the "*Print Map*" feature available in the Screening tool to create a map as required.	YES ☐	Attached as **APPENDIX 7G**
• Attach a pre-negotiated route with the landowner(s) as per Reg 3 of GNR 411. (*See template attached to this Application form*)	YES ☐	Attached as **APPENDIX 7H**

5d. STRATEGIC INFRASTRUCTURE PROJECTS:

Does the project form part of any of the Strategic Infrastructure Projects (SIPs) as described in the National Development Plan, 2011?	**YES*** ☐	**NO** ☒
If "YES*" attach the confirmation of SIP obtained from the relevant sector representative (SIP Coordinators) and not a motivation from an EAP as **APPENDIX 8B**. For a SIP project, kindly indicate which SIPs are applicable in **APPENDIX 8A**Error! Reference source not found. and attach the confirmation of SIP applications from the relevant sector representative in **APPENDIX 8B**. Should no proof be provided, the application will be considered as a normal EIA Application with associated timeframes.	Attached as **APPENDIX 8A** and **APPENDIX 8B**	

6. NATIONAL SECTOR CLASSIFICATION

Table 6.1. Please indicate which sector the project falls under by selecting the relevant block in the table below:

No.	Sector Classification		No.	Sector Classification	
1	Infrastructure /Transport Services/Roads – Public	☐	42	Services/Waste Management Services/Disposal facilities - General	☐
2	Infrastructure /Transport Services/Roads – Private	☐	43	Services/Waste Management Services/Treatment facilities - Hazardous	☐
3	Infrastructure /Transport Services/Rail – Public	☐	44	Services/Waste Management Services/Treatment facilities - General	☐
4	Infrastructure /Transport Services/Rail – Private	☐	45	Services/Waste Management Services/Storage Facilities - General	☐
5	Infrastructure /Transport Services/ Airport/Runways/Landing Strip/Helipad - Commercial	☐	46	Services/Waste Management Services/ Storage Facilities - Hazardous	☐
6	Infrastructure /Transport Services/ Airport/Runways/Landing Strip/Helipad - Private	☐	47	Services/Waste Management Services/Storage Facilities - Nuclear	☐
7	Infrastructure /Transport Services/ Airport/Runways/ Landing Strip/Helipad - Public Services	☐	48	Services/Burial and cemeteries - Cemeteries	☐
8	Infrastructure /Transport Services - Ports	☐	49	Services/Burial and cemeteries - Cremators	☐

No.	Sector Classification		No.	Sector Classification	
9	Infrastructure /Transport Services - Inland Waterways	☐	50	Services/Water services/Storage - Dams	☐
10	Infrastructure /Transport Services - Marina	☐	51	Services/Water services/Storage - Reservoirs	☐
11	Infrastructure /Transport Services - Canal	☐	52	Services/Water services - Desalination	☐
12	Infrastructure /Localised infrastructure - Infrastructure in the Sea/Estuary/Littoral Active Zone/ Development Setback/ 100M Inland/ or coastal public property.	☐	53	Services/Water services - Treatment & Waste Water	☐
13	Infrastructure /Localised infrastructure - Zip Lines & Foefie Slides	☐	54	Services - Hospitality	☐
14	Infrastructure /Localised infrastructure - Cableway or Funiculars	☐	55	Mining - Prospecting rights	☐
15	Infrastructure /Localised infrastructure – Billboards	☐	56	Mining - Mining Permit	☐
16	Infrastructure /Localised infrastructure/ Storage/Dangerous Goods/Hydrocarbon - Gas	☐	57	Mining - Mining Right	☐
17	Infrastructure /Localised infrastructure/ Storage/Dangerous Goods/ Hydrocarbon - Petroleum	☐	58	Mining/Exploration Right - Gas or Oil Marine	☐
18	Infrastructure /Localised infrastructure/ Storage/Dangerous good – Chemicals	☒	59	Mining/Exploration Right - Gas or Oil Terrestrial	☐
19	Utilities Infrastructure/Pipelines/water - Fresh/Storm Water	☐	60	Mining/Production Right - Gas or Oil Marine	☐
20	Utilities Infrastructure/ Pipelines/water - Waste Water	☐	61	Mining/Production Right - Gas or Oil Terrestrial	☐
21	Utilities Infrastructure/ Pipelines/ Dangerous Goods - Chemicals	☐	62	Mining/Underground gasification of coal - Oil	☐
22	Utilities Infrastructure/Pipelines/ Hydrocarbon – Petroleum	☐	63	Mining/Beneficiation - Hydrocarbon	☐
23	Utilities Infrastructure/Pipelines/ Hydrocarbon - Gas	☐	64	Mining/Beneficiation - Mineral	☐
24	Utilities Infrastructure/ Telecommunications/ Radio Broadcasting - Tower	☐	65	Agriculture/Forestry/ Fisheries - Crop Production	☐
25	Utilities Infrastructure/ Telecommunications/ Radio Broadcasting - Mast	☐	66	Agriculture/Forestry/ Fisheries - Animal Production	☐
26	Utilities Infrastructure/ Telecommunications/ Radio Broadcasting - Receivers	☐	67	Agriculture/Forestry/ Fisheries - Afforestation	☐
27	Utilities Infrastructure - Marine Cables	☐	68	Agriculture/Forestry/ Fisheries/Aquaculture/Inland- Alien	☐
28	Utilities Infrastructure/Electricity /Generation/ Non Renewable/ Hydrocarbon – Petroleum	☐	69	Agriculture/Forestry/ Fisheries/Aquaculture/Inland- Indigenous	☐
29	Utilities Infrastructure/Electricity /Generation/ Non Renewable/ Hydrocarbon – Coal	☐	70	Agriculture/Forestry/ Fisheries/Aquaculture/Marine - Alien	☐
30	Utilities Infrastructure/Electricity /Generation/ Non Renewable - Nuclear	☐	71	Agriculture/Forestry/ Fisheries/Aquaculture/Marine - Indigenous	☐
31	Utilities Infrastructure/Electricity /Generation/ Renewable - Hydro	☐	72	Agriculture/Forestry/ Fisheries - Agro-Processing	☐

No.	Sector Classification		No.	Sector Classification	
32	Utilities Infrastructure/Electricity /Generation/Renewable/Solar - PV	☒	73	Transformation of land - Indigenous vegetation	☒
33	Utilities Infrastructure/Electricity /Generation/Renewable/Solar - CSP	☐	74	Transformation of land - From open space or Conservation	☐
34	Utilities Infrastructure/Electricity /Generation/Renewable - Wind	☐	75	Transformation of land - From agriculture or afforestation	☐
35	Utilities Infrastructure/Electricity /Generation/Renewable - Biomass/ biofuels	☐	76	Transformation of land - From mining or heavy industrial areas	☐
36	Utilities Infrastructure/Electricity /Generation/Renewable - Wave	☐	77	Any activities within or close to a watercourse	☐
37	Utilities Infrastructure/Electricity /Distribution and Transmission - Power line	☐	78	Any activity in an estuary, on the seashore, in the littoral active zone, or in the sea.	☐
38	Utilities Infrastructure/Electricity /Distribution and Transmission – Substation	☐	79	Activity requiring permit or licence in terms of National or Provincial legislation governing the release or generation of emissions - Emissions	☐
39	Utilities Infrastructure/Gas /Distribution and Transmission – Compressor Station	☐	80	Activity requiring permit or licence - Marine Effluent	☐
40	Services/Waste Management Services/Disposal facilities - Hazardous	☐	81	Activity requiring permit or licence - Fresh Water Effluent	☐
82	Release of Genetically Modified Organisms	☐			☐

Table 6.2.

Does the listed activity/ies applied for form part of a larger project which is not a listed activity itself e.g., a road that is a listed activity that is needed to access a drilling site where the drilling does not constitute a listed activity	YES ☐	NO ☒
If indicated yes above, please provide a brief description on how the activity/ies relate to the larger project that form's part there of	Not Applicable	

7. SITE DESCRIPTION

Provide a detailed description of the site involved in the application.

Province/s	North West
District Municipality/ies	Dr Kenneth Kaunda District Municipality
Local Municipality/ies	JB Marks Local Municipality
Ward number/s	Ward 64005028
Nearest town/s	Carletonville
Farm name/s and number/s	Farm 96 (Rooipan) IQ
Portion number/s	Portion 1 and Portion 2

Surveyor General 21 digit code:
(If there are more than 4, please attach a list with the rest of the codes as **APPENDIX 9**. Where the 21-digit SGID and farm name are not available, the coordinates of the boundary of the property or properties must be provided in **APPENDIX 9**.

T	0	I	Q	0	0	0	0	0	0	0	0	0	0	9	6	0	0	0	0	2

Coordinates of Property/ies boundary (*corner points or start, middle, end)*
Coordinates must be provided in degrees, minutes and seconds using the Hartebeesthoek94 WGS84 co-ordinate system.

FEATURE	LATITUDE (S)			LONGITUDE (E)		
	DEG	MIN	SEC	DEG	MIN	SEC
	°	′	″	°	′	″
	°	′	″	°	′	″
	°	′	″	°	′	″

*N.B. This template/table must be used to provide additional coordinates for relevant infrastructure which must be included in **APPENDIX 9**.*

Locality map and Project Plan:

Locality map:	A locality map must be attached to the application form, as **APPENDIX 10**. The scale of the locality map must be at least 1:50 000. For linear activities of more than 25 kilometres, a smaller scale e.g. 1:250 000 can be used. The scale must be indicated on the map. The map must be legible and of high resolution. The map must include the following: • an accurate indication of the project site position as well as the positions of the alternative sites, if any; • road names or numbers of all the major roads as well as the roads that provide access to the site(s) • a north arrow; • scale indicator; • a legend (which explains all symbols used on the map; • site sensitivities, including but not limited to vegetation, wetlands, watercourses, heritage sites, critical biodiversity area/s, World Heritage Site, etc. and it must be overlaid by the study area; and • GPS co-ordinates (Indicate the position of the proposed activity with the latitude and longitude at the centre point for each alternative site. The co-ordinates should be in degrees, minutes and seconds. The seconds should be to at least two decimal places. The projection that must be used in all cases is the WGS-84 spheroid in a national or local projection).
Project Plan	A project schedule must be submitted as **APPENDIX 11**, and must include relevant milestones for:

(e.g. Gantt chart)	• public participation (dates for advertisements, workshops and other meetings, obtaining comment from organs of state including state departments); • the commencement of parallel application processes required in terms of other statutes and where relevant, the alignment of these application processes with the EIA process; • the submission of the key documents (e.g. Basic Assessment Report, Scoping Reports, EIA Reports and Environmental Management Programmes). Note: All the above dates must take into account the statutory timeframes for authority responses that are stipulated in the 2014 NEMA EIA Regulations, as amended. Possible appeals may impact on project timeframes/milestones. Regulation 45 states that "**An application in terms of these Regulations lapses, and a competent authority will deem the application as having lapsed, if the applicant fails to meet any of the time-frames prescribed in terms of these Regulations, unless extension has been granted in terms of regulation 3(7).**" It is recommended that the Competent Authority be approached for guidance on the process to be followed, prior to submitting an application.

8. ACTIVITIES APPLIED FOR

For an application for environmental authorisation that involves more than one listed activity that, together, make up one development proposal, all the listed activities pertaining to this application must be provided below.

Activity No(s):	Provide the relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 1** of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates. Ensure to include thresholds/area/footprint applicable.
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; (b) 2 kilometres or shorter in length; (c) within an existing transmission line servitude; and (d) will be removed within 18 months of the commencement of development.	The proposed Seelo Beta Solar PV Facility will require the construction and operation of an on-site facility substation with a capacity of up to 132kV to facilitate the connection of the facility to the national grid.
GN No. R.983 – Activity 14:	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	Installation of BESS (lithium-ion technology).
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 (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;	New roads required for the Project (construction and operational phases). With regard to the roads, the internal roads will be up to 6m wide with a 12m reserve.

	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.	The access road to the project site will be up to 8m wide with a 14m reserve.
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:	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 internal farm roads will be widened by more than 6m to accommodate heavy vehicle turning.
Activity No(s):	Provide the relevant Scoping and EIA Activity(ies) as set out in Listing Notice 2 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates. Ensure to include thresholds/area/footprint applicable.
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 PV facility with a total generation capacity of 240MW renewable solar energy.
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.	Clearance of areas associated with the construction footprint.
Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates. Ensure to include thresholds/area/footprint applicable.
N/A	N/A	N/A

Please note that any authorisation that may result from this application will only cover listed or specified activities specifically applied for. Only those activities listed above shall be considered for authorisation. The onus is on the applicant to ensure that all applicable listed activities are included in the application. Environmental Authorisation must be obtained prior to commencement with each applicable listed activity. **If a specific listed or specified activity is not included in an Environmental Authorisation, a new application for Environmental Authorisation will have to be submitted**.

Coordinate points indicating the location of each listed activity (where applicable) must be provided as part of **APPENDIX 9**. Coordinates must be provided in degrees, minutes and seconds using the Hartebeesthoek94 WGS84 co-ordinate system.

9. PUBLIC PARTICIPATION

Provide details of the public participation process proposed for the application as required by Regulation 41(2) of the EIA Regulations, 2014 as amended.

A. REVIEW OF DRAFT EIA REPORT

1) Access to the Draft EIA Report

The draft EIA Report will be uploaded to Nemai's website and a hardcopy will be placed at a public place such as the public library in Carletonville.

Copies of the draft EIA Report will also be distributed to key authorities with jurisdiction, including the following:

- DFFE (including Biodiversity Conservation Unit);
- DEDECT;
- DWS: North West Region;
- DMRE;
- DPWR;
- NWPHRA;
- Dr Kenneth Kaunda District Municipality; and
- JB Marks Local Municipality.

2) Notification of Review

Authorities and registered I&APs will be notified in writing of the review of the draft EIA Report. All notifications will be sent via email and/or as registered mail. Authorities and I&APs will be provided 30 days to comment on the draft EIA Report.

3) Authorities Meeting

An authorities meeting will be conducted virtually via Microsoft Teams during the review period. Authorities will be notified separately of the review of the draft EIA Report and of the authorities meeting. In the notification, we will request authorities to confirm their interest in partaking in the authorities meeting in writing prior to the date of notification. Participants will thus be pre-registered. Only the pre-registered parties that confirmed interest will receive a meeting invitation to the virtual meeting, with the link to join. Depending on the interest shown, and to manage the number of participants, an additional authorities' meeting may need to be scheduled.

4) Public Meeting

A public meeting will be convened at a suitable venue (e.g. community hall/virtually) during the review period. I&APs will be notified separately of the review of the draft EIA Report and of the public meeting. In the notification, we will request I&APs to confirm their interest in attending the public meeting in writing. Attendees will thus be pre-registered. Only the pre-registered parties that confirmed interest will receive a meeting invitation to the public meeting. Depending on the interest shown, and to manage the number of participants, an additional public meeting may need to be scheduled.

B. NOTIFICATION OF DECISION

Registered I&APs will be notified in writing of DFFE's decision and of the appeal process, in accordance with the National Appeal Regulations, 2014.

10. OTHER AUTHORISATIONS REQUIRED

Are there any other applications for Environmental Authorisation on the same property?		YES☐	NO☒
If YES, please indicate the following:			
Competent Authority	Click or tap here to enter text.		
Application Reference Number	Click or tap here to enter text.		
Project Name	Click or tap here to enter text.		
Please provide details of the steps taken to ascertain this information: Click or tap here to enter text.			
Explain whether the above approval(s) will be in conflict with the proposed development. Click or tap here to enter text.			

11. OTHER LEGISLATION/APPROVAL

Applications in terms of the National Environmental Management Act ("NEMA") & specific environmental management Acts ("SEMAs"):

LEGISLATION	**AUTHORISATION REQUIRED**		**APPLICATION SUBMITTED**	
	YES	**NO**	**YES**	**NO**
Is Section 50(5) of the National Environmental Management: Protected Areas Act applicable to your proposed development? (The proposed development is within a proclaimed protected area as defined the Act.)	☐	☒	☐	☐
National Water Act (Act No. 36 of 1998) *To be confirmed*	☐	☐	☐	☐
National Environmental Management: Air Quality Act (Act No. 39 of 2004)	☐	☒	☐	☐
National Environmental Management: Biodiversity Act (Act No. 10 of 2004)	☐	☒	☐	☐
National Environmental Management: Integrated Coastal Management Act (Act No. 24 of 2008)	☐	☒	☐	☐
National Environmental Management: Protected Areas Act (Act No. 57 of 2003)	☐	☒	☐	☐
National Environmental Management: Waste Act (Act No. 59 of 2008)	☐	☒	☐	☐
Others: Please specify National Heritage Resources Act (Act No. 25 of 1999)	☐	☒	☐	☐

Please be advised that:

- If a Waste Management license is required in terms of the National Environmental Management: Waste Act, please contact the Department for guidance on the **Integrated Permitting System**. **An IPS application can only be lodged with this Department in the event that this Department is the Competent Authority for both the EIA and Waste related activities**;
- If Sections 7B and 7C of the National Environmental Management: Integrated Coastal Management Act is applicable to your proposed development, you are required to obtain pre-approval for a reclamation application prior to an Application for Environmental Authorisation being lodged with the Competent Authority;
- If Section 50(5) of the National Environmental Management: Protected Areas Act is applicable to your proposed development, you are required to obtain approval from the Management Authority **prior** to an Application for Environmental Authorisation being lodged with the Competent Authority. This approval must be attached as **APPENDIX 12**; and

- If Section 38 of the National Heritage Resources Act (Act No. 25 of 1999) is applicable to your proposed development, you are requested to submit the Notice of Intent form to the relevant SAHRA or a Provincial Heritage Resources Authority and attach a copy to this form as **APPENDIX 13**. If it is indicated that a Heritage Impact Assessment will be required, the Heritage Impact Assessment must be undertaken as one of the specialist studies of the EIA process to be undertaken in terms of the NEMA EIA Regulations, 2014, as amended.

12. LIST OF APPENDICES

		SUBMITTED	
		YES	NO
APPENDIX 1	Copy of the pre-application meeting minutes	☒	☐
APPENDIX 2	Proof of Payment / Motivation for exclusion	☒	☐
APPENDIX 3	List of landowners (with contact details) and written consent of landowners. *If more than 1 landowner consent is attached, use sub-number 3a, 3b, 3c to denote the associated document.*	☒	☐
APPENDIX 4	Declaration of Applicant	☒	☐
APPENDIX 5	List of Local/Provincial Authority involved (with contact details)	☒	☐
APPENDIX 6A	Proof of appointment of EAP before 8 August 2022	☐	☒
APPENDIX 6B	Valid EAPASA Registration Certificate	☒	☐
APPENDIX 6C	Declaration of EAP and undertaking under oath or affirmation	☒	☐
APPENDIX 7A	Renewable Energy Development Zone Map	☐	☒
APPENDIX 7B	EGI in Strategic Transmission Corridor Map	☐	☒
APPENDIX 7C	Pre-Negotiated Route Agreement for EGI	☐	☒
APPENDIX 7D	Motivation pertaining to the Standard as per GNR 2313	☐	☒
APPENDIX 7E	EGI in Renewable Energy Development Zone Map	☐	☒
APPENDIX 7F	Pre-Negotiated Route Agreement for EGI in REDZ	☐	☒
APPENDIX 7G	Gas Transmission Pipeline Infrastructure Map	☐	☒
APPENDIX 7H	Pre-Negotiated Route Agreement for Gas Transmission Pipeline	☐	☒
APPENDIX 8A	List of Strategic Infrastructure Projects	☐	☐
APPENDIX 8B	SIP Confirmation Letter from SIP Coordinator	☐	☐
APPENDIX 9	List of SGIDs and coordinates	☒	☐
APPENDIX 10	Locality map	☒	☐
APPENDIX 11	Project schedule	☒	☐
APPENDIX 12	Section 50(5) of NEM:PAA approval	☐	☒
APPENDIX 13	Notice of Intent in terms of NHRA 25 of 1999	☐	☒
APPENDIX 14	Screening Tool Report	☒	☐
APPENDIX 15	Other Click or tap here to enter text.	☐	☒

APPENDIX 1
COPY OF THE PRE-APPLICATION MEETING MINUTES

NEMAI CONSULTING	**DRAFT MINUTES** **Pre-Application Meeting with the Department of Forestry, Fisheries and the Environment (DFFE)**	**Queries:**	Donavan Henning ☎ 011 781 1730 🖷 011 781 1731 ✉ donavanh@nemai.co.za
Applicant:	WKN Windcurrent PNE GROUP	**Project Name:**	Proposed Seelo Solar Photovoltaic Facilities and Associated Infrastructure near Carletonville, North West Province
Date:	28 February 2023	**Time:**	09:00 AM - 10:30 AM
Facilitator:	D. Henning	**Venue:**	Microsoft Teams Meeting

A. Attendance

Present

Attendees	Organisation	Email
Muhammad Essop	DFFE	messop@dffe.gov.za
Coenrad Agenbach	DFFE	cagenbach@dffe.gov.za
Trisha Rene Pillay	DFFE	tpillay@dffe.gov.za
Kernick Gordon	WKN Windcurrent SA (Pty) Ltd	kernick@wkn-windcurrent.com
Marshall Mabin	WKN Windcurrent SA (Pty) Ltd	mabin@wkn-windcurrent.com
Donavan Henning	Nemai Consulting (Pty) Ltd	donavanh@nemai.co.za
Niel Brink	GIBB Environmental (Pty) Ltd	nbrink@gibbenvironmental.co.za

Apologies

1. Mmamohale Kabasa (DFFE).

B. Discussion

Note: These minutes are not intended as a verbatim transcript of the meeting, but rather as a summary of the salient discussions which took place.

Item.	Description	Action	Target Date
1.	**WELCOME AND INTRODUCTION**		
1.1	The Pre-Application Meeting with the DFFE for the proposed Seelo Solar Photovoltaic (PV) Cluster Projects in the North West Province commenced at approximately 09:00 AM. D. Henning acted as the facilitator for the meeting and requested a round of introductions.	-	-
2.	**PURPOSE OF THE MEETING**		
2.1	D. Henning indicated that the objectives of the meeting included the following: • To present an overview of the proposed projects to DFFE; • To seek clarification regarding certain matters that pertain to the Environmental Impact Assessment (EIA) processes; • To determine DFFE's requirements; and	-	-

Item.	Description	Action	Target Date
	• To confirm the processes and timeframes.		
3	**CONFIRMATION OF AGENDA**		
3.1	The agenda was accepted without any amendments.	-	-
4.	**PROJECT OVERVIEW**		
4.1	The Applicant (M. Mabin) provided an overview of the proposed Projects (refer to the presentation contained in Appendix A).	-	-
4.2	M. Essop queried with the Applicant what the intensions are with the Environmental Authorisations (EAs). M. Mabin responded that the aim is to either bid for the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) or to engage with private off-takers. M. Essop indicated that to identify the Competent Authority (CA), the Applicant will need to first confirm whether the projects will follow the REIPPPP route or will be made available to private off-takers. He explained that as of May 2022, the National Department became the CA for projects under REIPPPP and the relevant Provincial Department the CA for projects related to private off-takers. M. Mabin queried what the process would entail if the EAs will be used to bid for the REIPPPP but at a later stage it is decided that private off-taking would be more suitable. M. Essop responded that an EA will not mention or specify whether it is a project under REIPPPP or related to private off-taking. M. Mabin confirmed that as the Applicant they would prefer to have the Applications submitted the DFFE and would thus follow the REIPPPP route for now.	-	-
4.3	D. Henning noted that DFFE previously confirmed that for a Battery Energy Storage System (BESS) it was not required to apply for the listed activity related to the storage of dangerous goods. He asked if it was necessary to identify the preferred alternative for BESS technology. C. Agenbach responded that it depends on the technology that will be used. He distinguished between solid- and liquid-state batteries, and noted that the storage of dangerous goods was related to the latter. D. Henning indicated that it will be confirmed with the Applicant which battery type will be used.	-	-
5.	**ENVIRONMENTAL IMPACT ASSESSMENT PROCESSES**		
5.1	**Process Outline & Timeframes**		
5.1.1	D. Henning indicated that the following applications will be submitted for the respective projects:	-	-

Item.	Description	Action	Target Date
	1. Scoping and Environmental Impact Reporting (S&EIR) Processes – a. Seelo Alpha Solar PV Facility; b. Seelo Beta Solar PV Facility; and c. Seelo Charlie Solar PV Facility. 2. Basic Assessment Processes – a. Seelo Alpha Grid Connection; b. Seelo Beta Grid Connection; and c. Seelo Charlie Grid Connection. D. Henning noted that the CA for the Solar PV facilities and grid connections was DFFE. He indicated that in the case of the gird connections, the proposed power lines will traverse two provinces, namely the North West and Gauteng Provinces.		
5.1.2	D. Henning presented the approaches to the S&EIR and Basic Assessment Processes for the PV facilities and grid connections, respectively (refer to the diagram in the presentation contained in Appendix A). D. Henning confirmed that three (3) separate Applications will be submitted for the PV Facilities and three (3) separate Applications for the grid connections.	-	-
5.2	**Public Participation**		
5.2.1	D. Henning indicated the following: • Public Participation will be undertaken in terms of Chapter 6 of the EIA Regulations; and • Proof of notifications and comments will be included in the final Scoping, EIA and Basic Assessment Reports that will be submitted to DFFE.	-	-
5.3	**Listed Activities**		
5.3.1	D. Henning indicated that the approach is to include all potential listed activities in the Applications and to link them to the project components, which will be refined as the respective processes progress.	-	-
5.4	**Alternatives**		
5.4.1	D. Henning noted that the following alternatives will be considered: 1. Layout Alternatives; 2. Technology Alternatives; and 3. No-Go Alternative.	-	-
5.5	**Specialist Studies**		
5.5.1	D. Henning noted that the DFFE Screening Tool was used to determine site sensitivity.	-	-
5.5.2	D. Henning indicated that the following specialist studies were identified to assess the projects: • Terrestrial Ecological Assessment; • Freshwater Ecological Assessment and Delineation; • Avifaunal Impact Assessment; • Agricultural Impact Assessment; • Visual Impact Assessment; • Social Impact Assessment; • Phase 1 Heritage Impact Assessment; and	-	-

Item.	Description	Action	Target Date
	• Desktop Palaeontological Impact Assessment.		
5.5.3	D. Henning indicated that the specialist studies will adhere to Appendix 6 of the EIA Regulations, or to the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes, as relevant.	-	-
5.6	**Scoping & EIA Reports**		
5.6.1	D. Henning indicated that the draft Scoping Reports will be submitted to DFFE together with the Application Forms to facilitate adherence to the regulated timeframes. He noted that copies of draft reports will be provided to the authorities with jurisdiction. He further stated that Generic Environmental Management Programmes will be prepared for the Power Line and Substation for the grid connections.	-	-
5.7	**Comments & Responses Report**		
5.7.1	D. Henning mentioned that DFFE's format for the Comments and Responses Report (CRR) will be used. He indicated that the comments received during the review of draft reports will be included in the final Scoping and EIA Reports and will be included verbatim in the CRR.	-	-
6.	**DFFE'S REQUIREMENTS / GENERAL**		
6.1	C. Agenbach conveyed the following requirements from DFFE: • Public Participation: Provision should be made for the local dominant language spoken in the area. • Specialist Studies: Specialists should be registered with the South African Council for Natural Scientific Professions (SACNASP).	-	-
6.2	M. Essop indicated that regarding the Screening Tool Report and protocols, the Scoping Reports should include site sensitivity verification confirming or disputing the findings of each of the themes specified.		
6.3	M. Mabin queried with the Department regarding 132kV infrastructure located inside the Strategic Transmission Corridors whether it is compulsory to follow GNR 113 (i.e. submit application with a pre-negotiated route). M. Essop responded that if your powerline route falls within the Strategic Transmission Corridors it is compulsory to follow the requirements of GNR 113 (as amended).		
7.	**CLOSE**		
7.1	The meeting was concluded at approximately 09h50.	-	-

Minutes Complied By:

Nemai Consulting

	6 March 2023
D. Henning	Date

Minutes Accepted By:

DFFE

	Date

APPENDIX A

PRESENTATION

PROPOSED SOLAR PV FACILITIES AND ASSOCIATED INFRASTRUCTURE NEAR CARLETONVILLE, NORTH WEST PROVINCE

DFFE Pre-Application Meeting

28 February 2023

(Reference No.: 2023-01-0036)

NEMAI CONSULTING

Environmental, Social and OHS Consultants

P.O. Box 1673
Sunninghill
2157

147 Bram Fisher Drive
Ferndale
2194

Tel: 011 781 1730
Fax: 011 781 1731
Email: info@nemai.co.za

AGENDA

AGENDA ITEMS
1) Welcome & Introduction
2) Apologies
3) Purpose of the Meeting
4) Project Overview
5) EIA Processes
5.1 - Process Outline & Timeframes
5.2 - Public Participation
5.3 - Listed Activities
5.4 - Alternatives
5.5 - Specialist Studies
5.6 - Scoping, EIA & Basic Assessment Reports
5.7 - Comments & Responses Report
6) DFFE Requirements
7) Way Forward & Close

(3) PURPOSE OF THE MEETING

- To present an overview of the Projects to DFFE.
- To seek clarification regarding certain matters that pertain to the Environmental Assessment processes.
- To determine DFFE's requirements.
- To confirm the process and timeframes.

(4) PROJECT OVERVIEW

(5) EIA PROCESSES

(5) EIA PROCESSES

5.1 – Process Outline & Timeframes

- Applications:

1) **Scoping & Environmental Impact Reporting Processes –**
   a) Seelo Alpha Solar PV Facility
   b) Seelo Beta Solar PV Facility
   c) Seelo Charlie Solar PV Facility
2) **Basic Assessment Processes –**
   a) Seelo Alpha Grid Connection
   b) Seelo Beta Grid Connection
   c) Seelo Charlie Grid Connection

(5) EIA PROCESSES

5.1 – Process Outline & Timeframes

- Applications:

1) **Scoping & Environmental Impact Reporting Processes –**
   a) Seelo Alpha Solar PV Facility
   b) Seelo Beta Solar PV Facility
   c) Seelo Charlie Solar PV Facility

   } Competent Authority: DFFE

2) **Basic Assessment Processes –**
   a) Seelo Alpha Grid Connection
   b) Seelo Beta Grid Connection
   c) Seelo Charlie Grid Connection

(5) EIA PROCESSES

5.1 – Process Outline & Timeframes

- Applications:

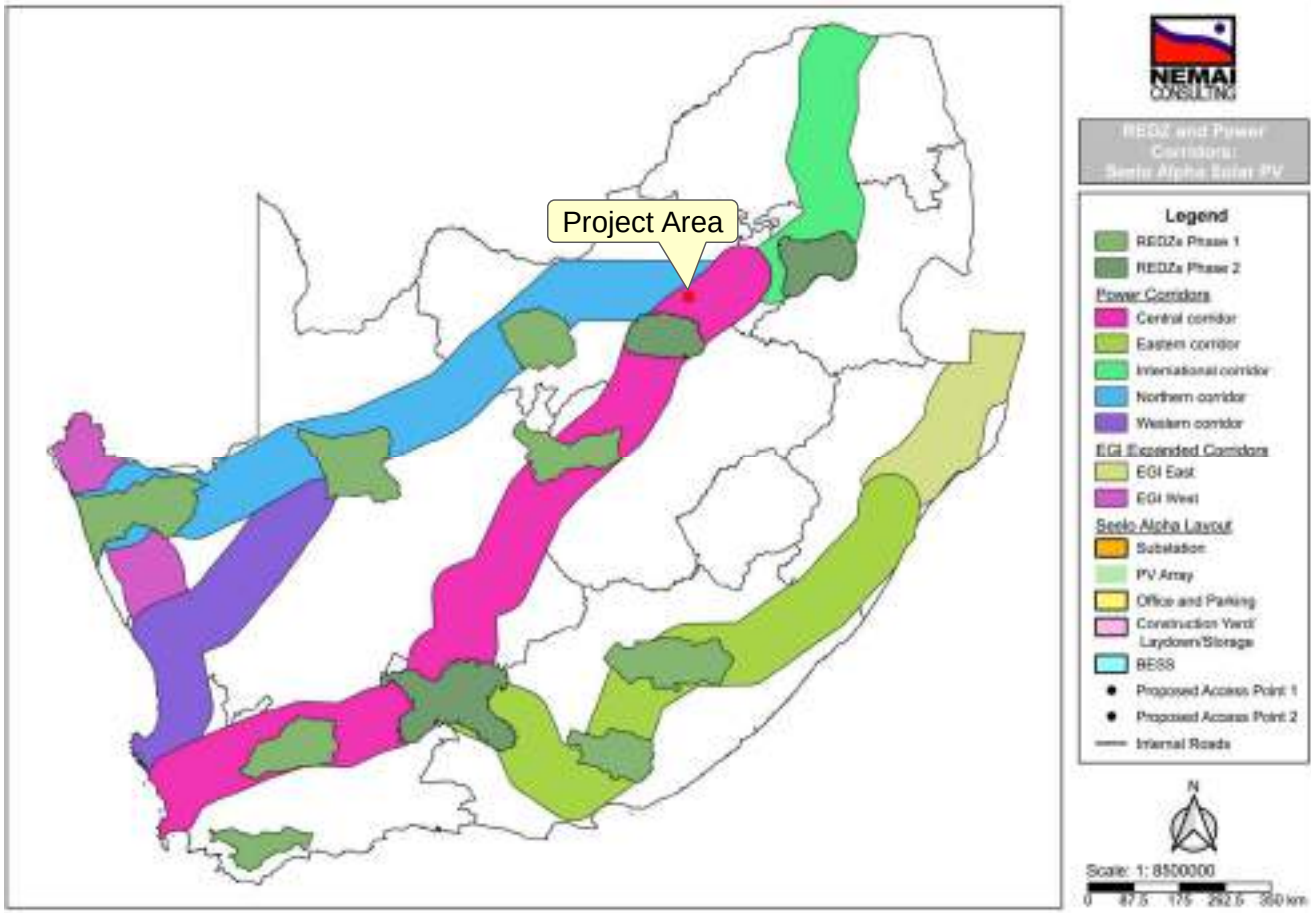
1) **Scoping & Environmental Impact Reporting Processes –**
   a) Seelo Alpha Solar PV Facility
   b) Seelo Beta Solar PV Facility
   c) Seelo Charlie Solar PV Facility
2) **Basic Assessment Processes –**
   a) Seelo Alpha Grid Connection
   b) Seelo Beta Grid Connection
   c) Seelo Charlie Grid Connection

Competent Authority: DFFE
(*NEMA S24C: development footprint within boundaries of more than one province*)

(5) EIA PROCESSES

5.1 – Process Outline & Timeframes

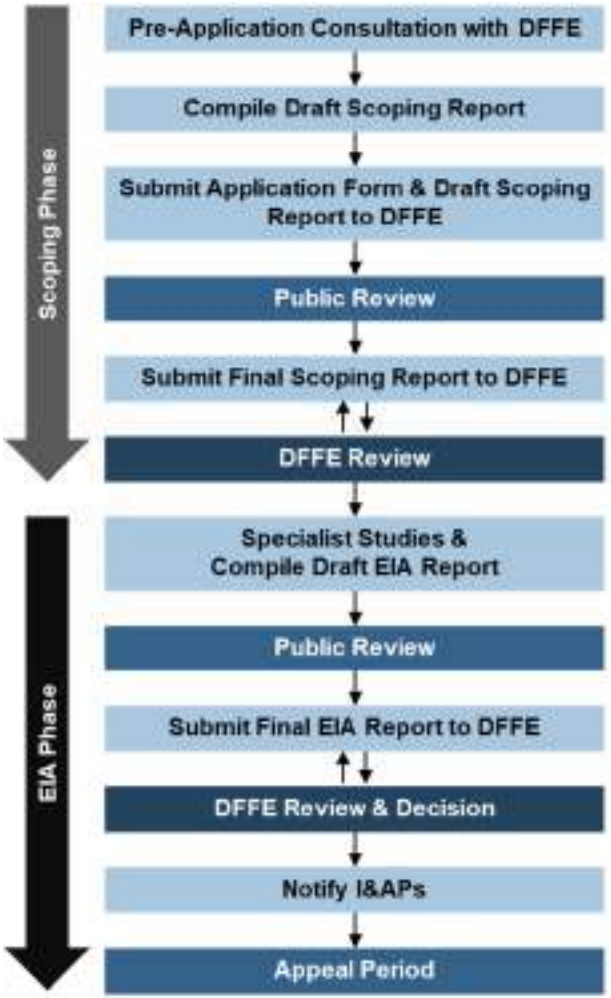
- REDZs & Strategic Transmission Corridors:



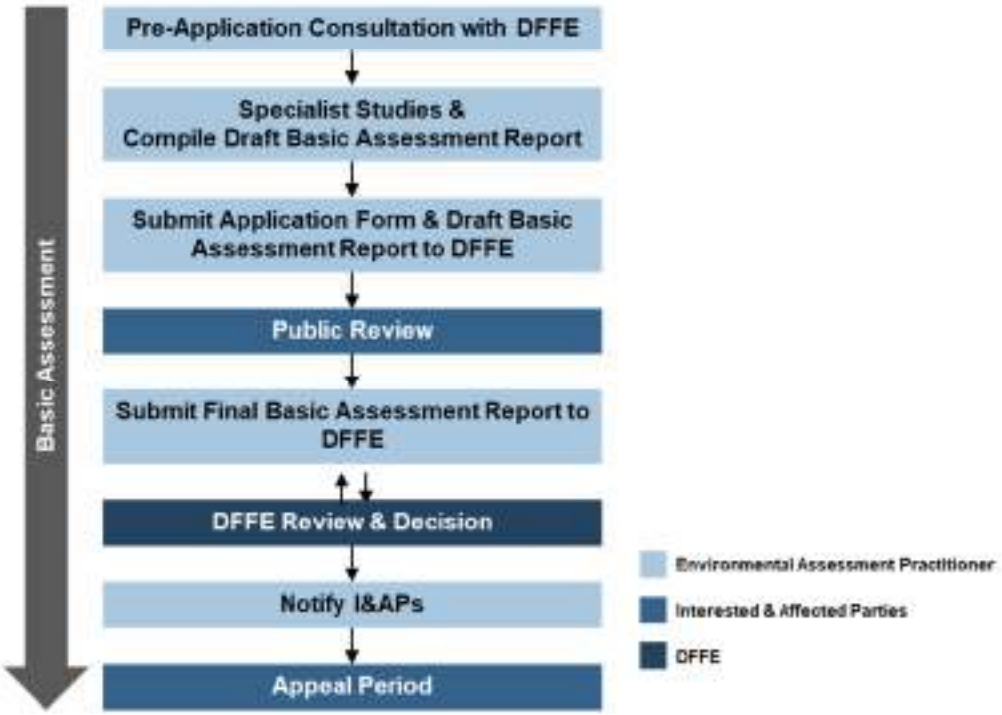
(5) EIA PROCESSES

5.1 – Process Outline & Timeframes

Solar PV Facilities



Grid Connections



(5) EIA PROCESSES

5.2 - PUBLIC PARTICIPATION

- Public Participation in terms of Chapter 6 of the EIA Regulations of 2014, as amended.
- Proof of notifications and comments to be included in the Final Scoping and EIA Reports.

(5) EIA PROCESSES

5.3 - LISTED ACTIVITIES

❑ Listing Notice 1:

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.
Activity 12(ii)(a) & (c):	The development of - (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs - (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse…
Activity 19:	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse…
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 (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres…
Activity 27:	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.
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…
Activity 56	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…

(5) EIA PROCESSES

5.3 - LISTED ACTIVITIES

❑ Listing Notice 2:

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.
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.

❑ Listing Notice 3:

Activity 4 - (h)(vi):	The development of a road wider than 4 metres with a reserve less than 13,5 metres.
Activity 12 - (h)(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.
Activity 14(ii)(a) & (c) - (h)(vi):	The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.
Activity 18(h)(ii) & (ix)	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.

(5) EIA PROCESSES

5.4 - ALTERNATIVES

- Layout Alternatives.
- Technology Alternatives.
- No-Go Alternative.

(5) EIA PROCESSES

5.5 - SPECIALIST STUDIES

- DFFE Screening Tool.
- Specialist Studies triggered:
  1. Terrestrial Ecological Assessment
  2. Freshwater Ecological Assessment & Delineation
  3. Avifaunal Impact Assessment
  4. Agricultural Impact Assessment
  5. Visual Impact Assessment
  6. Social Impact Assessment
  7. Phase 1 Heritage Impact Assessment
  8. Desktop Palaeontological Impact Assessment

- Environmental Theme Protocols / Appendix 6 of EIA Regulations.

(5) EIA PROCESSES

5.6 - SCOPING, EIA & BASIC ASSESSMENT REPORTS

- The Draft Scoping Reports will be submitted to DFFE together with the Application Forms to facilitate adherence to the regulated timeframes.

- Copies of draft reports to be provided to authorities with jurisdiction, including –
  - DFFE (including Biodiversity Conservation Unit)
  - DEDECT
  - DWS: North West Region
  - DMRE
  - North West Department of Public Works and Roads
  - NWPHRA
  - JB Marks LM and Dr Kenneth Kaunda DM

- Generic EMPr's (Power Line & Substation) for Grid Connections.

(5) EIA PROCESSES

5.7 COMMENTS & RESPONSES REPORT

- DFFE's format to be used.
- Comments from review of draft reports to be included final Scoping, EIA and Basic Assessment Reports.
- All comments received will be included verbatim in the CRR.
- Responses from Applicant, EAP and environmental specialists.

(6) DFFE's Requirements

(7) Way Forward & Close

Thank you

Company:	**Nemai Consulting**
Contact Person:	**Donavan Henning**
Tel:	**(011) 781 1730**
Fax:	**(011) 781 1731**
Email:	**donavanh@nemai.co.za**
Postal Address:	**PO Box 1673, Sunninghill, 2157**

PNE
pure new energy

Seelo Alpha, Beta and Charlie PV Facilities

FEBRUARY 2023

WKN Windcurrent
PNE GROUP

Project Description

- Alpha Seelo Solar PV and BESS– 240MW
- Beta Seelo Solar PV and BESS – 240MW
- Charlie Seelo Solar PV and BESS – 140MW

- 13km northwest of town of Carletonville in North West Province

- Three projects located across three land parcels owned by two private landowners:
  - Portion 2 of 96 – 851 ha
  - Portion 1 of 96 – 1131 ha
  - Portion 2 of 58 – 730

- Land use: livestock and game farming

- Total project Area footprint approximately – 935ha

- Separate132kV OHL applications from IPP substation to Carmel MTS circa 13km south of site and located in GP.

Project Components

- **Facility**
  - PV Panels
  - Mounting structures
  - On-site inverters
  - Cabling
  - Admin building, control room, workshop
  - Temp and permanent laydown areas
  - IPP substation
  - Battery Energy Storage System
  - Access roads and internal road system

- **Overhead line**
  - Eskom substation
  - Overhead 132kV line to Carmel MTS

APPENDIX 2
PROOF OF PAYMENT/ MOTIVATION FOR EXCLUSION

Standard Bank of South Africa

ComputerGeneratedCopy

The Standard Bank of South Africa Limited Registered Bank Reg. No. 1962/000738/06

CUSTOMER ALL PAYMENTS FINAL AUDIT REPORT

Customer No	996621523		
User ID	QMI54	**User Name**	NEMAI CONSULTING CC
Sub Module	SSVS	**Reference**	2023073002
Description	EFT7	**Action date**	20230314
Finalreleasingoperators	EA505 C CHIDLEY		N/A

Sub-batch 001 **From Account no** 0000220037515 **From Account Name** NEMAI CONSULTING CC

Trans No	1
Acc No / CDI	1044240072
Branch No	632005
Statement Ref	-26.304069/27.273972
Account Name	DEPARTMENT OF FORESTRY, FISHER
Creditor Code	
Amount	10,000.00
StatusDescription	FINAL AUDIT TO BE DOWNLOADED
RTGS/RTC	
ISN/Bus Ref	0
Pay Alert	N

NEMAI CONSULTING

Department of Fisheries, Forestry and the Environm

Attention :

P.O. Box 1673
SUNNINGHILL
2157

Tel : 011 781 1730
Fax : 011 781 1731

Remittance Advice

Account Number	Remittance Advice No.	Remittance Advice Date		Page
DFFE	09064	14/03/2023		Page 1 of 1

Transaction Type	Transaction Date	Transaction Reference	Transaction Description	Original Amount	Discount Allowed	Payment Amount
INV - Invoice	14/03/2023	DFFE PMT 2	RFP - Seelo Beta	10,000.00	0.00	10,000.00

Total Paid: 10,000.00

Payment to be made into your bank account on 14/03/2023

If you have any queries with regards this Remittance Advice, or believe that any invoices due for payment have not been paid, please email Creditors@nemai.co.za

APPENDIX 3
LIST OF LANDOWNERS

(with contact details) and written consent of landowners. If more than 1 landowner consent is attached, use sub-number 3a, 3b, 3c to denote the associated document.

- If more than 1 landowner consent is attached, use sub-number 3a, 3b, 3c to denote the associated document.
- See attached template for landowner consent.
- In addition, the below list of landowners must be completed.

Listed Activity	Project description	Farm Portions	Farm Owner	Landowner consent provided Y/N	Include document name
GN No. R.983 – Activity 11(i)	*On-site facility substation with a capacity of up to 132kV to facilitate the connection of the facility to the national grid.*	*Portion 1 of Farm 96 (Rooipan) IQ*	*Mr J. Lightfoot*	*YES*	*Appendix 3A*
GN No. R.983 – Activity 14:	Installation of BESS (lithium-ion technology)..	*Portion 1 of Farm 96 (Rooipan) IQ*	*Mr J. Lightfoot*	*YES*	*Appendix 3A*
GN No. R.983 – Activity 24(ii):	New roads required for the Project (construction and operational phases)..	*Portion 1 of Farm 96 (Rooipan) IQ*	*Mr J. Lightfoot*	*YES*	*Appendix 3A*
		Portion 2 of Farm 96 (Rooipan) IQ	*Mr A. Vermaak*	*YES*	*Appendix 3A*
GN No. R.983 – Activity 28(ii):	Footprint of Project on land that was previously used for agricultural purposes, outside of an urban area.	*Portion 1 of Farm 96 (Rooipan) IQ*	*Mr J. Lightfoot*	*YES*	*Appendix 3A*
		Portion 2 of Farm 96 (Rooipan) IQ	*Mr A. Vermaak*	*YES*	*Appendix 3A*
GN No. R.983 – Activity 56:	The existing internal farm roads will be widened by more than 6m to accommodate heavy vehicle turning.	*Portion 1 of Farm 96 (Rooipan) IQ*	*Mr J. Lightfoot*	*YES*	*Appendix 3A*
		Portion 2 of Farm 96 (Rooipan) IQ	*Mr A. Vermaak*	*YES*	*Appendix 3A*
GN No. R.984 – Activity 1:	The proposed Project involves the development of a PV facility with a total generation	*Portion 1 of Farm 96 (Rooipan) IQ*	*Mr J. Lightfoot*	*YES*	*Appendix 3A*

	capacity of 240MW renewable solar energy.				
GN No. R.984 – Activity 15:	Clearance of areas associated with the construction footprint.	*Portion 1 of Farm 96 (Rooipan) IQ*	*Mr J. Lightfoot*	*YES*	*Appendix 3A*

*If more than 1 activity applies to the same farm portion/property and same landowner, One (1) landowner consent form may be submitted, which clearly outlines all the relevant activities specific to said property and landowner.

APPENDIX 3 (a)
CONSENT FROM THE LANDOWNER / PERSON IN CONTROL OF THE LAND, ON WHICH THE ACTIVITY IS TO BE UNDERTAKEN

Please see attached Special Power of Attorney

Submitted in terms of the requirements of sub-regulation 39(1) of the Environmental Impact Assessment Regulations, 2014 (if the applicant is not the owner or person in control of the land on which the activity is to be undertaken).

KINDLY NOTE THAT:

1. This document should be attached as Appendix 3 to: The application form for Environmental Authorization in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998).
2. This form is current as of August 2023. It is the responsibility of the Applicant / Environmental Assessment Practitioner ("EAP") to ascertain whether subsequent versions of the form have been released by the Department.
3. One form must be filled in per landowner.

1. DETAILS OF APPLICANT:

Project Applicant	Click or tap here to enter text.
Trading name (if any)	Click or tap here to enter text.
Contact person	Click or tap here to enter text.
Physical address	Click or tap here to enter text.
Postal address:	Click or tap here to enter text.
Postal code	Click or tap here to enter text.
Telephone/ cell:	Click or tap here to enter text.
E-mail:	Click or tap here to enter text.

2. DETAILS OF LANDOWNER:
(where the applicant is not the landowner or person in control of the land)

Landowner or person in control of the land:	Click or tap here to enter text.
Contact person	Click or tap here to enter text.
Physical address	Click or tap here to enter text.
Postal address:	Click or tap here to enter text.
Postal code	Click or tap here to enter text.
Telephone/ cell:	Click or tap here to enter text.
E-mail:	Click or tap here to enter text.

3. PROJECT DETAILS AND ACTIVITIES APPLIED FOR:

Project title	Click or tap here to enter text.

3.1. Activities applied for:

Describe each listed activity in Listing Notices 1, 2 or 3 (GNR 983 -985, 04 December 2014) which is being applied for as per the project description

Activity No(s):	Provide the relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 1** of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates. Ensure to include

		thresholds/area/footprint applicable.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Activity No(s):	Provide the relevant **Scoping and EIA Activity(ies**) as set out in **Listing Notice 2** of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates. Ensure to include thresholds/area/footprint applicable.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Activity No(s):	Provide the relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 3** of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates. Ensure to include thresholds/area/footprint applicable.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.
Click or tap here to enter text.	Click or tap here to enter text.	Click or tap here to enter text.

4. PROPERTY DESCRIPTION:

Property Description	Click or tap here to enter text. (Farm name, portion etc.) Where a large number of properties are involved), please attach a full list to this application.
Town(s) or district(s):	Click or tap here to enter text.
Physical (street) address of project:	Click or tap here to enter text.

5. CONSENT FROM LANDOWNER OR PERSON IN CONTROL OF THE LAND TO UNDERTAKE THE ACTIVITY/IES:

I, Click or tap here to enter text.declare that, I:-

1. Am the landowner or person in control of the property described in Section 4 of this document; and
2. That I hereby give consent to the applicant Click or tap here to enter text. as described in section 1 of this document to undertake the activity/ies as described in section 3 of this document on the property described in section 4.

_____

Signature of the landowner or person in control of the land

Monday, 03 July 2023

SPECIAL POWER OF ATTORNEY

We, Lightfoot Family Trust, Registration No. IT9300/2000, herein represented by John Lightfoot Identity No. 4403125026080 do hereby nominate, constitute, and appoint:

Michael Mangnall (ID No. 7211245134081) or other employee as designated by WKN Windcurrent SA (Pty) Limited (Reg nr: 2010/022616/07)

with power of substitution, to be our lawful attorney(s) and agent(s) in our name, place and stead to sign and lodge with all competent authorities on behalf of the Registered Owner any forms and applications whatsoever on my behalf in order for WKN Windcurrent SA (Pty) Limited or any other juristic person to obtain all necessary consents and approvals as may be required by law to operate a wind facility and/or solar facility on the following properties:

Portion 1 of Farm 96 (Rooipan) in extent 1130.74ha held by Title Deed T153235/2003 and Portion 2 of Farm 58 (Leeuwpan) in extent 737.78ha held by Title Deed T64834/2006 both in the Ventersdorp Local Municipality, IQ Division, North West Province.

which includes but is not limited to Subdivision of Agricultural Land Act 70 of 1970 , Rezoning, Environmental Authorisations and Amendments as required, Building Plan Approval, WULA, Grid Connection and Civil Aviation Authority Approval, as well as generally, for effecting the purposes aforesaid, to do or cause to be done whatsoever shall be requisite as fully and effectually for all intents and purposes as we might or could do if personally present and acting herein - hereby ratifying, allowing and confirming all and whatsoever our said agents shall lawfully do, or cause to be done, by virtue of these presents.

SIGNED at Krugersdorp on this the 28 day of September 2022, in the presence of the undersigned witnesses.

AS WITNESSES :

1. _____

2. _____

Name: John Lightfoot

Sign: _____

duly authorised hereto

SPECIAL POWER OF ATTORNEY

We the undersigned, **Adriaan Jakobus Vermaak ID nr 6007255068081 and Sandra Jacomina Vermaak ID nr 6504210004086** do hereby nominate, constitute, and appoint:

Michael Mangnall (ID No. 7211245134081) or other employee as designated by WKN Windcurrent SA (Pty) Limited (Reg nr: 2010/022616/07)

with power of substitution, to be our lawful attorney(s) and agent(s) in our name, place and stead to sign and lodge with all competent authorities on behalf of the Registered Owner any forms and applications whatsoever on my behalf in order for WKN Windcurrent SA (Pty) Limited or any other juristic person to obtain all necessary consents and approvals as may be required by law to operate a wind facility and/or solar facility on the following properties:

Portion 2 of Farm 96 (Rooipan) in extent 898.29ha held by Title Deed T26854/2017 in the Ventersdorp Local Municipality, IQ Division, North West Province.

which includes but is not limited to Subdivision of Agricultural Land Act 70 of 1970 , Rezoning, Environmental Authorisations and Amendments as required, Building Plan Approval, WULA, Grid Connection and Civil Aviation Authority Approval, as well as generally, for effecting the purposes aforesaid, to do or cause to be done whatsoever shall be requisite as fully and effectually for all intents and purposes as we might or could do if personally present and acting herein - hereby ratifying, allowing and confirming all and whatsoever our said agents shall lawfully do, or cause to be done, by virtue of these presents.

SIGNED at Kragersdorp on this the 28 day of September 2022, in the presence of the undersigned witnesses.

AS WITNESSES :

1. _____

2. _____

Name: Adriaan Jakobus Vermaak

Sign: _____

duly authorised hereto

Name: Sandra Jacomina Vermaak

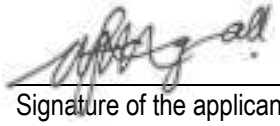
Sign: _____

duly authorised hereto

APPENDIX 4
DECLARATION OF APPLICANT

I, **Michael Mangnall** declare that –

a) I am, or represent[1], the applicant in this application;
b) I have appointed a valid, EAPASA registered Environmental Assessment Practitioner (EAP) to act as the independent EAP for this application / have obtained exemption from the requirement to obtain an EAP[2];
c) I will take all reasonable steps to verify whether the EAP and specialist/s appointed are independent, affiliated with the relevant professional body e.g. EAPASA/SACNASP etc and have expertise in conducting environmental impact assessments or undertaking specialist work as required, including knowledge of the Act, the EIA Regulations and any guidelines that have relevance to the proposed activity;
d) I will provide the EAP and the Competent Authority with access to all information at my disposal that is relevant to the application;
e) I will be responsible for the costs incurred in complying with the EIA Regulations, including but not limited to –
   - costs incurred in connection with the appointment of the EAP or any person contracted by the EAP;
   - costs incurred in respect of the undertaking of any process required in terms of the Regulations;
   - costs in respect of any fee prescribed by the Minister or MEC in respect of the Regulations;
   - costs in respect of specialist reviews, if the Competent Authority decides to recover costs; and
   - the provision of security to ensure compliance with conditions attached to an environmental authorisation, should it be required by the Competent Authority;
f) I will inform all registered interested and affected parties of any suspension of the application as well as of any decisions taken by the Competent Authority in this regard;
g) I am responsible for complying with the conditions of any environmental authorisation issued by the Competent Authority;
h) I hereby indemnify the Government of the Republic of South Africa, the Competent Authority and all its officers, agents and employees, from any liability arising out of the content of any report, any procedure or any action which the applicant or EAP is responsible for in terms of these Regulations;
i) I will not hold the Competent Authority responsible for any costs that may be incurred by the applicant in proceeding with an activity prior to obtaining an environmental authorisation or prior to an appeal being decided in terms of these EIA Regulations;
j) I will perform all obligations as expected from an applicant in terms of the EIA Regulations;
k) All the particulars furnished by me in this form are true and correct;
l) I am aware of what constitutes an offence in terms of Regulation 48 and that a person convicted of an offence in terms of Regulation 48(1) is liable to the penalties as contemplated in section 49B of the NEMA Act; and
m) I am aware that in terms of Section 24F of the National Environmental Management Act, as amended (Act No. 107 of 1998) that no listed activity may commence prior to an environmental authorisation being granted by the Competent Authority.



Signature of the applicant/ Signature on behalf of the applicant

WKN-Windcurrent

Name of company (if applicable)

Click or tap to enter a date.
Date

01/09/2023

[1] If this is signed on behalf of the applicant, proof of such authority from the applicant must be attached. If the applicant is a juristic person, a signature on behalf of the applicant is required as well as proof of such authority.
[2] If exemption is obtained from appointing an EAP, the responsibilities of an EAP will automatically apply to the person conducting the environmental impact assessment in terms of the Regulations.

APPENDIX 5
LIST OF LOCAL/PROVINCIAL AUTHORITY INVOLVED
(WITH CONTACT DETAILS)

(Use this table as a template for information)

Provincial/Local authority:	North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT)
Contact person:	Lufuno Tshikovhi
Postal/Physical address:	Private Bag X15, Mmabatho
Telephone/Cell:	018 389 5666
E-mail:	Ltshikovhi@nwpg.gov.za

APPENDIX 6A
PROOF OF APPOINTMENT OF EAP BEFORE 8 AUGUST 2022

Not Applicable

APPENDIX 6B
VALID EAPASA REGISTRATION CERTIFICATE

Environmental Assessment Practitioners Association of South Africa

Registration No. 2020/1217

Herewith certifies that

Donavan Henning

is registered as an

Environmental Assessment Practitioner

Registered in accordance with the prescribed criteria of Regulation 15. (1) of the Section 24H Registration Authority Regulations (Regulation No. 849, Gazette No. 40154 of 22 July 2016, of the National Environmental Management Act (NEMA), Act No. 107 of 1998, as amended).

Effective: 01 March 2023

Expires: 29 February 2024

Chairperson

Registrar

SAQA
SOUTH AFRICAN QUALIFICATIONS AUTHORITY

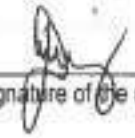
APPENDIX 6C
DECLARATION OF EAP AND UNDERTAKING UNDER OATH OR AFFIRMATION

I, **Donavan Henning**, declare that –

a) I act as the independent, registered in terms of EAPASA, environmental assessment practitioner in this application;
b) I have expertise in conducting environmental impact assessments, including knowledge of the Act, EIA Regulations and any guidelines that have relevance to the proposed activity;
c) I will comply with the Act, EIA Regulations and all other applicable legislation;
d) **I am aware that I must be registered with Environmental Assessment Practitioners Association of South Africa (EAPASA) in terms of Regulation 14 of Section 24H Registration Authority Regulations, 2016, as amended.**
e) I am aware that a candidate EAP may only assist the registered EAP and work under the supervision of a registered EAP (regulation 14(6) in the S24H Registration Authority Regulations, 2016, as amended) such as myself. I take full responsibility for the work conducted.
f) I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
g) I will take into account, to the extent possible, the matters listed in Regulation 13 of the EIA Regulations and Regulation 14 of S24H of Section 24H Registration Authority Regulations, 2016, as amended, when preparing the application and any report relating to the application;
h) I undertake to disclose to the applicant and the Competent Authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the Competent Authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the Competent Authority, unless access to that information is protected by law, in which case it will be indicated that such information exists and will be provided to the Competent Authority;
i) I will perform all obligations as expected from an environmental assessment practitioner in terms of the EIA Regulations and S24H of NEMA ; and
j) I am aware of what constitutes an offence in terms of Regulation 48 and that a person convicted of an offence in terms of Regulation 48(1) is liable to the penalties as contemplated in Section 49B of the Act and EIA Regulations and Regulation 18 and 20 of S24H Registration Authority Regulations, 2016, as amended.

Disclosure of Vested Interest (delete whichever is not applicable)

k) I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the EIA Regulations;
~~l) I have a vested interest in the proposed activity proceeding, such vested interest being:~~
Click or tap here to enter text.



Signature of the registered environmental assessment practitioner

Nemai Consulting (Pty) Ltd
Name of company:

Monday, 04 September 2023
Date

UNDERTAKING UNDER OATH/ AFFIRMATION

I, Dewaren Henning swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the registered Environmental Assessment Practitioner

Nemai Consulting
Name of Company

04/09/2023
Date

Signature of the Commissioner of Oaths

04 | 09 | 2023
Date

Colette Henning
Commissioner of Oaths
Ex Officio - Practising Attorney
7 Katbos Avenue
Bassonia, Johannesburg
082 463 5547

APPENDIX 7A
RENEWABLE ENERGY DEVELOPMENT ZONE MAP

Not Applicable

APPENDIX 7B
EGI IN STRATEGIC TRANSMISSION CORRIDOR MAP

Not Applicable

APPENDIX 7C
PRE-NEGOTIATED ROUTE AGREEMENT FOR EGI

Not Applicable

APPENDIX 7D
MOTIVATION PERTAINING TO THE STANDARD AS PER GNR 2313

Not Applicable

APPENDIX 7E
EGI IN RENEWABLE ENERGY DEVELOPMENT ZONE MAP

Not Applicable

APPENDIX 7F
PRE-NEGOTIATED ROUTE AGREEMENT FOR EGI IN REDZ

Not Applicable

APPENDIX 7G
GAS TRANSMISSION PIPELINE INFRASTRUCTURE MAP

Not Applicable

APPENDIX 7H
PRE-NEGOTIATED ROUTE AGREEMENT FOR GAS TRANSMISSION PIPELINE

Not Applicable

APPENDIX 8A
LIST OF STRATEGIC INFRASTRUCTURE PROJECTS

Not Applicable

SIP NUMBER	SIP NAME

APPENDIX 8B
SIP CONFIRMATION LETTER FROM SIP COORDINATOR

Not Applicable

APPENDIX 9
LIST OF SGIDS AND COORDINATES

9A. LIST OF SGIDS OF DIRECTLY AFFECTED PROPERTIES

Farm Name	Portion / Erf	21-digit Surveyor General No.
FARM 96 (ROOIPAN) IQ *(PV Site & Access Road Route)*	1	T0IQ00000000009600001
FARM 96 (ROOIPAN) IQ *(Access Road Route)*	2	T0IQ00000000009600002

9B. COORDINATES OF PROJECT AND LISTED ACTIVITIES

The coordinates of the project and applicable listed activities are as follows (shown in **Table 1 - 6** below):

- ❑ **PV Site Boundaries** –

Table 1: PV Site Coordinates

Description	Coordinates	Applicable Listed Activity
Corner and Bend Coordinates of buildable area	26°18'45.26"S; 27°15'59.82"E	GN No. R.983 – Activity 28(ii) GN No. R.984 – Activity 1 GN No. R.984 – Activity 15
	26°18'42.83"S; 27°15'59.80"E	
	26°18'0.96"S; 27°15'52.62"E	
	26°17'59.91"S; 27°15'52.22"E	
	26°17'58.86"S; 27°15'50.61"E	
	26°17'54.94"S; 27°14'58.31"E	
	26°17'54.94"S; 27°14'40.24"E	
	26°17'56.50"S; 27°14'40.24"E	
	26°17'59.25"S; 27°14'41.00"E	
	26°19'4.76"S; 27°15'4.91"E	
	26°19'4.76"S; 27°15'7.80"E	
	26°18'59.72"S; 27°15'18.47"E	
	26°19'5.75"S; 27°15'20.81"E	
	26°19'5.74"S; 27°15'21.83"E	

- ❑ **Proposed access road location** (start and end points, as well as bend points) –

Table 2: Access Road Coordinates

Description	Coordinates	Applicable Listed Activity
Start point (at PV area)	26°19'4.69"S; 27°15'23.69"E	GN No. R.983 – Activity 24(ii) GN No. R.983 – Activity 28(ii) GN No. R.983 – Activity 56
Bend 1	26°19'5.03"S; 27°15'23.87"E	
Bend 2	26°19'13.09"S; 27°15'8.42"E	
Bend 3	26°19'24.76"S; 27°15'12.57"E	
Bend 4	26°19'29.19"S; 27°15'7.26"E	
Bend 5	26°19'47.83"S; 27°14'35.58"E	
Bend 6	26°19'47.83"S; 27°14'33.64"E	
End point (at road tie-in)	26°19'49.07"S; 27°14'31.93"E	

- ❑ **Substation area** –

Table 3: Substation area Coordinates

Description	Coordinates	Applicable Listed Activity
Corner Coordinates of substation area	26°19'4.16"S; 27°15'9.19"E	GN No. R.983 – Activity 11(i) GN No. R.983 – Activity 28(ii) GN No. R.984 – Activity 15
	26°19'11.17"S; 27°15'11.97"E	
	26°19'13.35"S; 27°15'7.89"E	
	26°19'6.02"S 27°15'5.17"E	

❑ Battery Energy Storage System (BESS) area –

Table 4: BESS area Coordinates

Description	Coordinates	Applicable Listed Activity
Corner Coordinates of BESS area	26°19'2.46"S; 27°15'12.74"E	GN No. R.983 – Activity 14 GN No. R.983 – Activity 28(ii) GN No. R.984 – Activity 15
	26°19'9.12"S; 27°15'15.88"E	
	26°19'11.24"S; 27°15'11.90"E	
	26°19'4.19"S; 27°15'9.08"E	

❑ Construction yard/laydown/storage area –

Table 5: Construction yard/laydown/storage area Coordinates

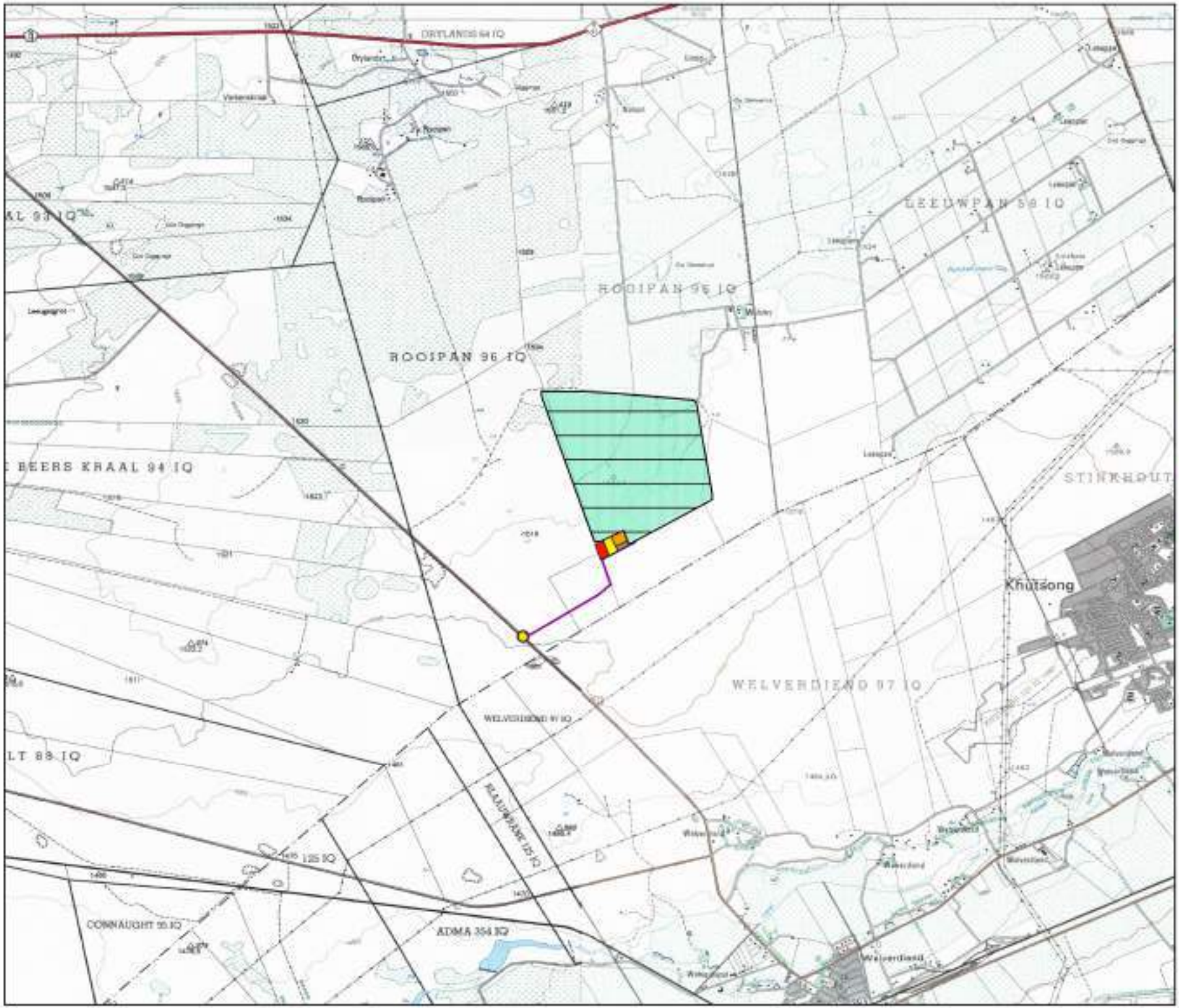
Description	Coordinates	Applicable Listed Activity
Corner Coordinates of construction yard/laydown/storage area	26°18'59.74"S; 27°15'18.44"E	GN No. R.983 – Activity 28(ii) GN No. R.984 – Activity 15
	26°19'4.40"S; 27°15'20.28"E	
	26°19'7.08"S; 27°15'14.90"E	
	26°19'2.53"S; 27°15'12.75"E	

❑ Office, Operation and Maintenance Building, workshops and parking area –

Table 6: Office, Operation and Maintenance Building, workshops and parking area Coordinates

Description	Coordinates	Applicable Listed Activity
Corner Coordinates of office and parking area	26°19'4.50"S; 27°14'28.01"E	GN No. R.983 – Activity 28(ii) GN No. R.984 – Activity 15
	26°19'6.44"S; 27°15'21.00"E	
	26°19'9.14"S; 27°15'15.89"E	
	26°19'7.12"S; 27°15'14.91"E	

APPENDIX 10
LOCALITY MAP



Seelo Solar PV Cluster: Beta Solar PV

Locality

Legend

Beta Solar PV

- Facility Substation
- PV Array
- Laydown Area
- BESS
- Offices
- Power stations
- Access Point
- Access Roads
- Internal Roads

NEMAI CONSULTING

N

Scale: 1: 50 000

0 2.5 5 7.5 10 12.5 km

Seelo Solar PV Cluster: Beta Solar PV

Layout

Legend

Cadastral

- Parent Farm
- Farm Portion
- SA Roads

Beta Solar PV

- Facility Substation
- PV Array
- Laydown Area
- BESS
- Offices
- Power stations
- Access Point
- Access Roads
- Internal Roads

NEMAI CONSULTING

N

Scale: 1: 35 000

0 1.7 3.4 5.1 6.8 8.5 km

APPENDIX 11
PROJECT SCHEDULE

Task	Days	From	To
Circulate dEIR	30 days	06/09/2023	09/10/2023
Finalise FEIR and submit	1 days	13/10/2023	13/10/2023

APPENDIX 12
SECTION 50(5) OF NEM:PAA APPROVAL

Not Applicable

APPENDIX 13
NOTICE OF INTENT IN TERMS OF NHRA 25 OF 1999

Not Applicable

APPENDIX 14
SCREENING TOOL REPORT

SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE ENVIRONMENTAL SENSITIVITY

EIA Reference number:

Project name: Seelo Solar PV Cluster

Project title: Beta Solar PV

Date screening report generated: 30/01/2023 15:20:29

Applicant: Seelo Beta (RF) (PTY) Ltd

Compiler: Divan van Rooyen

Compiler signature:

.....

Application Category: Utilities Infrastructure|Electricity|Generation|Renewable|Solar|PV

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MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY 20

Proposed Project Location

Orientation map 1: General location

General Orientation: Seelo Solar PV Cluster

Unable to obtain map image.

Map of proposed site and relevant area(s)

Cadastral details of the proposed site

Property details:

No	Farm Name	Farm/ Erf No	Portion	Latitude	Longitude	Property Type
1		96	0	26°17'13.96S	27°14'54.06E	Farm
2		96	1	26°18'4.2S	27°15'37.56E	Farm Portion

Development footprint[1] vertices:
No development footprint(s) specified.

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No nearby wind or solar developments found.

Environmental Management Frameworks relevant to the application

No intersections with EMF areas found.

[1] "development footprint", means the area within the site on which the development will take place and incudes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

Environmental screening results and assessment outcomes

The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development site as well as the most environmental sensitive features on the site based on the site sensitivity screening results for the application classification that was selected. The application classification selected for this report is: **Utilities Infrastructure|Electricity|Generation|Renewable|Solar|PV**.

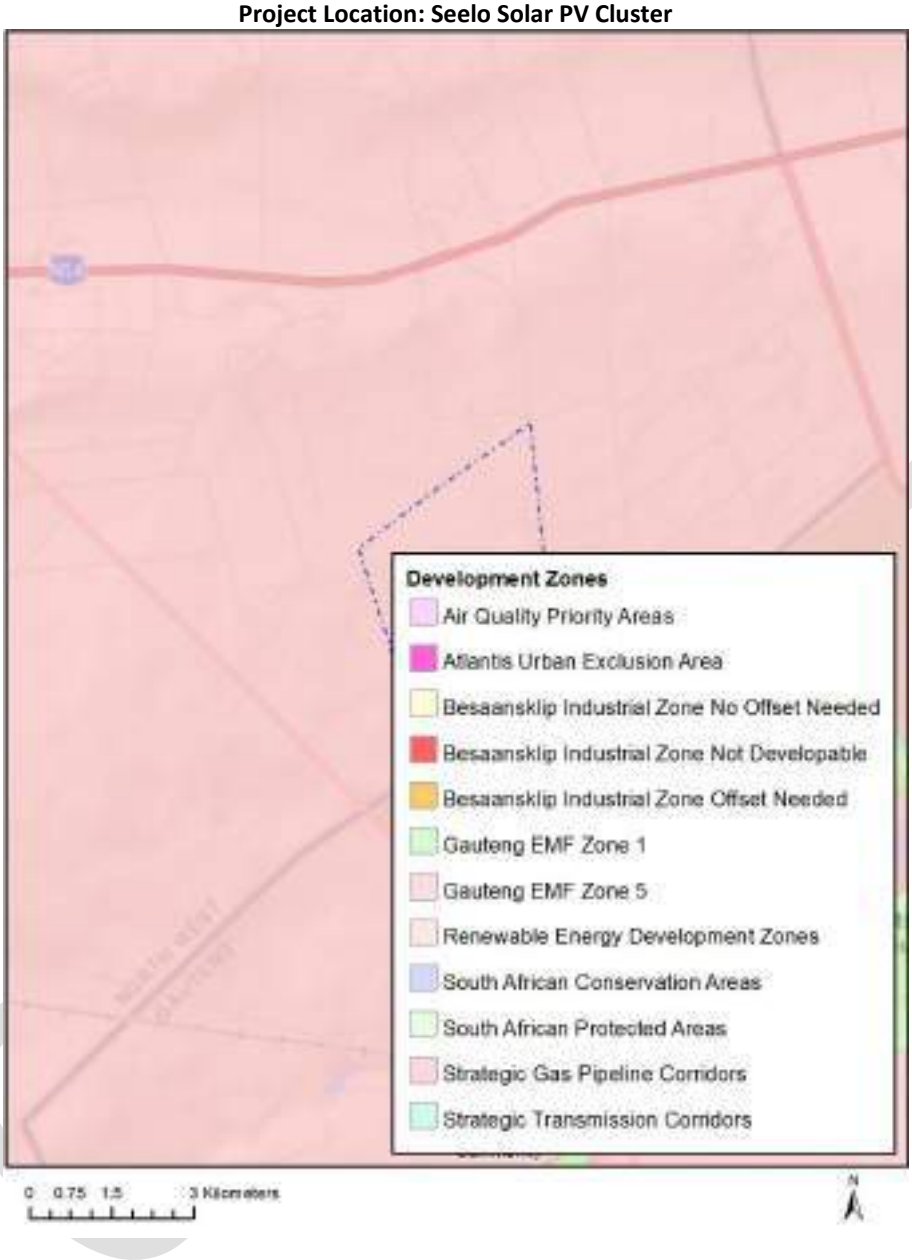
Relevant development incentives, restrictions, exclusions or prohibitions

The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

Incentive, restriction or prohibition	Implication
Strategic Transmission Corridor-Central corridor	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Combined_EGI.pdf
Strategic Gas Pipeline Corridors-Phase 3: Richards Bay to Gauteng	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Combined_GAS.pdf

Map indicating proposed development footprint within applicable development incentive, restriction, exclusion or prohibition zones

Project Location: Seelo Solar PV Cluster



Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme			X	

Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Avian Theme	X			
Civil Aviation (Solar PV) Theme				X
Defence Theme				X
Landscape (Solar) Theme	X			
Paleontology Theme	X			
Plant Species Theme			X	
RFI Theme				X
Terrestrial Biodiversity Theme	X			

Specialist assessments identified

Based on the selected classification, and the environmental sensitivities of the proposed development footprint, the following list of specialist assessments have been identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

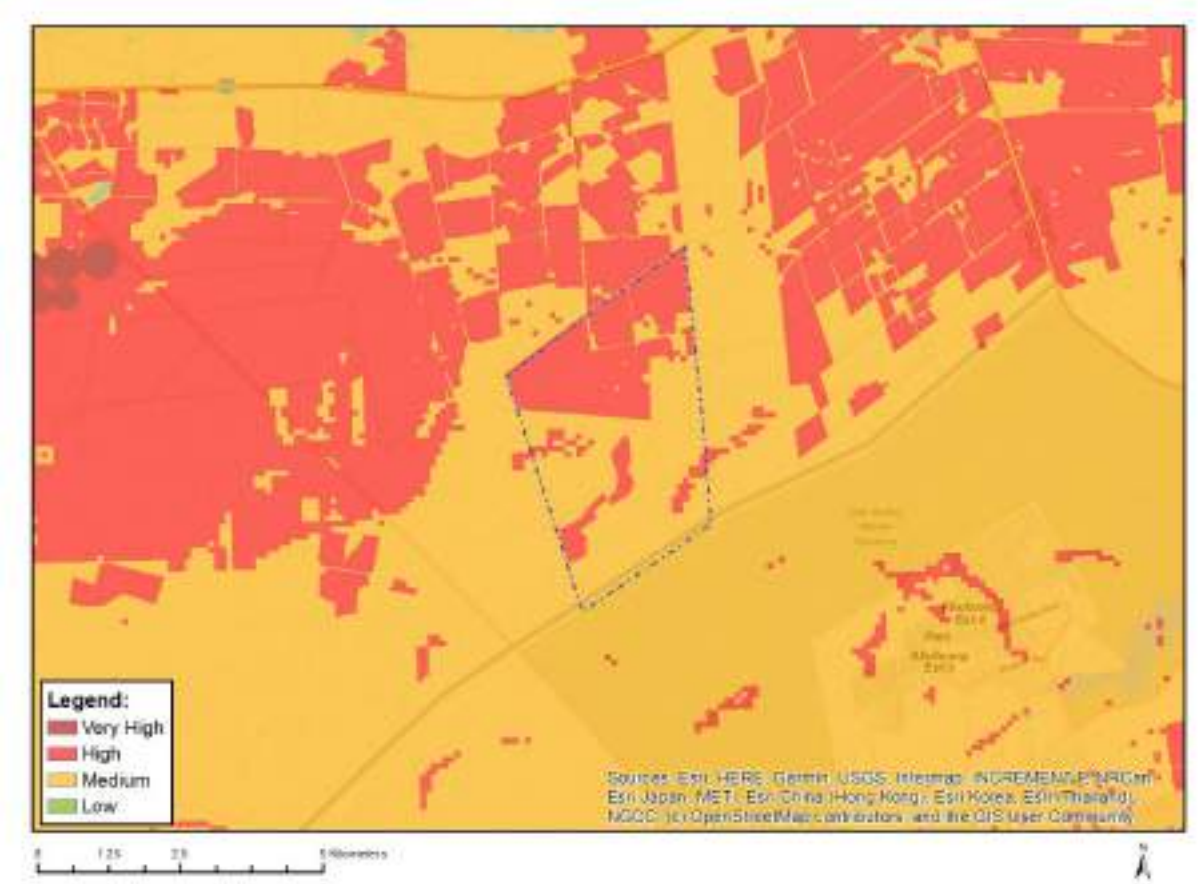
No	Specialist assessment	Assessment Protocol
1	Agricultural Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_WindAndSolar_Agriculture_Assessment_Protocols.pdf
2	Landscape/Visual Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
3	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
4	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
5	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf
6	Aquatic Biodiversity	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf

	Impact Assessment	
7	Civil Aviation Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Civil_Aviation_Installations_Assessment_Protocols.pdf
8	Defense Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Defence_Installations_Assessment_Protocols.pdf
9	RFI Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
10	Geotechnical Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
11	Socio-Economic Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
12	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.pdf
13	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Animal_Species_Assessment_Protocols.pdf

Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

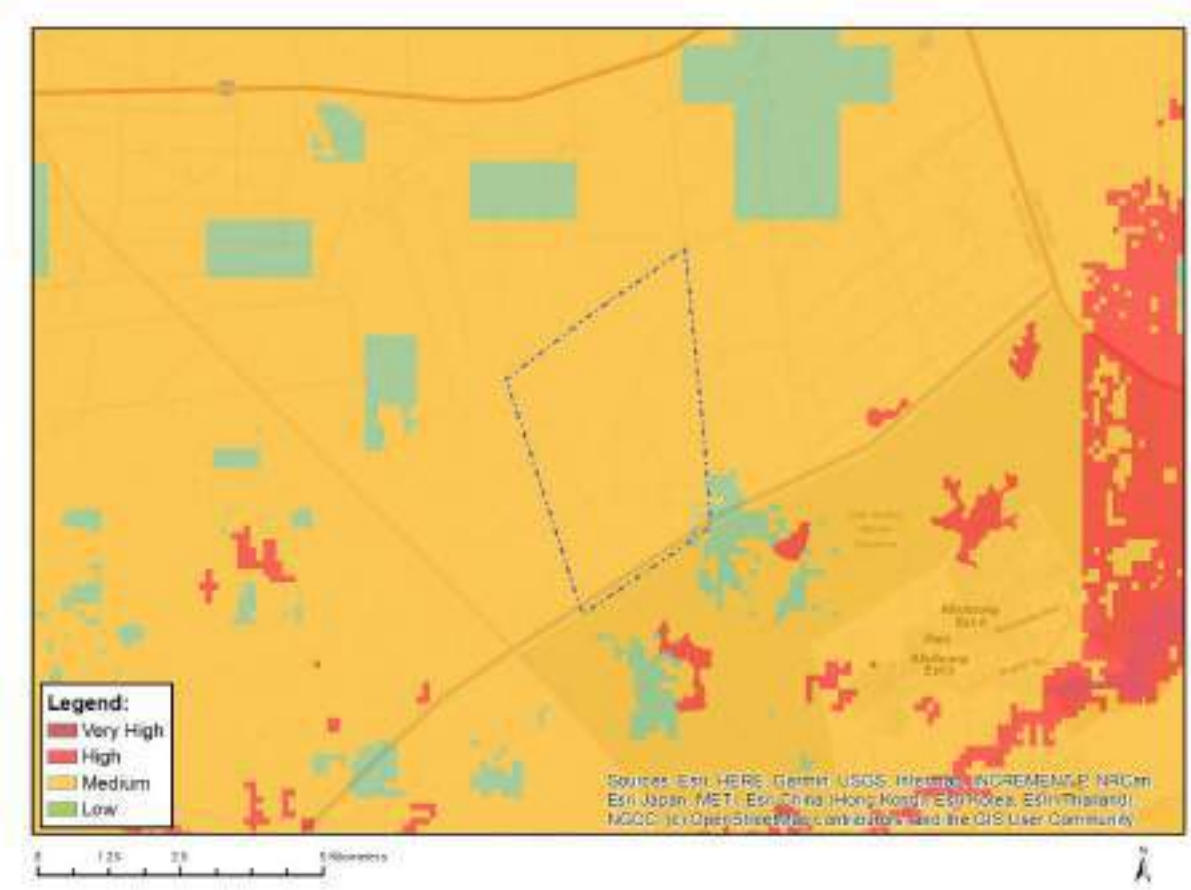


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Land capability;09. Moderate-High/10. Moderate-High
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;09. Moderate-High/10. Moderate-High
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



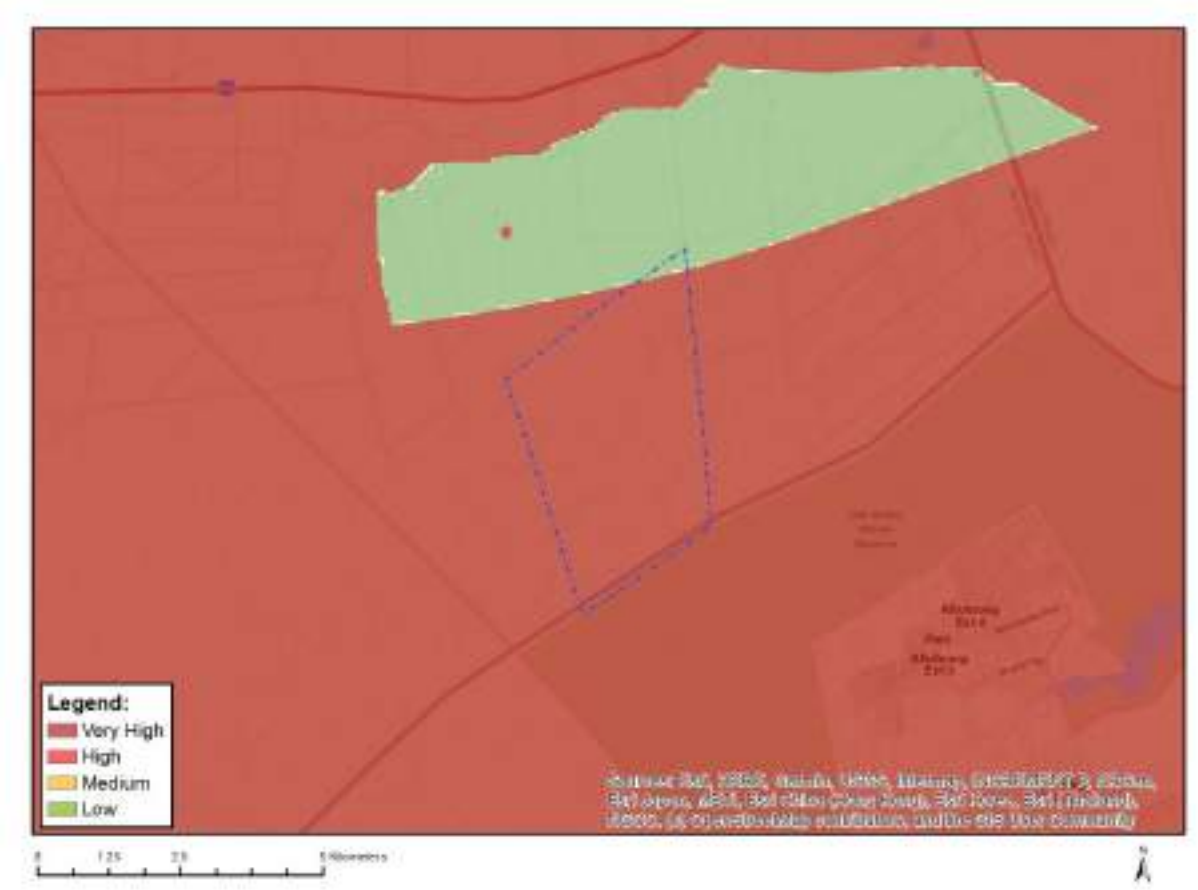
Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Subject to confirmation
Medium	Aves-Tyto capensis
Medium	Aves-Circus ranivorus
Medium	Aves-Eupodotis senegalensis
Medium	Mammalia-Crocidura maquassiensis
Medium	Mammalia-Hydrictis maculicollis

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY

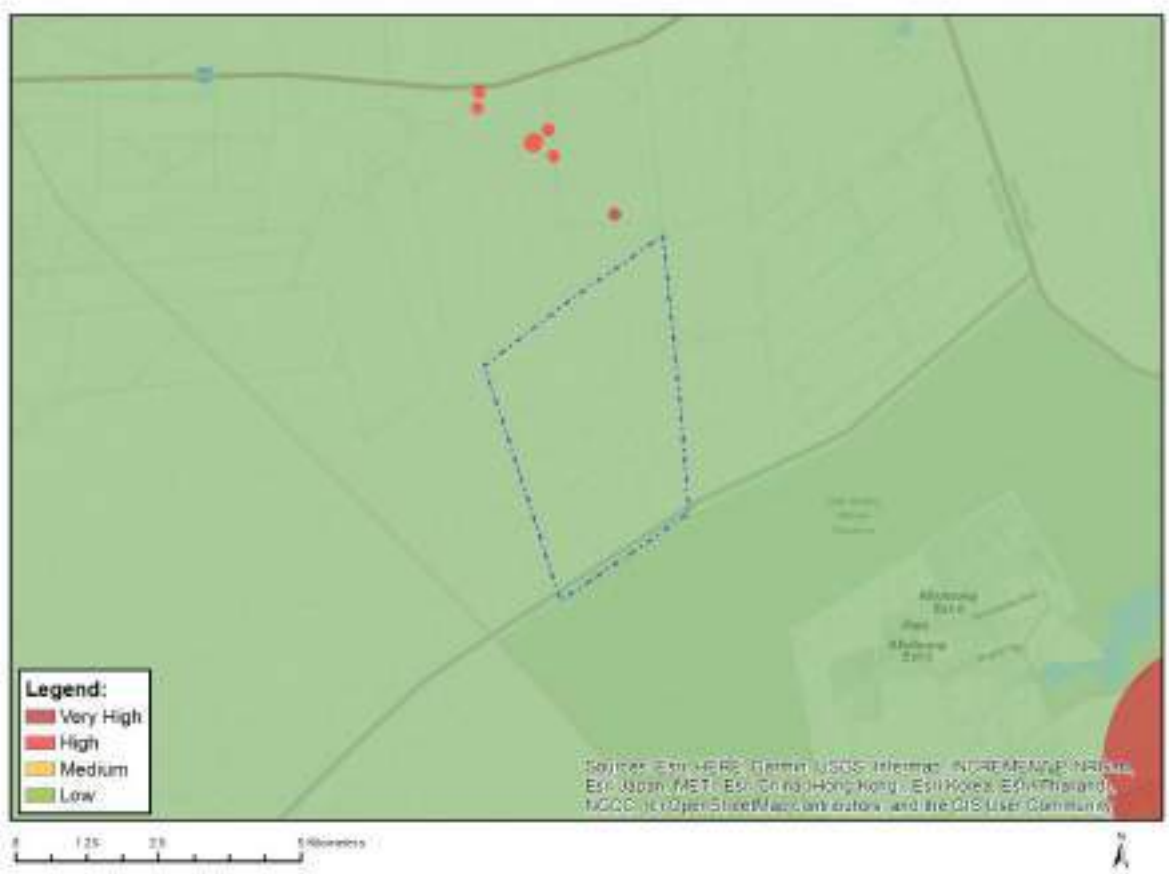


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	Aquatic CBAs
Very High	Strategic water source area
Very High	Wetlands and Estuaries

MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY

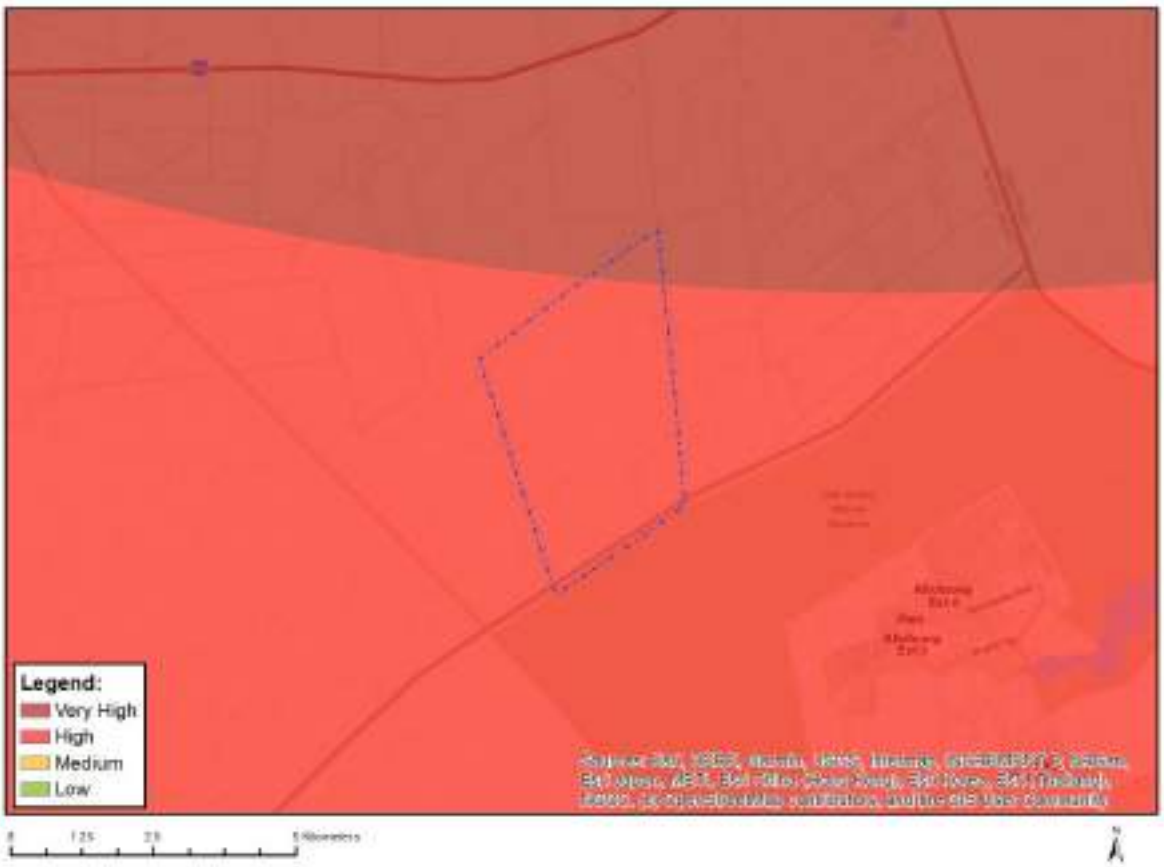


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

MAP OF RELATIVE AVIAN THEME SENSITIVITY

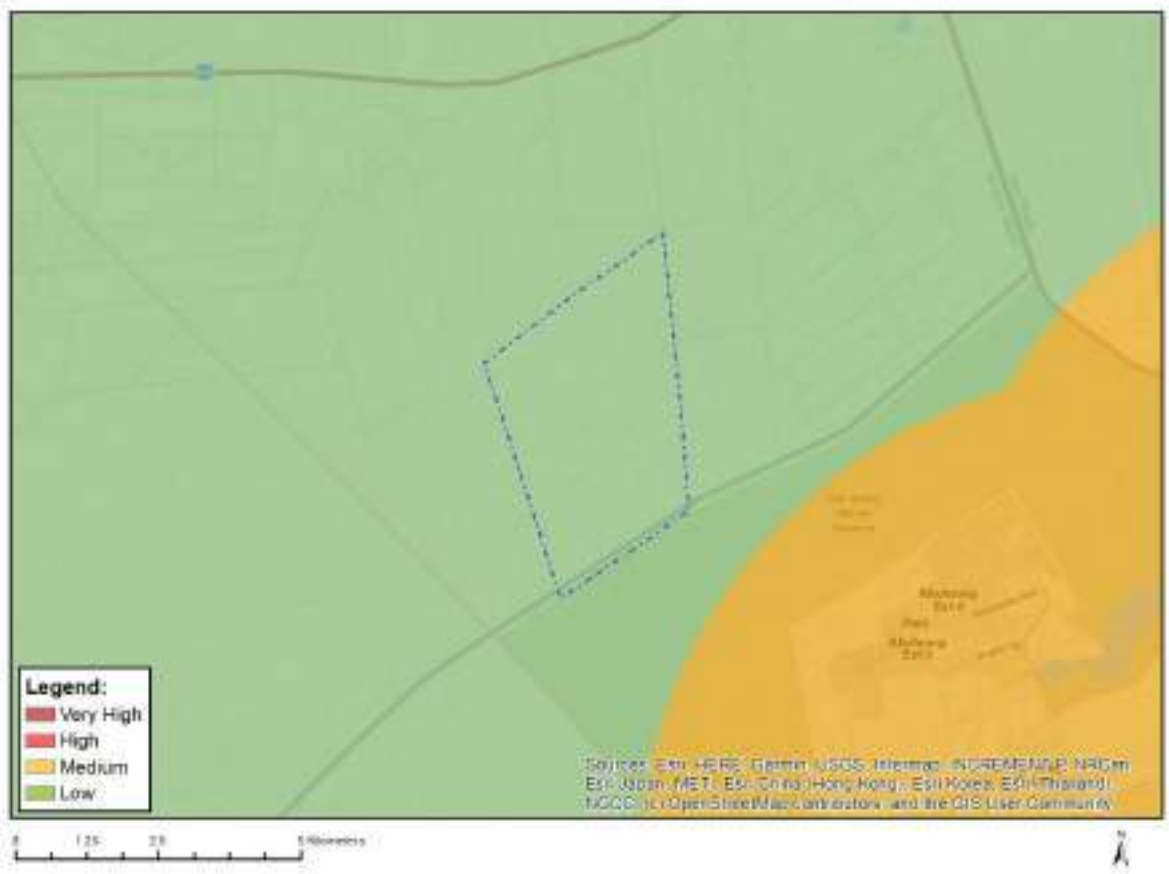


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
High	within 20 km of known Cape Vulturerestuarants sites
Very High	within 50 km of Colonies

MAP OF RELATIVE CIVIL AVIATION (SOLAR PV) THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	No major or other types of civil aviation aerodromes

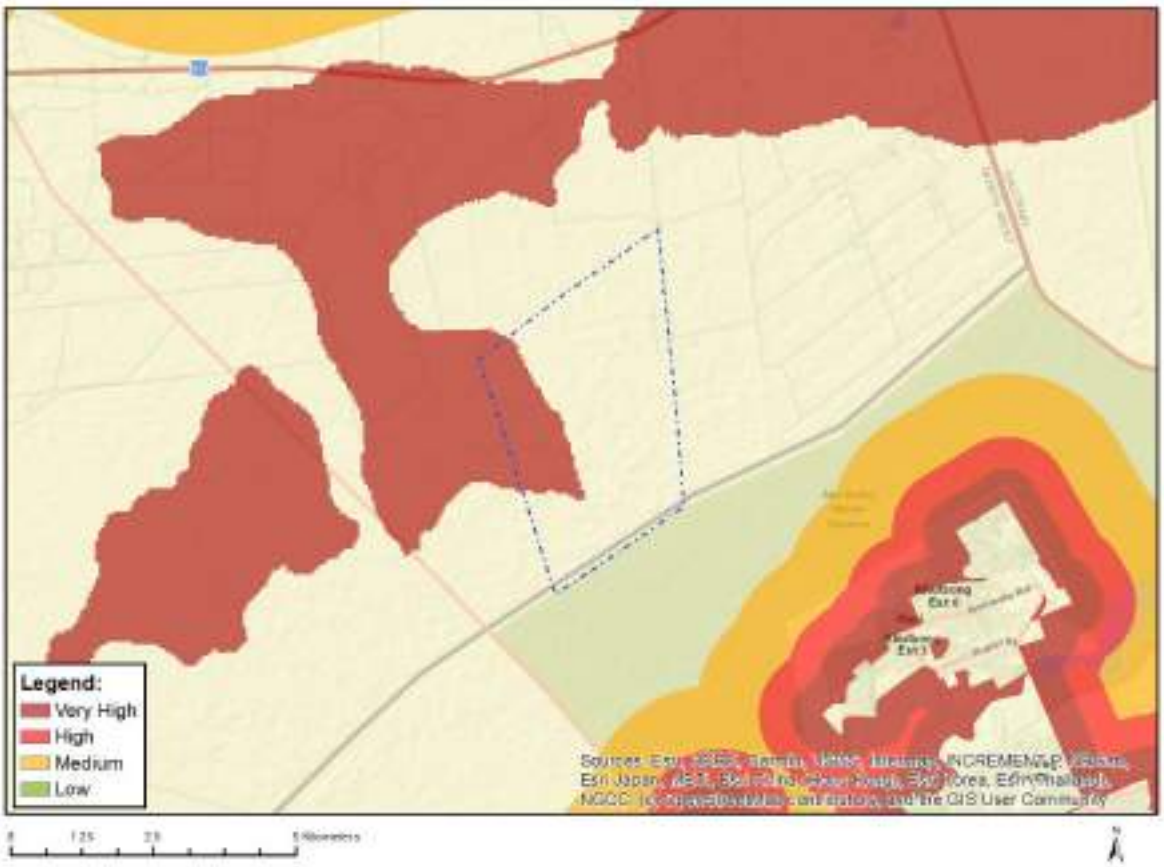
MAP OF RELATIVE DEFENCE THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

MAP OF RELATIVE LANDSCAPE (SOLAR) THEME SENSITIVITY

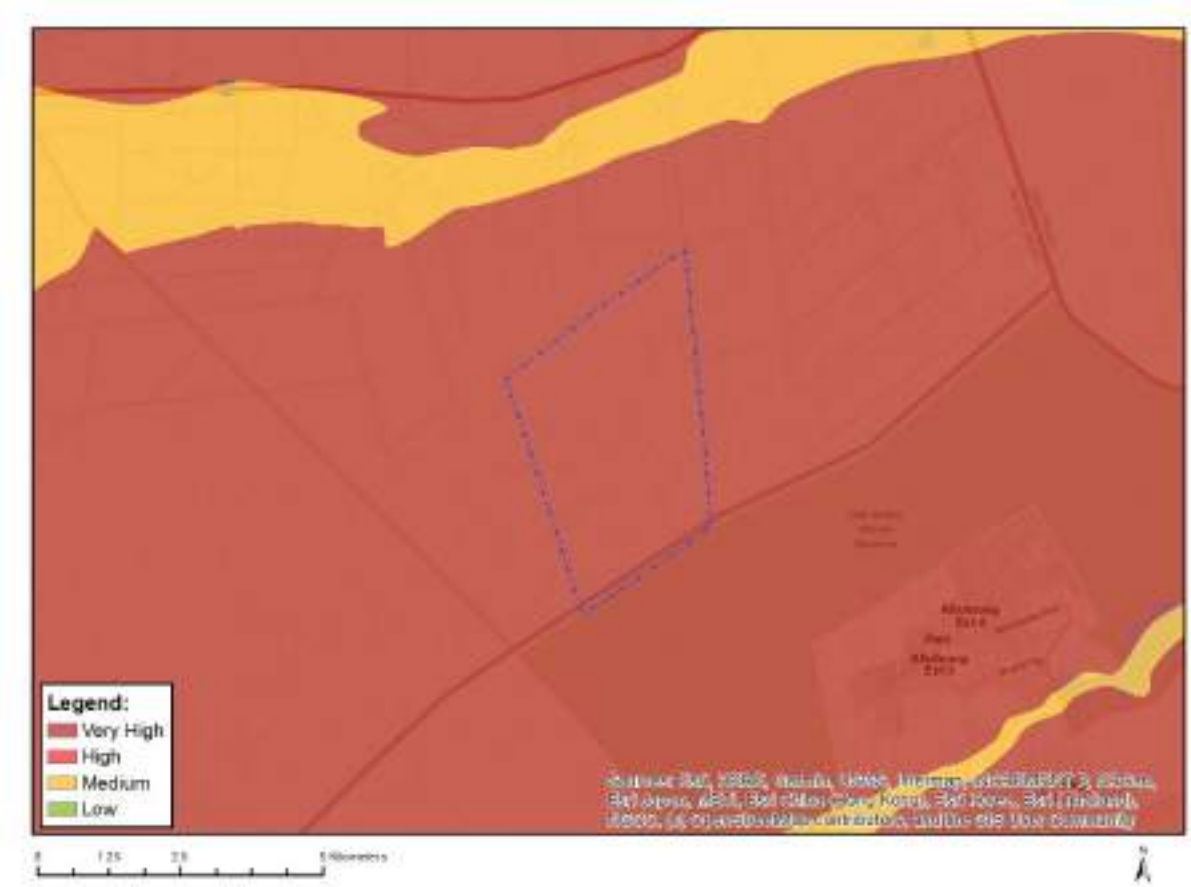


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Mountain tops and high ridges

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY

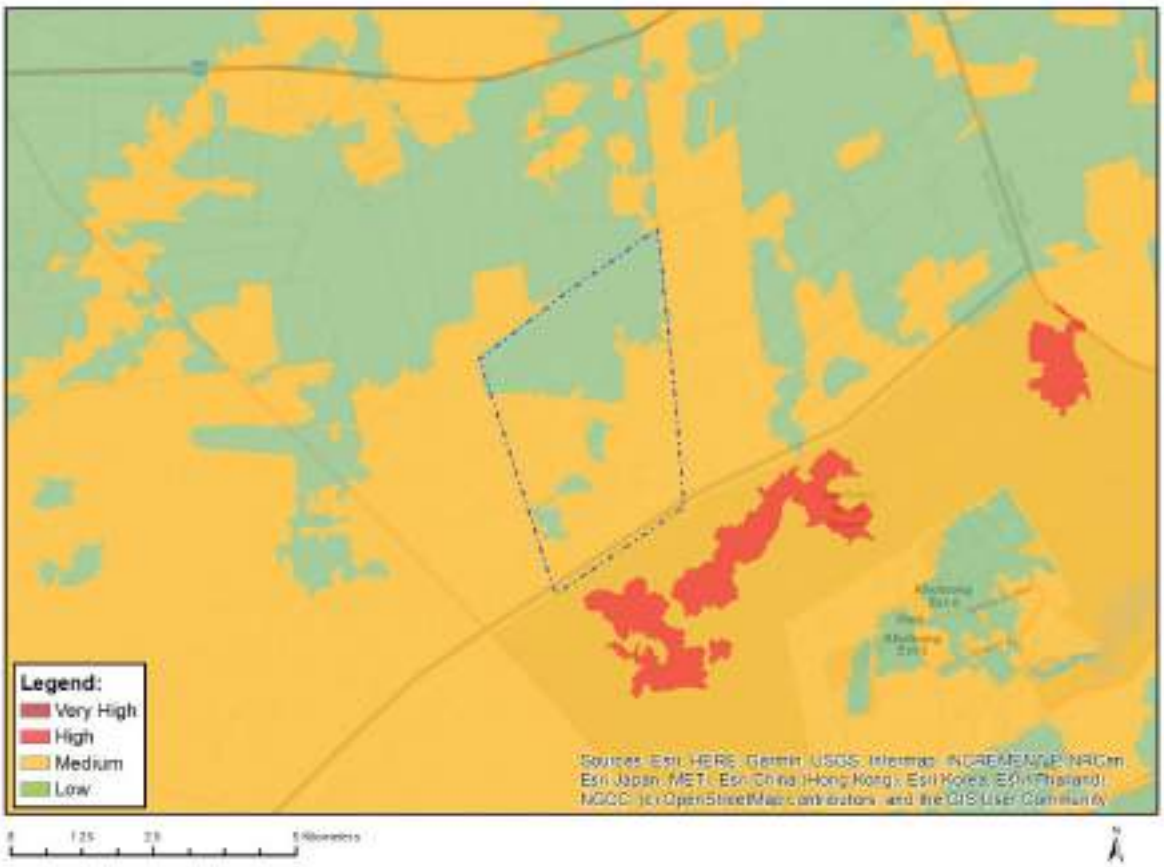


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



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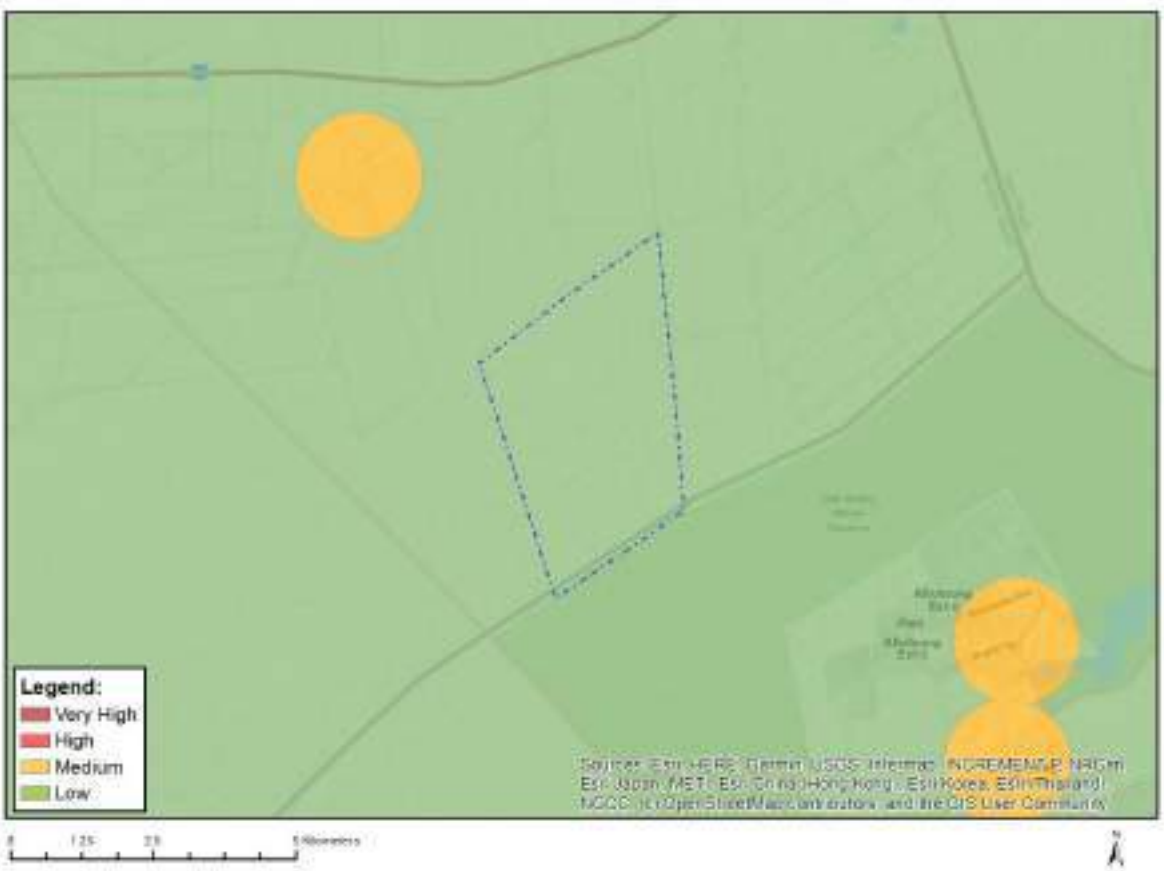
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Medium	Sensitive species 1147
Medium	Sensitive species 1248

MAP OF RELATIVE RFI THEME SENSITIVITY

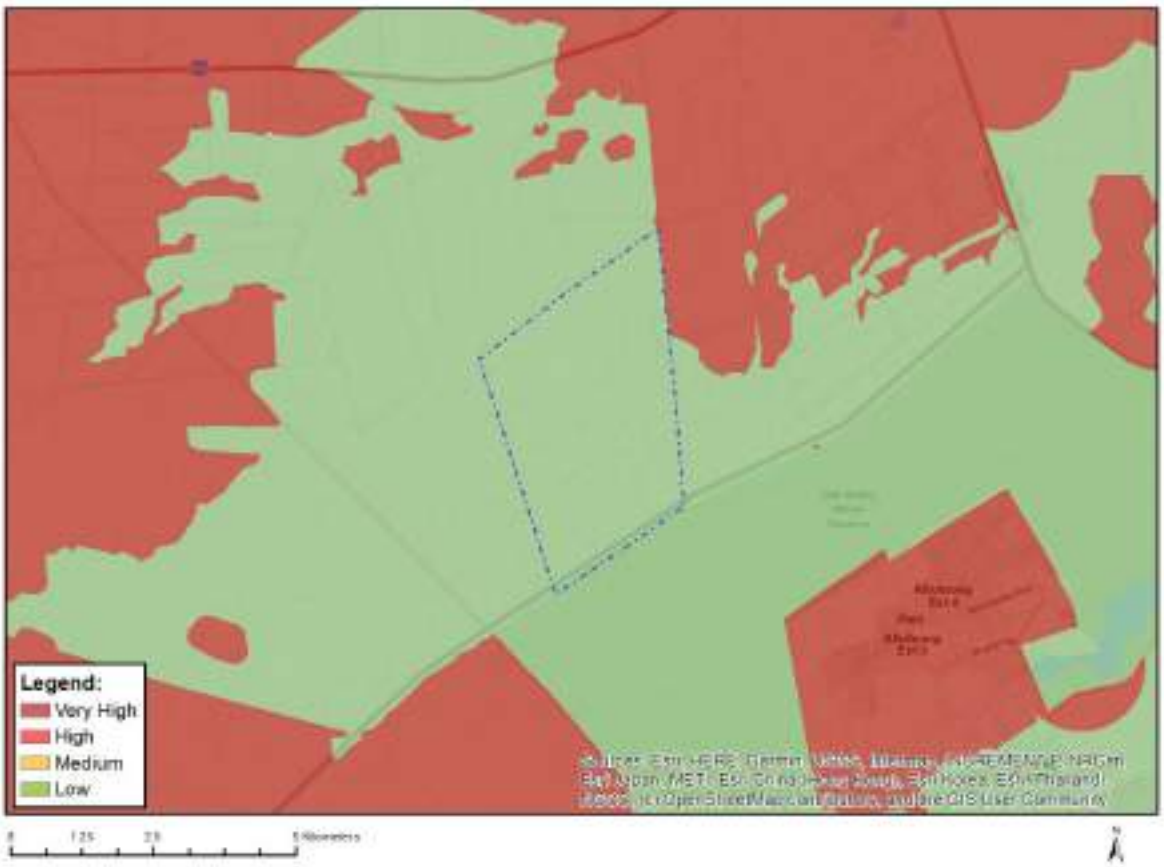


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Very High	Critical biodiveristy area 2
Very High	Protected Areas Expansion Strategy

APPENDIX 15
OTHER

Not Applicable

APPENDIX D

CURRICULA VITAE OF ENVIRONMENTAL ASSESSMENT PRACTITIONER

Curriculum Vitae

Queries: Donavan Henning
☎ +27 11 781 1730
+27 82 891 0604
🖷 +27 11 781 1731
✉ donavanh@nemai.co.za

1 Personal Particulars

Date of Birth:	1976-12-06
Name of Staff:	Donavan Henning
Years of Experience:	20
Nationality:	RSA

2 Position in the firm and within the organization of this assignment

Registered Environmental Assessment Practitioner.

3 Education

Institution (Date from – Date to)	Degree(s) or Diploma(s) obtained
RAU (1995 – 1997)	B.Sc. Zoology and Biochemistry
RAU (1998)	B. Sc. Hons. Zoology
RAU (1999 – 2000)	M. Sc. Freshwater Ecology

4 Membership of professional bodies

- Environmental Assessment Practitioners Association of South Africa (EAPASA) (2020/1217).
- South African Council for Natural Scientific Professions (SACNASP) (400108/17).

5 Relevant Experience - Energy

1.	**Project Name:**	**KIVU56**
	Client:	Symbion Power Lake Kivu LTD
	Location of Project:	Rubavu District, Western Province, Rwanda
	Duration (Start & Completion Dates):	Feb 2020 – Nov 2020
	Brief Description of work:	
	The KIVU56 project is located on the eastern shores of Lake Kivu, Rwanda. Methane gas is extracted from the waters of Lake Kivu and used to run engines that generate electricity. The electricity is passed onto the Rwandan national grid and used throughout the country. Nemai Consulting was appointed to ensure that the project conforms to the International Finance Corporation's 2012 Performance Standards on Environmental and Social Sustainability.	

2.	**Project Name:**	**Matjhabeng Solar PV Project**
	Client:	SunElex Energy (Pty) Ltd
	Location of Project:	Odendaalsrus, Free State Province, RSA
	Duration (Start & Completion Dates):	Jul – Nov 2018
	Brief Description of work:	
	SunElex Energy (Pty) Ltd has proposed the development of the Matjhabeng 400 MW Solar Photovoltaic Plant with 80 MW (320 MWh) Battery Energy Storage System, which is located north and south of the town of Odendaalsrus in the Free State Province. The proposed Solar Photovoltaic Plant will be developed to serve the Matjhabeng Local Municipality's energy requirements and will generate power for delivery to the local/national grid. The electricity generated by the Solar Photovoltaic Plant will be injected into the existing Eskom 132kV distribution system.	

3.	**Project Name:**	**75MW Beaufort West Photovoltaic Project**
	Client:	Beaufort West Photovoltaic (Pty) Ltd
	Location of Project:	Beaufort West, Western Cape, RSA
	Duration (Start & Completion Dates):	Nov 2020 – Jul 2021
	Brief Description of work:	

	Beaufort West Photovoltaic (Pty) Ltd has proposed the development of the Beaufort West Photovoltaic (PV) Project in the Western Cape, with a total generation capacity of not exceeding 75MW renewable solar energy. The associated infrastructure includes access roads, overhead power lines, substation and control building(s). The electricity generated by the PV Park will be transferred to the national Eskom grid. The Project will connect to existing Droërivier Substation beside the N12 through a ±14.9km single circuit twin conductor 132 kV line.

4.	**Project Name:**	**uMkhomazi Water Project Phase 1**
	Client:	Department of Water and Sanitation
	Location of Project:	Bulwer, KwaZulu-Natal Province, RSA
	Duration (Start & Completion Dates):	Aug 2013 - Present
	Brief Description of work:	
	EIA as part of Feasibility Study for the uMkhomazi Water Project Phase 1. Project components include large storage dam, tunnel, balancing dam, raw water pipeline and **hydropower facilities** (Baynesfield HPP - 3 MW power potential; Smithfield Dam HPP- 2.6 MW power potential).	

5.	**Project Name:**	**Hydropower Plant within Hydraulic Network at Zoekfontein Site**
	Client:	Rand Water
	Location of Project:	Zoekfontein, Gauteng Province, RSA
	Duration (Start & Completion Dates):	Feb 2012 – April 2014
	Brief Description of work:	
	Environmental Impact Assessment for the construction of an 8 MW hydropower station alongside the Zoekfontein Control Works downstream of the Vaal Dam.	

6.	**Project Name:**	**Impompomo Hydropower Plant**
	Client:	Blue World Power & Energy
	Location of Project:	Mpumalanga, RSA
	Duration (Start & Completion Dates):	2018
	Brief Description of work:	
	Environmental Screening for a hydropower plant on the Mpompomo Falls in Mpumalanga. The scope of works include the Impompomo powerhouse (hydropower plant), powerlines from Impompomo hydropower plant to Barberton, penstock from Mpompomo Top Weir and Mpompomo Top Weir.	

7.	**Project Name:**	**Neptune-Poseidon Transmission Line**
	Client:	Eskom
	Location of Project:	Eastern Cape, RSA
	Duration (Start & Completion Dates):	2009 - 2011
	Brief Description of work:	
	EIA and public participation for a 200 km transmission line, with alternatives, with 3000 affected parties and landowners.	

8.	**Project Name:**	**Anderson Dinaledi Transmission Line**
	Client:	Eskom
	Location of Project:	North-West, RSA
	Duration (Start & Completion Dates):	2011 - 2013
	Brief Description of work:	
	EIA and public participation for an 80 km transmission line, with alternatives, through a the Magaliesburg Nature Conservation Area.	

9.	**Project Name:**	**Makalu B (Igesi) Substation and Associated Transmission Loop-In Lines**
	Client:	Eskom
	Location of Project:	Free State, RSA
	Duration (Start & Completion Dates):	2016 - 2018
	Brief Description of work:	
	EIA and public participation for a new substation and 2 x 275 kV line loop-ins from the Lethabo – Makalu Lines.	

APPENDIX E

SPECIALIST REPORTS / SITE SENSITIVITY VERIFICATION

APPENDIX E1: Aquatic Biodiversity Compliance Statement

Seelo Beta Solar (RF) (PTY) Ltd.

Aquatic Compliance Statement for the proposed Seelo Beta Solar PV, JB Marks Local Municipality, North West

19 JULY 2023

Prepared by:

Dr Divan van Rooyen

Nitai Consulting (Pty) Ltd.

147 Bram Fischer Drive

Ferndale

2194

And:

Denisha Ponnusamy

Nitai Consulting (Pty) Ltd.

147 Bram Fischer Drive

Ferndale

2194

NITAI CONSULTING

SPECIALIST ENVIRONMENTAL CONSULTING

Authors	Qualification	Date	Signature	Version No.
Dr. Divan van Rooyen	Ph.D. Environmental Science (NWU) (Can. Nat. Sci. Aquatic Science 151272)	19 July 2023		1.2
Denisha Ponnusamy	M.Sc. Hydrology (UniZulu) (Can. Nat. Sci. Environmental Science 155319)	04 April 2023		2.0
Reviewed by	**Qualification**	**Date**	**Signature**	**Version No.**
Elzet Human	M-Tech Nature Conservation (TUT) (Pri. Sci. Nat. Conservation Science 147031)	04 April 2023		3.0
Antoinette Bootsma	M.Sc. Environmental Science (UNISA) (Pri. Sci. Nat. Ecology & Botany 400222-09)	04 April 2023		4.0
Prepared for	Nemai Consulting (PTY) Ltd. 147 Bram Fischer Drive, Ferndale Randburg, 2194 NEMAI CONSULTING			

Table 1: Requirements of a Compliance Statement as set out in GN 320

Requirements of a Compliance Statement as set out in GN 320	Seelo Beta Solar PV Facility wetland specialist findings
3.1 The compliance statement / assessment must be prepared by a suitably qualified specialist registered with the SACNASP, with expertise in the field of aquatic sciences.	Divan van Rooyen Ph.D. Environmental Science (Aquatic Ecosystem Health) NWU, SACNASP Reg. No. 151272 (Aquatic Sciences) Expertise in the field of aquatic sciences evident from CV (Appendix 1)
3.2 The compliance statement / assessment must:	
3.2.1. be applicable to the preferred site and the proposed development footprint;	A specialist assessment was conducted on the site earmarked for the proposed Seelo Beta Solar PV Facility.
3.2.2. confirm that the site is “low” sensitivity for aquatic biodiversity; and	Please refer to Section 5 of this Aquatic Compliance Statement and Executive Summary for confirmation of “Low” sensitivity.
3.2.3. indicate whether or not the proposed development will have an impact on the aquatic features.	Refer to Section 6 – 8 of a detailed description of any associated impacts the development might have.
3.3. The compliance statement must contain, as a minimum, the following information:	
3.3.1 contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Appendix 1
3.2.2. a signed statement of independence by the specialist;	Appendix 4
3.3.3. a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Site assessments were conducted on the 19 January 2023 and 31 January 2023.
3.3.4. a baseline profile description of biodiversity and ecosystems of the site;	Refer to Section 2 of the report for a description of the receiving environment.
3.3.5. the methodology used to undertake the site inspection and the specialist assessment, including equipment and modelling used, where relevant;	Please refer to Section 3 of this Compliance Statement for a brief detailed description of the methodology used to undertake the site inspection and specialist assessment.

3.3.6. in the case of a linear activity, confirmation from the aquatic biodiversity specialist that, in their opinion, based on the mitigation and remedial measures proposed, the land can be returned to the current state within two years of completion of the construction phase;	Please refer to Section 7 of the Compliance Statement for a discussion on rehabilitation.
3.3.7. where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr;	None. No freshwater features were identified during the site visits.
3.3.8. a description of the assumptions made, any uncertainties or gaps in knowledge or data;	Refer to Section 4 of the Report.
3.3.9. any conditions to which this statement is subjected.	None.

1 INTRODUCTION & PROJECT DESCRIPTION

1.1 Introduction

Nitai Consulting (Pty) Ltd. was appointed by Nemai Consulting (Pty) Ltd. to undertake an Aquatic Compliance Statement for the proposed Seelo Beta Solar Photovoltaic (PV) Facility (hereafter referred to as the study area), North West Province, South Africa.

The scope of this assessment is guided by the requirements of the National Environmental Management Act (Act No. 107 of 1998) and the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes (Government Notice No. 320 in Government Gazette No. 43110 of 20 March 2020) ("the protocols") (see **Error! Reference source not found.** above for the requirements). In terms of the protocols, an Aquatic Compliance Statement was undertaken as the site sensitivity was classified as Low sensitivity.

1.2 Background

Seelo Beta Solar PV (RF) (Pty) Ltd. proposes the construction of a Solar PV facility (known as Seelo Beta) located on Portion 1 of the Farm Rooipan No. 96 IQ, approximately 13km north-west of the town Carletonville, in the North West Province. The Solar PV will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 240 MW. The proposed development will include PV modules, mounting structures, a substation, Batter Energy Storage System (BESS), site and internal roads, office/parking and a temporary and permanent laydown area (Figure 1).

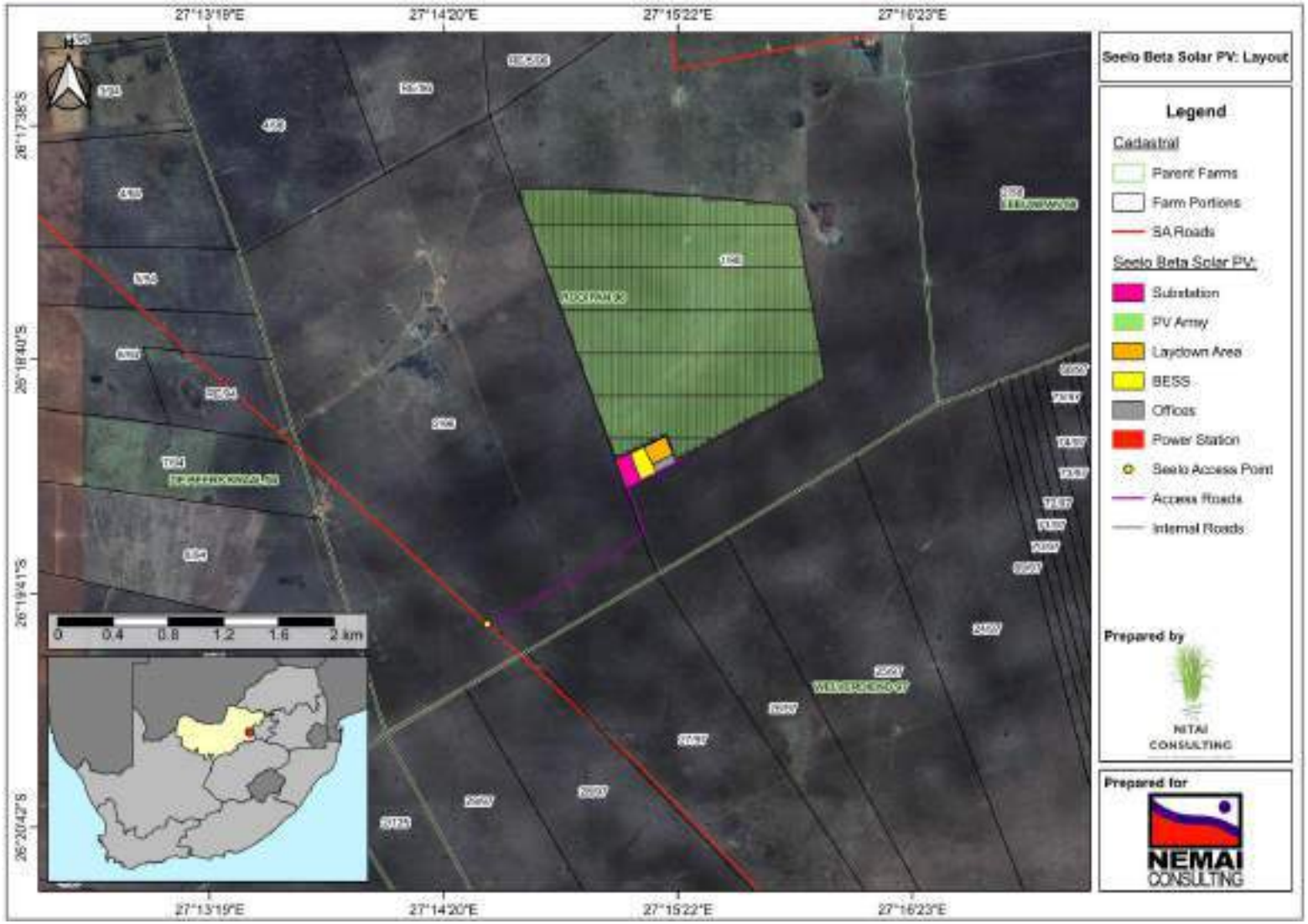


Figure 1: Layout of the Seelo Beta Solar PV Facility

2 DESCRIPTION OF THE STUDY AREA

The study area is located in the North West Province of South Africa near Carletonville and is within the Cwb (subtropical highland climate) climate 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. Additionally, summer temperatures are high and severe frequent frost occurs in the winter (Mucina & Rutherford, 2006).

The underlying geology of the study area consists of Dolomite and Chert of the Malmani Subgroup (Transvaal Supergroup) that supports mostly shallow Mispah and Glenrosa soil forms that is typical of the Fa land type. Furthermore, deeper red to yellow apedal soils (Hutton and Clovelly soil forms) occurs sporadically and represents the Ab land type (Mucina & Rutherford, 2006). These soils invariably don't exhibit mottling or redox morphology characteristics (van der Waals *et al*., 2019).

The study area is located within the Vaal Water Management Area (WMA) and within the C23E and C23G Quaternary Catchments. The major rivers found within these sub-catchments are the Vaal and Mooi rivers. Moreover, there are some smaller tributaries such as the Mooiriverloop and Loopspruit (DWAF, 2002). Furthermore, the study area is situated north of the Mooirivierloop, and no non-perennial rivers are situated in close proximity to the study area. Furthermore, according to the NBA NWM 5 spatial data, two small depressions are located in the northern portion of the study area (Figure 2). According to the North West (NW) Biodiversity Sector Plan, the proposed development is not located within any Critical Biodiversity Area's or Ecological Support Area's (Figure 3) (Desmet & Shaller, 2015).

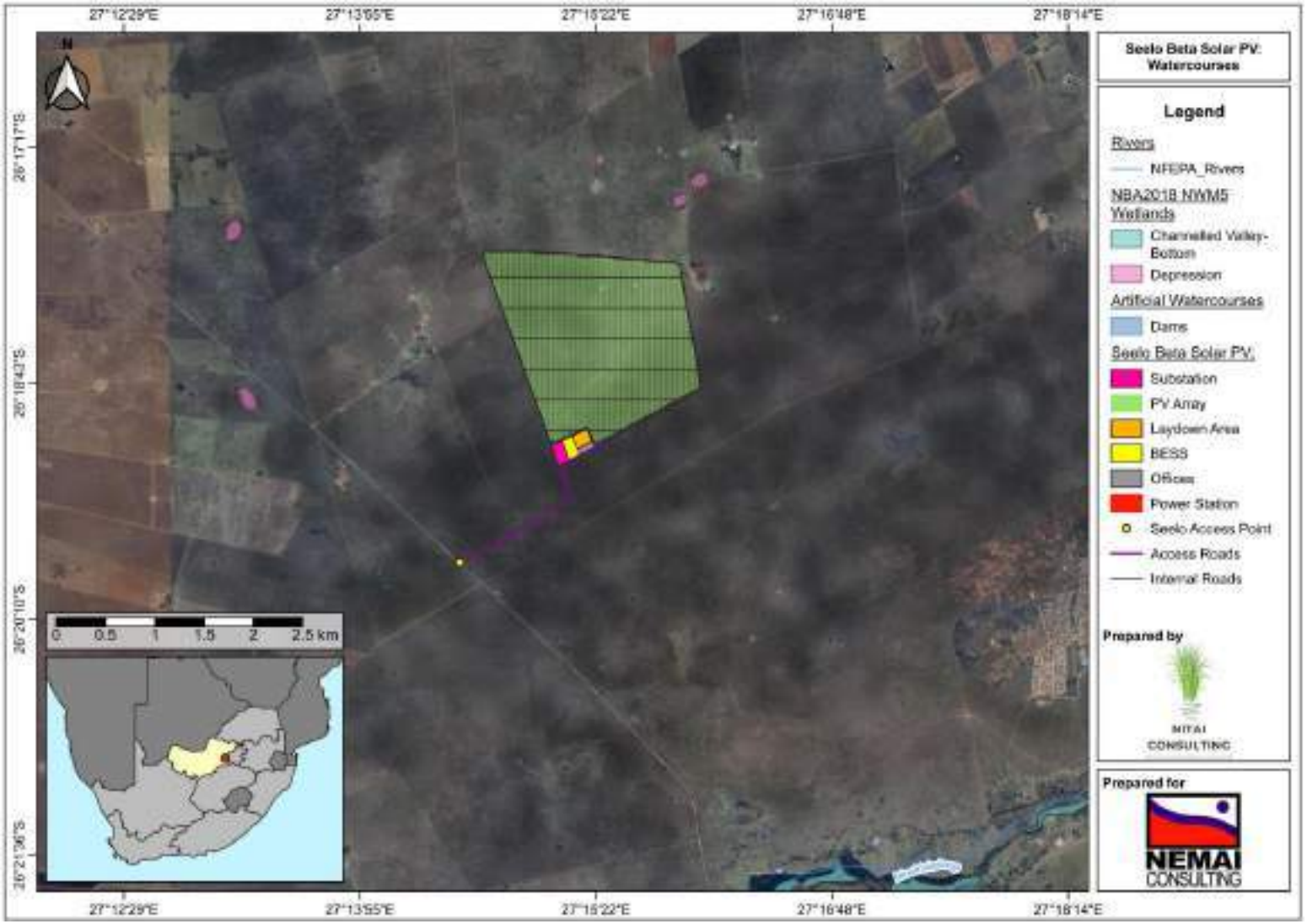


Figure 2: All watercourses associated with the proposed Seelo Beta Solar PV development

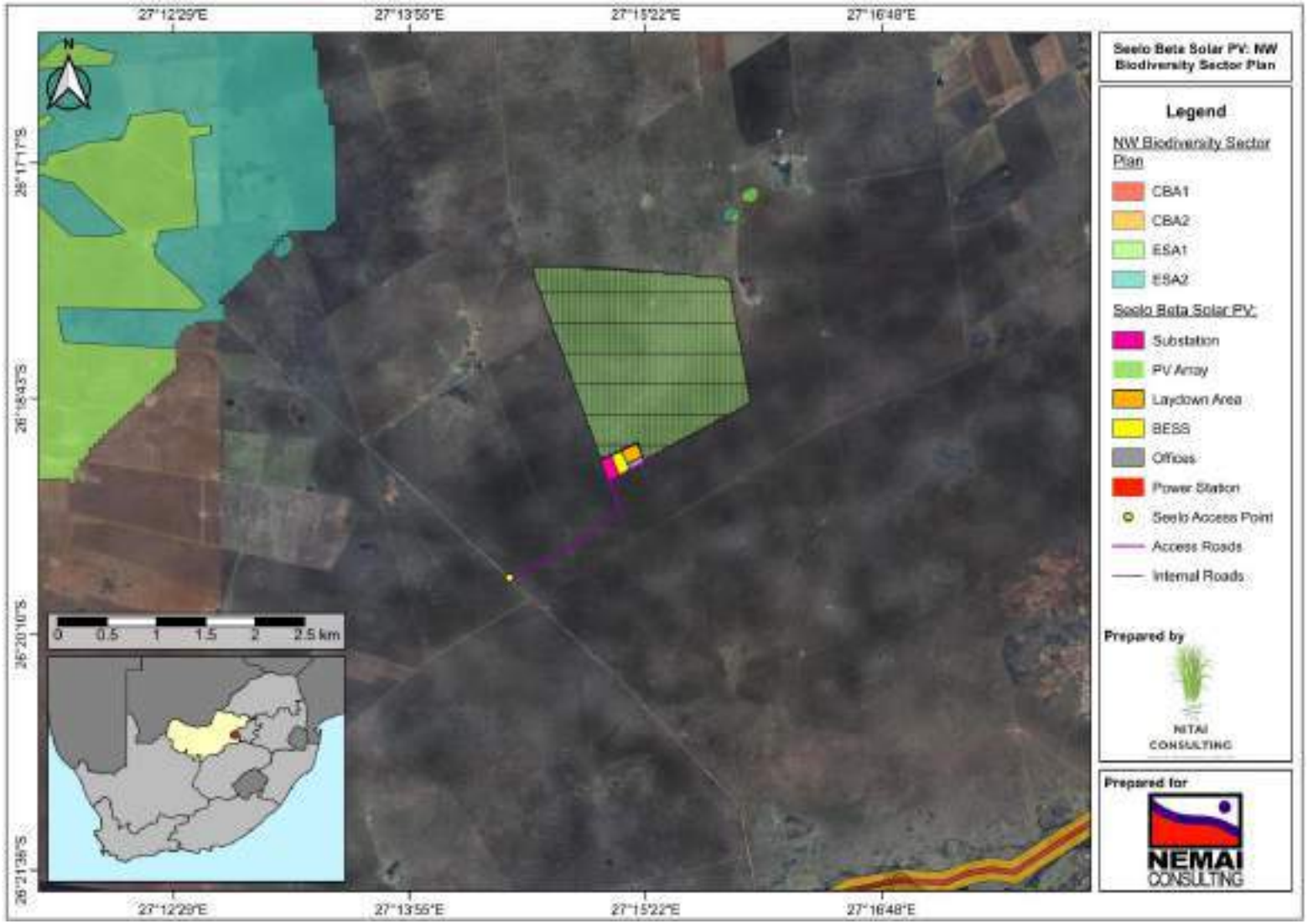


Figure 3: Critical Biodiversity Areas and Ecological Support Areas associated with the proposed Seelo Beta Solar PV development

3 METHODOLOGY AND APPROACH

The following approach was adopted in order to determine and confirm site sensitivity for aquatic biodiversity within the footprint of the Solar PV site:

- In the event that the site sensitivity within the project footprint will be confirmed Very High, a full Aquatic Biodiversity Specialist Assessment will be required; and
- In the event that the site sensitivity within the project footprint would be confirmed as Low, an Aquatic Compliance Statement would be required.

Site sensitivity was determined by conducting a Desktop Study through using the latest Satellite Imagery as well as various different types of spatial data. Spatial data include the following:

- National Freshwater Ecosystem Priority Areas (NFEPA) (rivers and wetlands) (Nel *et al*., 2011);
- South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (van Deventer *et al*., 2018);
- 5m Contours;
- NASA Shuttle Radar Topography Mission Global 1 arc second digital elevation data;
- North West Critical Biodiversity Areas (CBA's) and Ecological Support Areas (ESA's) (Showno & Desmet, 2008); and,
- Strategic Water Source Areas (SWA's) (Nel *et al*., 2013).

Furthermore, a site visit was conducted on 19 January 2023 and 31 January 2023 during which the following was confirmed on site:

- Identify all areas of interest identified during the Desktop study;
- Identify and classify all watercourses according to the method of Ollis *et al*. (2013);
- Take soil samples through augering to confirm soil type and identify wetland soil indicators (DWAF, 2005);
- Identify any hydrophytic plant species that may indicate the presence of wetlands.

4 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations accompany this assessment:

- This report is based on the information and layout received from the proponent;
- This reports only addresses surface water features and groundwater features and sensitivity is addressed in a separate geohydrological report;

- The findings, observations, conclusions and recommendations are based on the author's best professional and scientific knowledge; and
- **The assessment of wetlands presented in this report is limited to the proposed project footprint and does not include the extended 500 m radius regulated area of the Seelo Beta Solar PV Facility. This report is therefore not sufficient for use in a General Authorisation application.**

5 SITE SENSITIVITY: AQUATIC BIODIVERSITY THEME

During the Desktop study for the proposed Seelo Beta Solar PV development the Environmental Screening tool from Department of Forestry, Fisheries & the Environment (DFFE) was queried. The Screening Tool allows for the generation of a Screening Report referred to in Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended, whereby a Screening Report is required to accompany any application for Environmental Authorisation.

The DFFE Screening Report identified that Aquatic Biodiversity Theme for the proposed study area is of very high sensitivity (Figure 4). The area is classified as very high sensitivity due to the area being within a Strategic Water Source Area (SWSA) (groundwater SWSA, i.e. Westrand Karst Belt) with potentially sensitive groundwater interactions.

During site visits to the study area earmarked for the proposed Seelo Beta Solar PV facility, the areas of interest were inspected to confirm the sensitivity. As such, due to no watercourses identified during these site visits, this specialist classified the site sensitivity as Low sensitivity.

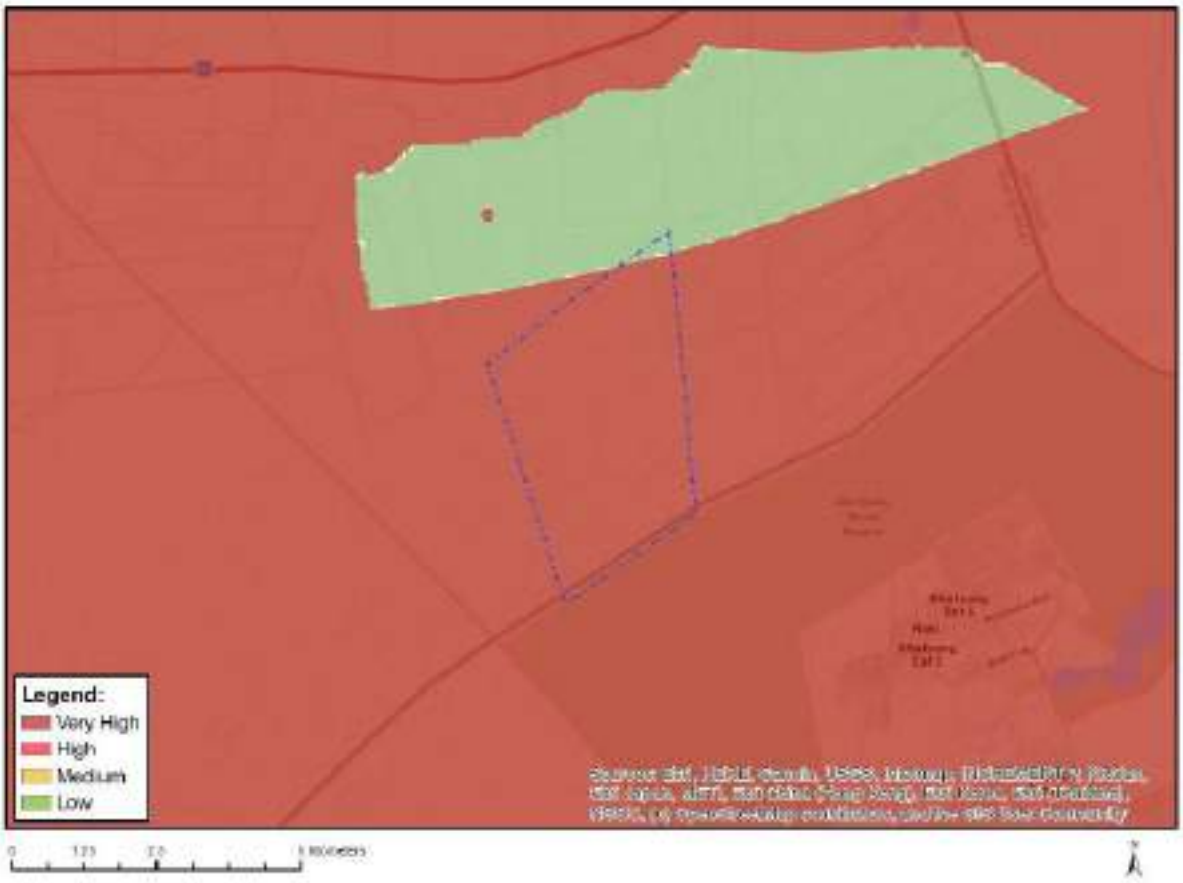


Figure 4: Aquatic Biodiversity Sensitivity Theme from the Department of Forestry, Fisheries & the Environment Screening Tool

6 RESULTS

The proposed site is situated in an agricultural landscape (small and large livestock). According to the NBA 2018 NWM 5 spatial data, two small depressions are located in the Northern section of the footprint (Figure 5c and Figure 5d). However, during the site visit, this could not be verified and can rather be classified as terrestrial habitat. No plants indicative of a moisture gradient was recorded in the target areas. Therefore, the site does not contain any sensitive features in terms of watercourses. The proposed site is comprised of natural vegetation characteristics in medium to good condition. See Figure 5 below for an overview of the environment within the proposed footprint.

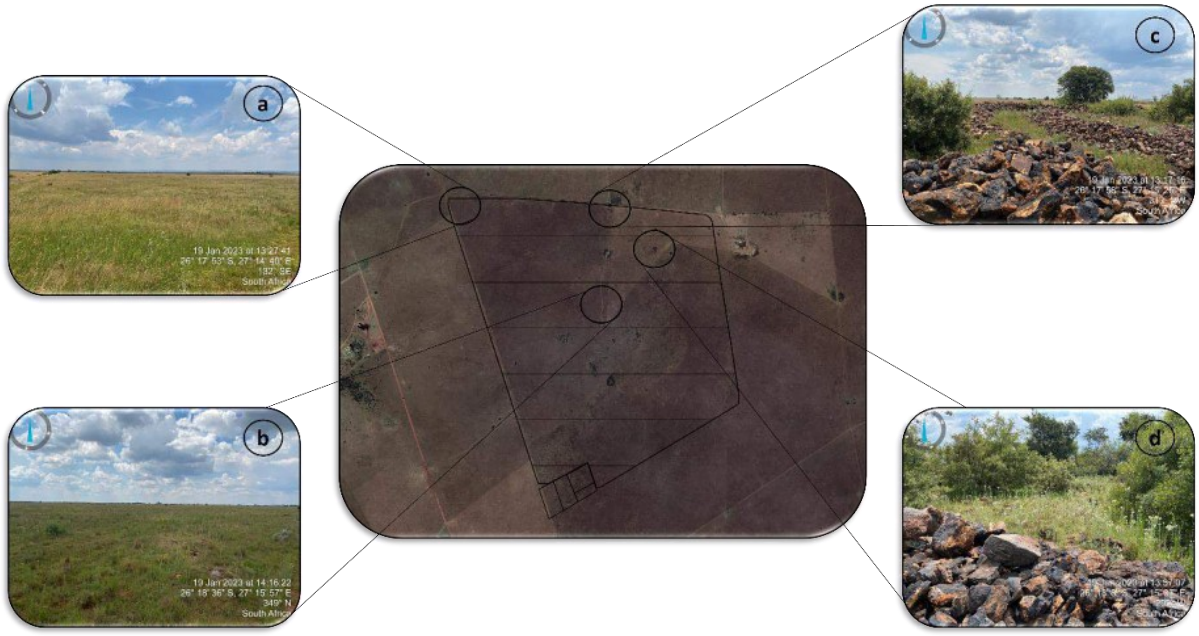


Figure 5: Photographs indicating the general environment within the proposed footprint of Seelo Beta Solar PV

7 POTENTIAL IMPACTS

The DFFE Screening report identified the proposed site as very high sensitivity due to a Strategic Water Source Area – groundwater. The groundwater features and sensitivity are discussed in a separate Geohydrological Report. Furthermore, no sensitive freshwater hydrological features were identified and therefore the proposed study area can be classified as low sensitivity to freshwater hydrological features.

8 CONCLUSION AND RECOMMENDATIONS

The proposed Seelo Beta Solar PV facility is situated in the JB Marks Local Municipality within the North West Province of South Africa. Although spatial data suggests there is two wetlands (depression) located in the northern part of the footprint, no watercourses were identified to be within the proposed footprint of the PV facility which was validated by an absence of wetland vegetation indicators as well as an absence of wetland soil indicators present. The area has been mostly characterised as Hutton soils. The vegetation recorded throughout the site are not associated with wetlands and rather with terrestrial vegetation. Therefore, we can conclude that no wetland exists within the footprint of the proposed PV facility and that no watercourses will be affected.

Although the DFFE Screening Tool has identified the area as a very high sensitivity from an Aquatic Biodiversity Theme perspective. This is due to the area being a SWSA, under the groundwater category. However, it is of the opinion of the specialist that the area does not hold very high freshwater sensitivity features.

Since no sensitive hydrological features were recorded on this site, the revised aquatic biodiversity in terms of surface water and wetlands is therefore Low. More importantly, the specialist recommends that the PV facility may proceed without impact to regional watercourses, given that best practise mitigation measures, particularly in terms of pollution control, are implemented.

9 REFERENCES

Department of Water Affairs and Forestry (DWAF). 2005. A practical field procedure for identification and delineation of wetlands and riparian areas.

Department of Water Affairs and Forestry (DWAF). 2002. The Middle Vaal WMA – Water Resources Situation Assessment. DWAF Report No. P WMA 08/000/00/0302.

Nel, J.L., Colvin, C., Le Maitre, D., Smith, J. & Haines, I. 2013. South Africa's Strategic Water Source Areas (SWSA's). Report for WWF-South Africa. March 2013. Report No. CSIT/NRE/ECOS/ER/2013/0031/A. CSIR, Stellenbosch, South Africa.

Nel, J.L., Murray, K.M., Maherry, A.M., Petersen, C.P., Roux, D.J., Driver, A., Hill, L., van Deventer, H., Funke, N., Swartz, E.R., Smith-Adao, L.B., Mbona, N., Downsborough, L. & Nienaber, S. 2011. Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801.

Nel, J., Colvin, C., Le Maitre, D., Smith, J. & Haines, I. 2013. South Africa's Strategic Water Source Areas. CSIR/NRE/ECOS/ER/2013/0031/A.

North West Department of Rural, Environment and Agricultural Development (READ). 2015. North West Biodiversity Sector Plan. North West Provincial Government, Mahikeng, December 2015.

North West Province of Rural, Environment and Agriculture Department. 2008. North West Aquatic Critical Biodiversity Areas. Compiled by A. Showno & P. Desmet.

Ollis, D.J., Snaddon, C.D., Job, N.M. & Mbona, N. 2013. Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems. *SANBI Biodiversity Series* 22. South African National Biodiversity Institute, Pretoria.

Skowno, A.L., Poole, C.J., Raimondo, D.C., Sink, K.J., Van Deventer, H., Van Niekerk, L., Harris, L.R., Smith-Adao, L.B., Tolley, K.A., Zengeya, T.A., Foden, W.B., Midgley, G.F. & Driver, A. 2019. National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report. South African National Biodiversity Institute, and entity of the Department of Environment, Forestry and Fisheries, Pretoria, p. 1 - 214.

Van Deventer, H., Smith-Adao, L., Peterson, C., Mbona, N., Showno, A. & Nel, J.L. 2018. Review of available data for a South African Inventory of Inland Aquatic Ecosystems (SAIIAE).

van Der Waals, J.H., Grundling, A.T. & Paterson, D.G. 2019. Developing wetland distribution and transfer functions from land type data as a basis for the critical evaluation of wetland

delineation guidelines by inclusion of soil water flow dynamics in catchment areas: Volume 3. *WRC Report No: 2461/3/18*.

APPENDIX 1: SPECIALIST DETAILS, QUALIFICATIONS AND EXPERTISE

1 PERSONAL PARTICULARS

Profession:	Aquatic and Wetland Specialist
Date of Birth:	20 December 1993
Name of Firm:	Nitai Consulting
Name of Staff:	Divan van Rooyen
Nationality:	RSA
Membership of Professional Societies	SACNASP (Can. Sci. Nat. 151272), IAIAsa (7063)

2 EDUCATION:

- Ph.D. Environmental Science (Aquatic Ecosystem Health), NWU, South Africa, 2022
- M. Sc. Environmental Science (Ecological Remediation and Sustainable Development), NWU, South Africa, 2017
- B.Sc. Hons Environmental Science (Ecological Remediation and Sustainable Development), NWU, South Africa, 2015
- B.Sc. Tourism, Geography and Zoology, NWU, South Africa, 2014

Publications:

- Schaeffner, B.C. van Rooyen, D., Gerber, R., Scholz, T. & Smit, N.J. 2020. *Wenyonia gracilis* sp. n. (Cestoda: Caryphyllidea) from *Synodontis zambezensis* (Siluriformes: Mochokidae): the first native caryophyllidean tapeworm from southern Africa. Folia Parasitologica, 67: 035.
- van Rooyen, D., Gerber, R., Smit, N.J. & Wepener, V. 2022. An assessment of water and sediment quality of aquatic ecosystems within South Africa's largest floodplain. *African Journal of Aquatic Sciences, 474 – 488*.

3 EMPLOYMENT RECORD:

- 2022 – Present Aquatic and Wetland Specialist, Nitai Consulting

  Conduct Wetland Delineations and Impact Assessments;

  Conduct Aquatic Ecological Assessments;

SASS5 Assessments;

Aquatic and Wetland Monitoring Programs; and,

GIS Mapping

- March 2022 – November 2022 Environmental Consultant and Aquatic Specialist, Enviroworks

  Environmental Control Officer;

  Water Use Licensing;

  Environmental Auditing;

  Report Writing.

- January 2022 – February 2022 Environmental Intern, ABS-Africa (PTY) Ltd

  Environmental Auditing;

  Groundwater quality monitoring;

  Data interpretation and evaluation; and

  Report writing

- 2017 – 2021 Research and Field Assistant, North West University (NWU-Water Research Group)

  Assisting UNISA and NWU Zoology students with module practical's;

  Supervisor to 3rd year Zoology students on a Water Quality Project;

  Fish specialist for a fish translocation study at Lethabo Power Station (ESKOM);

  Junior Aquatic Specialist for aquatic biomonitoring at Khumba Iron Ore Mining (Joint Amanzi Aquatics and NWU-WRG);

  Junior Aquatic Specialist for biomonitoring at a WWTW (Ecosphere & NWU-WRG); and

  Assisted students with aquatic biomonitoring assessments (FRAI, MIRAI, FROC, Fish identification and SASS under the supervision of Dr. Wynand Malherbe).

4 SELECTED CONSULTANCIES

4.1 Fish Translocation study (NWU – WRG), Lethabo Power Station (ESKOM)

2016 - 2021 – Fish Specialist, Fish Translocation at ESKOM, South Africa, Sampling of fish species in ESKOM Cooling Towers and translocating them to the NWU.

4.2 Aquatic Biomonitoring at Khumba Iron Ore Mining (Joint with Amanzi Aquatics and NWU – WRG)

2019, Junior Aquatic Specialist, Aquatic Biomonitoring at Khumba Iron Ore Mining (Joint Amanzi Aquatics and NWU – WRG), South Africa, Undertake aquatic biomonitoring in nearby rivers surrounding Khumba Iron Ore to assess fish community structures.

4.3 Aquatic Biomonitoring at a WWTW near Greylingstad (Joint with Ecosphere and NWU – WRG)

2022, Junior Aquatic Specialist, Aquatic biomonitoring (SASS5, water and sediment quality and fish community structure), South Africa, Undertake aquatic biomonitoring in nearby rivers surrounding Khumba Iron Ore to assess fish community structures.

4.4 Kroonstad Solar PV Facilities

2022, Aquatic and Wetland Specialist, Development of three Solar PV facilities near Kroonstad, Free State Province, South Africa, Assess and map all wetlands associated with the three solar PV facilities as well as perform aquatic biomonitoring of the Vals River.

4.5 Kroonstad South Solar PV Facilities

2022, Aquatic and Wetland Specialist, Development of five Solar PV facilities near Kroonstad, Free State Province, South Africa, Assess and map all wetlands associated with the five solar PV facilities as well as perform aquatic biomonitoring of the Blomspruit.

4.6 Proposed Nketoana Regional Bulk Water Scheme Project

2022, Aquatic and Wetland Specialist, Nketoana Local Municipality is experiencing severe water shortages in its towns Reitz/Petsana/ Petrus Steyn/ Mamafubedu/ Arlington/ Leratswana and Lindley. Solutions to the water shortages are the proposed Nketoana Regional Bulk Water Scheme Pipeline, South Africa, Perform aquatic biomonitoring and assessing all wetlands within a 500m radius of the bulk water scheme project.

4.7 Rustenburg Solar PV Facilities

2022, Aquatic and Wetland Specialist, Development of three Solar PV facilities near Rustenburg, North West Province, South Africa, Assess and map all wetlands associated with the three solar PV facilities as well as perform aquatic biomonitoring of the Elands River.

4.8 Grootvlei Solar PV Facility

2022, Aquatic and Wetland Specialist, Development of three Solar PV facilities near Carletonville, North West Province, South Africa, Assess and map all wetlands associated with the one solar PV facility.

4.9 400kV Transmission and 132kV distribution power lines for the Apollo-Lepini-Mesong Project

2023, Aquatic and Wetland Specialist, Proposed development of a 400kV transmission and 132kV power lines for the Apollo-Lepini-Mesong Project, Gauteng Province, South Africa, Undertake and Aquatic and Wetland Impact Assessment along the proposed routes for the 400kV and 132kV power lines.

4.10 CCUS 3D Seismic Survey & Drilling

2023, Wetland Specialist. Proposed 3D Seismic Survey within the Leandra area, Mpumalanga Province, South Africa, Assess and map all wetlands within the footprint of the survey area.

4.11 Paulputs 400 kV Strengthening (Transmission Line Loop in Loop Out) Project

2022, Aquatic and Wetland Specialist, Proposed Paulputs 400kv Strengthening Project (Transmission Line Loop In Loop Out From Aries – Kokerboom Transmission Line), South Africa, Assess and map all wetlands associated with the power line as well as aquatic biomonitoring.

4.12 Seelo Solar PV Facilities

2022, Aquatic and Wetland Specialist, Development of three Solar PV facilities near Carletonville, North West Province, South Africa, Assess and map all wetlands associated with the three solar PV facilities as well as perform aquatic biomonitoring of the Mooirivierloop.

5 LANGUAGES:

English - excellent speaking, reading, and writing

Afrikaans – excellent speaking, reading and writing

APPENDIX 2: REVIEWERS DETAILS, QUALIFICATIONS AND EXPERTISE (ELZET HUMAN)

1. PERSONAL PARTICULARS

Profession:	Biodiversity Specialist
Date of Birth:	13 March 1987
Name of Firm:	Nitai Consulting
Name of Staff:	Elzet Human
Nationality:	RSA
Membership of Professional Societies	SACNASP (Pr. Sci. Nat. 147031)

2. EDUCATION:

- M-Tech Nature Conservation, (Plant DNA Barcoding and phylogenetics), TUT, South Africa, 2021
- B-Tech Nature Conservation, (Resource Management, Vegetation ecology and rehabilitation) TUT, South Africa, 2011
- N. Dip Nature Conservation, TUT, South Africa, 2008

3. EMPLOYMENT RECORD:

- 2022 – Present Biodiversity Specialist, Nitai Consulting

  Conduct Biodiversity Impact Assessments.

  Conduct Plant Ecological Assessments.

  Conduct Animal Ecological Assessments

  Biodiversity monitoring programs; and,

  GIS Mapping

- 2013 – 2022 Lecturer: Nature Management, Centurion academy

  Lectured various subjects for undergraduate students in Nature Management:

  Botany and Vegetation Ecology, Zoology, Animal Health, Conservation Development, Ecology, Game Ranch Management, Biostatistics, Research Methodology, Genetics, Soil Science

- 2009 – 2013 HOD Rangers Department, Zebula Gold Estate and Spa

  Ecological Monitoring, Reserve Maintenance, Animal Husbandry, Neonatal care of Endangered carnivore species, Zoological display, and permit compliance

- 2008 – Conservation Student, Ann van Dyk Cheetah Research Centre

  Neonatal Care of Carnivore species,

  Veterinary assistance work – vaccine, diets, Endo scoping, pregnancy tests, health monitoring, quarantine care of species, emergency c-sections, bleeding procedures on vultures

  Enclosure Maintenance

  Tracking wild cheetahs

  Rewilding cheetahs

  Anatolian Shepard project assistance

4. SELECTED CONSULTANCIES

4.1 Ecological assessment for Victorius Game farm, Visgat, Ellisras, Limpopo

2018, Ecologist, Ecological condition assessment and game carrying capacity for game farm. Habitat evaluation and rehibition program for problem areas

4.2 Elephant impact study on Mabula Game Reserve, Bela-Bela, Limpopo,

2019, Ecologist, Ecological impact study on Private Nature reserve to see extent of elephant utilisation and impact. Woody species analysis – structure classification and net primary production. Elephant movement patterns and carrying capacity. Identification of vulnerable habitats and management program.

4.3 Faan Meintjies Municipal Nature Reserve, Matlosana, North West

2018-2022, Ecologist, Habitat assessments, game carrying capacities, ecological condition assessments, game counts and game recommendations, ecological rehabilitation programs, white rhino monitoring, anti-poaching programs, Environmental Education programs.

4.4 Kroonstad Solar PV Facilities

2022, Biodiversity Specialist. Development of three Solar PV facilities near Kroonstad, Free State Province, South Africa, Assess and map all wetlands associated with the three solar PV facilities as well as perform aquatic biomonitoring of the Vals River.

4.5 Kroonstad South Solar PV Facilities

2022, Biodiversity Specialist. Development of five Solar PV facilities near Kroonstad, Free State Province, South Africa, Assess and map all wetlands associated with the five solar PV facilities as well as perform aquatic biomonitoring of the Blomspruit.

4.6 Proposed Nketoana Regional Bulk Water Scheme Project

2023, Biodiversity Specialist. Nketoana Local Municipality is experiencing severe water shortages in its towns Reitz/Petsana/ Petrus Steyn/ Mamafubedu/ Arlington/ Leratswana and Lindley. Solutions to the water shortages are the proposed Nketoana Regional Bulk Water Scheme Pipeline, South Africa, Assess and map all biodiversity, plant and animal features associated within the footprint of the bulk water scheme project.

4.7 Rustenburg Solar PV Facilities

2023, Biodiversity Specialist. Development of three Solar PV facilities near Rustenburg, North West Province, South Africa, Assess and map all biodiversity, plant and animal features associated with the three solar PV facilities.

4.8 Grootvlei Solar PV Facility

2023, Biodiversity Specialist. Development of three Solar PV facilities near Carletonville, North West Province, South Africa, Assess and map all biodiversity, plant and animal features associated with the one solar PV facility.

4.9 400kV Transmission and 132kV distribution power lines for the Apollo-Lepini-Mesong Project

2023, Biodiversity Specialist. Proposed development of a 400kV transmission and 132kV power lines for the Apollo-Lepini-Mesong Project, Gauteng Province, South Africa, undertake assessments and map all biodiversity, plant, and animal features along the proposed routes for the 400kV and 132kV power lines.

4.10 CCUS 3D Seismic Survey & Drilling

2023, Biodiversity Specialist. Proposed 3D Seismic Survey within the Leandra area, Mpumalanga Province, South Africa Assess and map all biodiversity, plant and animal features within the footprint of the survey area.

4.11 Paulputs 400 kV Strengthening (Transmission Line Loop in Loop Out) Project

2023, Biodiversity Specialist. Proposed Paulputs 400kv Strengthening Project (Transmission Line Loop In Loop Out From Aries – Kokerboom Transmission Line), South Africa, Assess and map all biodiversity, plant and animal features within the power line footprint as well as perform biodiversity monitoring.

4.12 Seelo Solar PV Facilities

2023, Biodiversity Specialist. Development of three Solar PV facilities near Carletonville, North West Province, South Africa, Assess and map all biodiversity, plant, and animal features within the three solar PV facilities as well as perform biodiversity monitoring.

5 LANGUAGES:

English - excellent speaking, reading, and writing

Afrikaans – excellent speaking, reading and writing

APPENDIX 3: REVIEWERS DETAILS, QUALIFICATIONS AND EXPERTISE (ANTOINETTE BOOTSMA)

1. PROFESSIONAL AFFILIATIONS

- Professional Natural Scientist (SACNASP) # 400222-09 Botany and Ecology
- South African Wetland Society # NA6RY2FP
- Grassland Society of South Africa

2. QUALIFICATIONS

- **M.SC** (Environmental Science), University of South Africa, 2017. *Awarded with distinction*. Project Title: Natural mechanisms of erosion prevention and stabilization in a Marakele peatland; implications for conservation management.

3. PUBLICATIONS

- A.A. Boostma, S. Elshehawi, A.P. Grootjans, P.L Grundling, S. Khosa, M. Butler, L. Brown, P. Schot. 2019. Anthropogenic disturbances of natural ecohydrological processes in the Matlabas mountain mire, South Africa. South African Journal of Science Volume 115| Number 5/6, May/June 2019, P1 to 8.

4. EMPLOYMENT HISTORY

- Director at Limosella Consulting (Pty) Ltd - 2009 – ongoing
- Senior Wetland Specialist at Strategic Environmental Focus – 2007 to 2009
- Technical Assistant at the Conservation Ecology Research Unit, University of Pretoria, Richards Bay field station, 2005 to 2007.

5. SUMMARY OF KEY SKILLS

- Management of projects in terms of specialist input, including quotations, planning, technical review, submission of reports and invoicing;
- Fine scale wetland delineations and functional assessments;
- Strategic wetland assessments and open space management and planning;
- General Rehabilitation, Monitoring and Mitigation assessments;
- Wetland offset strategies;
- Hydropedological investigations; and
- Implementation of wetland assessment tools including the DWS (2016) Risk Assessment, Present Ecological Status (PES) Macfarlane et al, (2020), Ecological Importance and Sensitivity (EIS) (DWAF, 1999), Recommended Ecological Category (REC) Rountree et al (2013), Riparian Vegetation Response Assessment Index (VEGRAI) (Kleynhans et al, 2007) and QHI (Quick Habitat Integrity).

6. SHORT SUMMARY OF EXPERIENCE

- Numerous external peer reviews as part of mentorship programs for companies including Galago Environmental Consultants, Lidwala Consulting Engineers, Bokamoso Environmental Consultants, Gibb, 2009 – ongoing;
- Wetland specialist input into the Kloof Mine wetland sediment interim management, remediation and rehabilitation plan, 2022;
- Wetland Assessments for the upgrade of 7 culverts and bridges in Vereeniging, Gauteng, July 2021
- Input into the Environmental Management Plan for repair to 90 bridges in the City of Johannesburg, 2020;
- Wetland specialist input into the City of Tshwane Open Space Framework, 2019;
- Wetland specialist input into the North West Environmental Outlook, 2018;
- Wetland specialist input into the Gauteng Environmental Outlook, 2017;
- Wetland specialist input into the Open Space Management Framework for Kyalami and Ruimsig, City of Johannesburg, 2016;
- Kangra Maquasa East and Maquasa West and Nooitgesien Mine, Mpumalanga Province: Rehabilitation and Monitoring Assessment. June 2018; and
- Mbuyelo Coal Welstand Reserve Amendment: Wetland assessment. June 2017.

APPENDIX 4: SIGNED DECLARATION INDEPENDENCE

I, **Divan van Rooyen**, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and

I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

04/04/2023

Dr. Divan van Rooyen (Can. Sci. Nat. 151272) **Date**

Aquatic and Wetland Specialist

I, **Denisha Ponnusamy**, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and

I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

04/04/2023

Denisha Ponnusamy (Can. Sci. Nat. 147031) **Date**

Environmental Officer

I, **Elzet Human**, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and

I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

04/04/2023

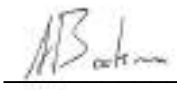
Elzet Human (Pri. Sci. Nat. 147031) **Date**

Terrestrial Ecologist

I, **Antoinette Bootsma**, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and

I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



04/04/2023

Antoinette Bootsma (Pri. Sci. Nat. 400222-09) **Date**

Wetland Specialist

Seelo Beta Solar (RF) (PTY) Ltd.

Aquatic Biodiversity site verification report for the proposed Seelo Beta Solar PV, JB Marks Local Municipality, North West

01 MARCH 2023

Prepared by:

Dr. Divan van Rooyen

Nitai Consulting (PTY) Ltd.

147 Bram Fischer Drive

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2194

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NITAI CONSULTING

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Authors	Qualification	Date	Signature	Version No.
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Denisha Ponnusamy	M.Sc. Hydrology (UniZulu) (Can. Nat. Sci. Environmental Science 155319)	01 March 2023		2.0
Reviewed by	**Qualification**	**Date**	**Signature**	**Version No.**
Antoinette Bootsma	M.Sc. Environmental Science (UNISA) (Pri. Sci. Nat. Ecology & Botany 400222-09)	02 March 2023		3.0
Prepared for	Nemai Consulting (PTY) Ltd. 147 Bram Fischer Drive, Ferndale Randburg, 2194 NEMAI CONSULTING			

1 INTRODUCTION & PROJECT DESCRIPTION

1.1 Background

Seelo Beta Solar PV (RF) (PTY) Ltd. proposes the construction of a Solar PV facility (known as Seelo Beta) located on Portion 1 of the farm Rooipan No. 96, approximately 13km north west of the town Carletonville, in the North West Province. The Solar PV will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 240 MW. The proposed development will include PV modules, mounting structures, a substation, Batter Energy Storage System (BESS), site and internal roads, office/parking and a temporary and permanent laydown area.

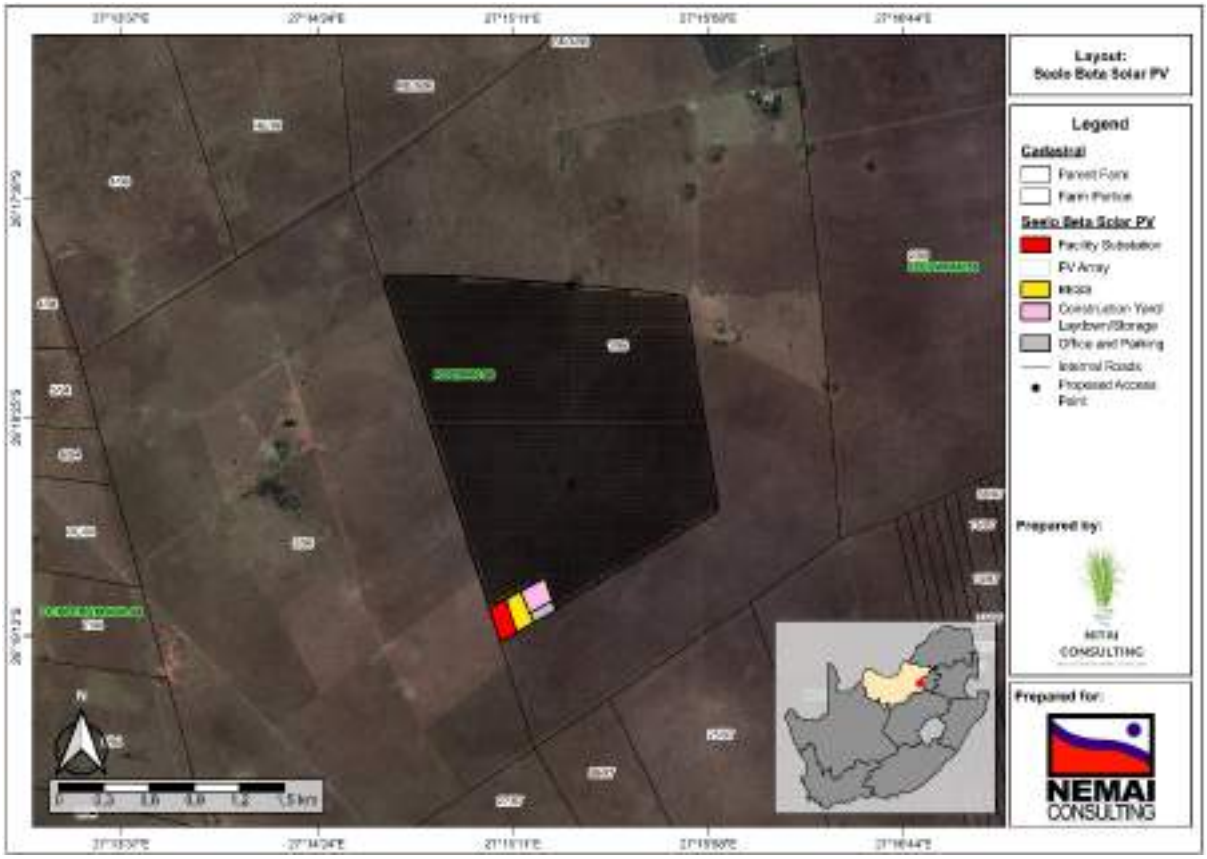


Figure 1: Layout of the Seelo Beta Solar PV Facility

2 SITE VERIFICATION REPORT: AQUATIC BIODIVERSITY THEME

During the Desktop study for the proposed Seelo Beta Solar PV development the Environmental Screening tool from Department of Forestry, Fisheries & the Environment (DFFE) was queried. The Screening Tool allows for the generation of a Screening Report referred to in Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended, whereby a Screening Report is required to accompany any application for Environmental Authorisation.

The report has identified that Aquatic Biodiversity Theme for the proposed study area is of very high sensitivity (Figure 2). Although no watercourses were identified during the site visit, the area is still classified as very high sensitivity due to the area being within the Strategic Water Source Area (SWSA) (groundwater SWSA, i.e. Westrand Karst Belt) with potentially sensitive groundwater interactions.

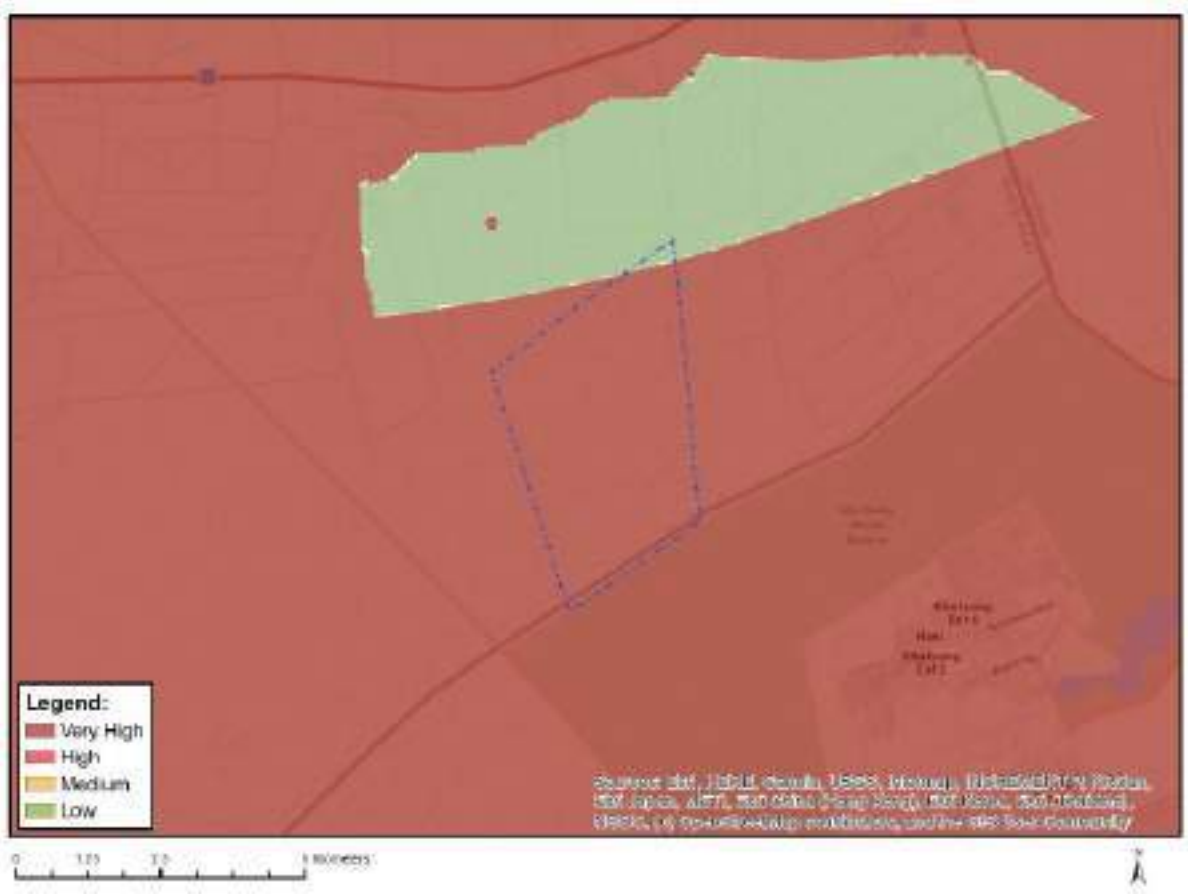


Figure 2: Aquatic Biodiversity Sensitivity Theme from the Department of Forestry, Fisheries & the Environment Screening Tool

3 CURRENT STATUS OF THE SURROUNDING ENVIRONMENT

The proposed site is situated in an agricultural landscape (small and large livestock). According to the NBA 2018 NWM 5 spatial data, two small depressions are located in the Northern section of the footprint (Figure 3c and Figure 3d). However, during the site visit, this could not be verified and can rather be classified as terrestrial habitat. No plants indicative of a moisture gradient was recorded in the target areas. Therefore, the site does not contain any sensitive features in terms of watercourses. The proposed site is comprised of natural vegetation characteristics in medium to good condition. See Figure 3 below for an overview of the environment within the proposed footprint.

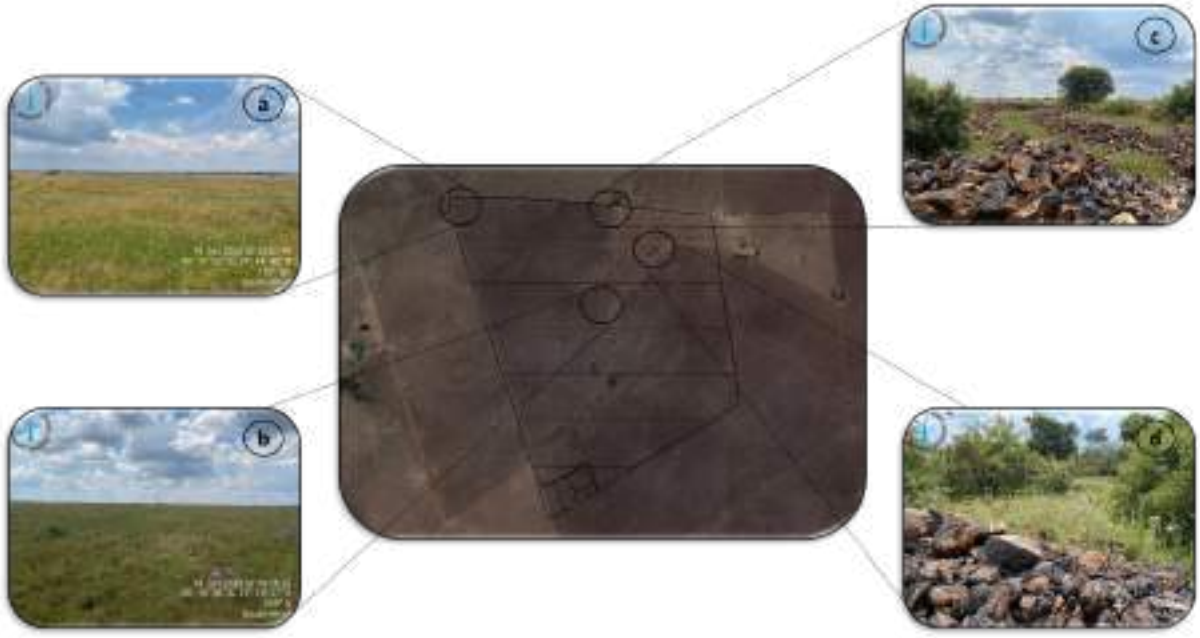


Figure 3: Photographs indicating the general environment within the proposed footprint of Seelo Beta Solar PV

4 CONCLUSION AND RECOMMENDATIONS

The proposed Seelo Beta Solar PV facility is situated in the JB Marks Local Municipality within the North West Province. Although spatial data suggests there is two wetlands (depression) located in the northern part of the footprint, no watercourses were identified to be within the proposed footprint of the PV facility which was validated by an absence of wetland vegetation indicators as well as an absence of wetland soil indicators present. The area has been mostly characterised as Hutton soils. The vegetation recorded throughout the site are not associated with wetlands and rather with terrestrial vegetation. Therefore, we can conclude that no wetland exists within the footprint of the proposed PV facility and that no watercourses will be affected.

Although the DFFE Screening Tool has identified the area as a very high sensitivity from an Aquatic Biodiversity Theme perspective. This is due to the area being a SWSA, under the groundwater category. However, it is of the opinion of the specialist that the area does not hold very high sensitivity features (no indication of links between the soil and groundwater could be found) and that the underground aquifers would not be significantly negatively influenced by the proposed development of the Seelo Beta Solar PV facility since the groundwater recharge is between 31 m and 33 m. Thus, groundwater pollution would be low for the proposed Solar PV development, given that best practice pollution control is implemented as specified in the Geohydrological report.

Since no sensitive hydrological features were recorded on this site, therefore, the revised Aquatic Biodiversity sensitivity is low. More importantly, the specialist recommends that the PV facility may proceed without impact to regional watercourses, given that best practise mitigation measures, particularly in terms of pollution control, are implemented.

APPENDIX 1: REVIEWER LETTER

278 Kei Avenue,

Sinoville Pretoria, 0182

02 March 2023

Dr Divan van Rooyen

Nitai Consulting (PTY) Ltd, 147 Bram Fischer Drive

Ferndale, 2194

Dear Dr van Rooyen,

Aquatic Biodiversity site verification report for the proposed Seelo Beta Solar PV, JB Marks Local Municipality, North West

This letter serves to confirm that I have completed an external review of the Aquatic Biodiversity assessment for this project. A site visit, undertaken by myself and Dr van Rooyen, on the 30th of January, 2023. The focus of the site visit was to investigate soil and vegetation conditions on focus areas identified as potential wetlands. These focus areas were identified on Google Earth by Dr van Rooyen, based on potential moisture gradients, and were reviewed by myself prior to the site visit.

No wetland plants, or soil wetland indicators, as confirmed by a Munsell soil chart, were recorded on the study site and I therefore support the conclusion that no wetlands or riparian habitat occur on the site earmarked for development.

A review of the written Aquatic Biodiversity assessment report was undertaken on the 2nd March, 2023. I support your conclusion that the proposed PV facility will not impact on watercourses on the study site and recommend that reference to best practice mitigation measures, with a particular focus on pollution control be made.

Please do not hesitate to contact us should any further information be required.

Antoinette Bootsma

Ecologist/Botanist

Pri Sci Nat # 400222-09

APPENDIX E2: Terrestrial Biodiversity Compliance Statement

Proposed Seelo Beta Solar PV project, Carletonville, North West Province, South Africa

TERRESTRIAL BIODIDVERSITY COMPLIANCE STATEMENT

03 May 2023

Submitted to : Nemai Consulting

Prepared by:

Helena Elizabeth Human (Pr. Sci. Nat 147031)

Nitai Consulting (PTY) Ltd.

147 Bram Fischer Drive

Ferndale

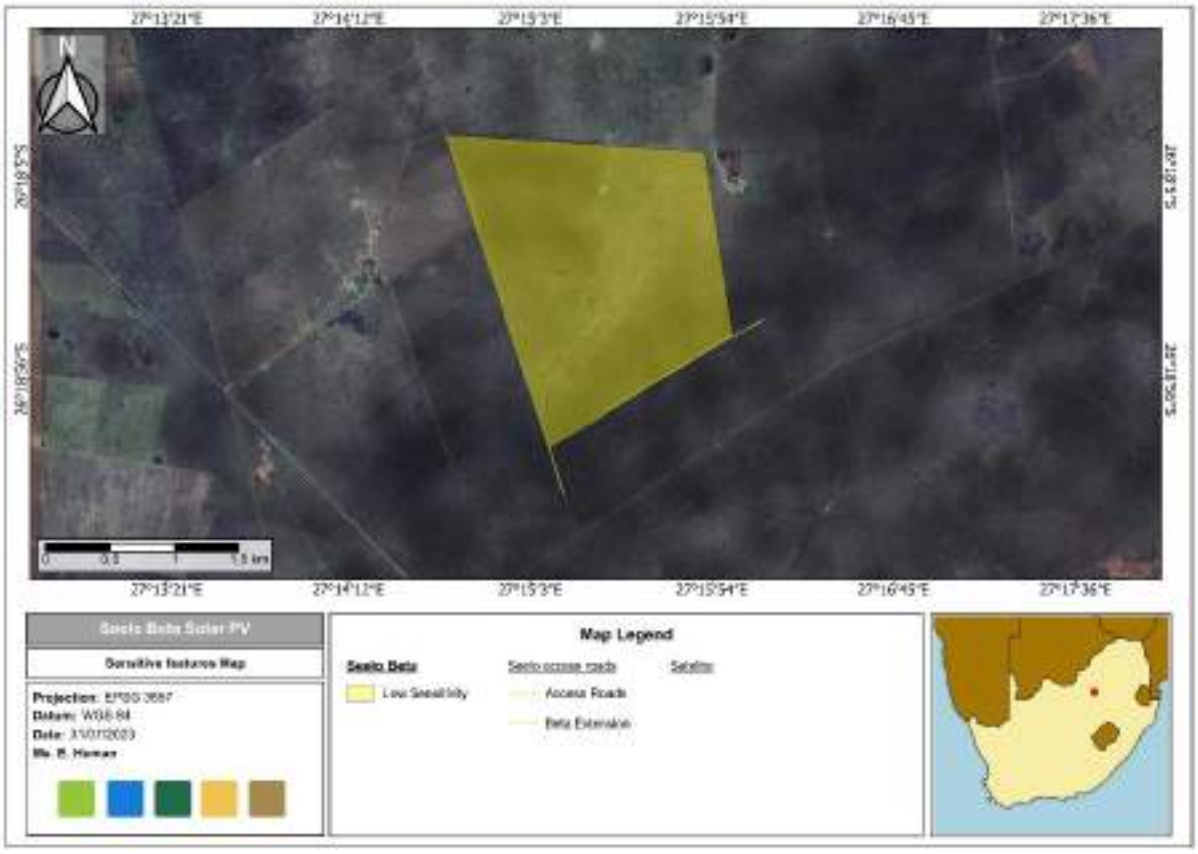
2194

Executive Summary

Nitai Consulting (Pty) Ltd. was appointed by Nemai Consulting (Pty) Ltd. to undertake a terrestrial biodiversity assessment for the proposed Seelo Beta Solar project in the North West Province, South Africa.

According to the National Web Based Environmental Screening Tool (the "Screening Tool"), the terrestrial biodiversity sensitivity theme is "low".

No sensitive biodiversity features were identified on site as the area is overgrazed by livestock.



The area has experienced long-term and continuous disturbance, mostly due to the agricultural grazing practices and associated impacts. The project area is modified and as such is assigned a sensitivity rating of 'Low'.

The screening report classified both the animal and plant theme sensitivity as 'medium' and 'High' respectively. Following the field survey findings, both the animal and plant species themes may be re-classified as having 'Low' sensitivities. This is since there is limited suitable habitat available to support the regular occurrence of any faunal SCC within the project area.

Completion of the Terrestrial Biodiversity Assessment led to a confirmation of the 'Low' classification for the terrestrial biodiversity theme sensitivity as allocated by the National Environmental Screening

Tool but dispute the 'High' classification for the animal theme sensitivity as allocated by the National Environmental Screening Tool. The project area has instead been assigned a 'Low' sensitivity, because of the extent of environmental disturbance that has taken place, and the fact that limited SCC were observed and are unlikely to frequently occur within the project area.

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List of Abbreviations

CBA	Critical Biodiversity Area
CR	Critical
DFFE	Department of Forestry, Fisheries & the Environment
DWS	Department of Water and Sanitation
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme
EN	Endangered
ESA	Ecological Support Area
GDARD	Gauteng Department of Agriculture and Rural Development
GIS	Geographic Information System
GN	Government Notice
ha	Hectares
km	Kilometer (1 000m)
LC	Least Concern
MAP	Mean Annual Precipitation
m	Meters
NEMA	National Environmental Management Act (No. 107 of 1998)
NFEPA	National Freshwater Priority Areas
NWA	National Water Act
SANBI	South African National Biodiversity Institute
VU	Vulnerable

1 INTRODUCTION

1.1 Terms of Reference

The specialist study is required to follow the published Protocols, for the assessment of impacts on Terrestrial Biodiversity, Terrestrial Plants Species and Terrestrial Animal Species. Note that the Protocols require determination of the level of sensitivity, which then determines the level of assessment required, either a full assessment, or a Compliance Statement.

This site sensitivity assessment follows the requirements of The Environmental Impact Assessment Regulations, as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998), published in GN. No. 320 dated 20 March 2020.

The principle aim of the assessment was to provide information to inform on the risk that the proposed activity has on the terrestrial ecosystems within the PAOI. This was achieved through the following:

- Identification and description of any sensitive receptors that occur in the Project Area of Influence, and the manner in which these sensitive receptors may be affected by the proposed activity;
- Conducting of a desktop assessment to identify the relevant ecologically important geographical features within or nearby to the Project Area of Influence;
- Conducting of a desktop assessment to compile an expected species list and identify flora and fauna Species of Conservation Concern (SCC) that may occur within the Project Area of Influence;
- Conducting of a field survey to ascertain the baseline species composition of the present flora and fauna community within the Project Area of Influence;
- Delineation and mapping of the habitats and their respective sensitivities that occur within the Project Area of Influence;
- Identification of the manners in which the proposed project impacts the flora and fauna communities, and an evaluation of the level of risk that these potential impacts present; and
- The prescription of mitigation measures and associated recommendations for the identified risks.

2 LEGISLATION

The legislation, policies and guidelines listed below in Table 1 are applicable to the current project. The list below, although extensive, may not be complete and other legislation, policies and guidelines may apply in addition to those listed below.

Table 1: A list of key legislative acts and guidelines relevant to biodiversity and conservation for the project area.

Level	Legislation
International	Convention on Biological diversity (CBD)
National	National Environmental Management Act, Act No. 107 of 1998 (NEMA)
	National Environmental Management: Biodiversity Act, Act No. 10 of 2004 (NEM:BA)
	Government Notice No. 47526 of 2022: The revised National List of ecosystems that are threatened and in need of protection.
	GNR 151: Critically Endangered, Endangered, Vulnerable and Protected Species List Published under Section 56(1) of NEMBA.
	GNR 1187: Amendment of Critically Endangered, Endangered, Vulnerable and Protected Species List Published under Section 56(1) of NEMBA.
	National Environmental Management Act, 1998 (Act No. 107 of 1998): The National Biodiversity Offset Guideline published for implementation [G48841 – GoN 3569]
	National Forests Act, Act no. 84 of 1998
	Conservation of Agricultural Resources, Act No. 43 of 1983 as amended in 2001
	National Veld and Forest Fire Act, Act No. 101 of 1998
	Constitution of the Republic of South Africa (Act No. 108 of 1996)

	The National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
	The National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
	Threatened or Protected Species Regulations and lists (No. R. 152 of Government Gazette No. 29657 of 23 February 2007, and No. R. 1187 of Government Gazette No. 30568 of 14 December 2007)
	Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 320 of Government Gazette 43110 (March 2020); and GNR 1150 of Government Gazette 43855 (October 2020)
	Natural Scientific Professions Act (Act No. 27 of 2003)
	World Heritage Convention Act (Act No. 49 of 1999)
	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations and Alien and Invasive Species List 2014-2020, published under NEM:BA
Provincial	North West Biodiversity Management Act, No 4 of 2016.
	North West Biodiversity Management Act, No 4 of 2016. Critical Biodiversity Areas of the North West Province, North West Biodiversity Sector Plan Technical Report, 2015

2.1 Definitions

2.1.1 Species of Conservation Concern

In accordance with the National Red List of South African Plants website, managed and maintained by the South African National Biodiversity Institute (SANBI), a Species of Conservation Concern (SCC) is a species that has a high conservation importance in terms of preserving South Africa's rich biodiversity. This classification covers a range of red list categories as illustrated in Figure 1 below.

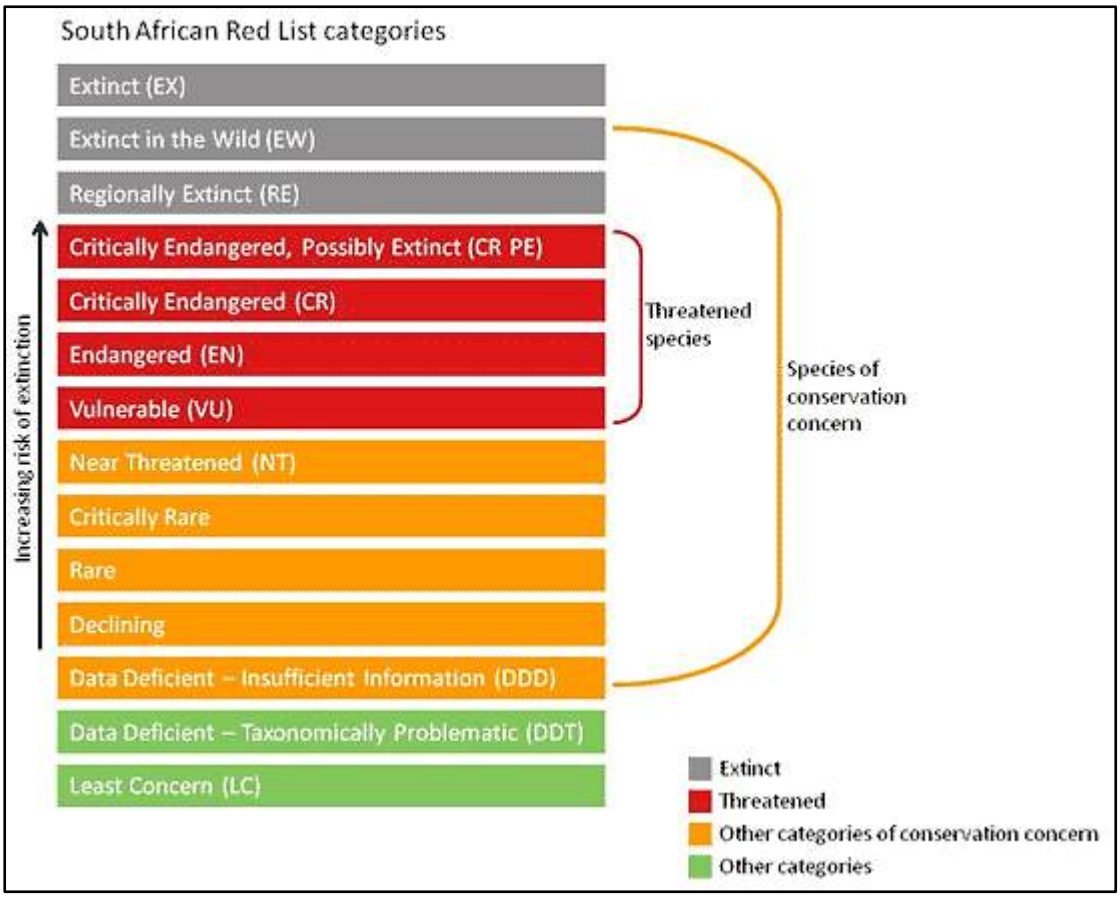


Figure 1: Threatened species and Species of Conservation Concern (SANBI, 2016)

South Africa uses the internationally endorsed International Union for Conservation of Nature (IUCN) Red List Categories and Criteria (IUCN, 2012). This scientific system is designed to measure species' risk of extinction and its purpose is to highlight those species that are in need of critical conservation action. As this system has been adopted from the IUCN, the definition of an SCC as described and categorised above is extended to all red list classifications relevant to fauna as well as the IUCN categories, for the purposes of this report.

2.1.2 Protected Species

Protected species include both flora and fauna species that are protected according to some form of relevant legislation, be it provincial, national, or international. Provincial legislation may include that published in the form of a provincial ordinance, bill, or act, and national legislation includes that which is published in terms of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) or the National Forests Act (Act No. 84 of 1998). Relevant international legislation includes the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 2021).

3 PROJECT DETAILS

3.1 Project Background and Motivation

From a regional perspective, the Carletonville area is considered favourable for the development of a solar energy facility by virtue of prevailing climatic conditions, relief, aspect, the extent of the affected properties, the availability of a direct grid connection (i.e., a point of connection to the national grid) and the availability of land on which the development can take place. The complete extent of the study area is located in the Central Corridor of the Strategic Transmission Corridors.

The solar facility is proposed in response to identified objectives of the national and provincial government, and local and district municipalities to develop renewable energy facilities for power generation purposes. The facility is planned to be bid into the Department of Mineral Resource and Energy's (DMRE) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme with the aim of evacuating the generated power into the national grid.

This will aid in the diversification and stabilisation of the country's electricity supply with the facility set to inject up to 240MW into the national grid, in line with the objectives of the Integrated Resource Plan (IRP).

3.2 Project Description

The development of a solar photovoltaic (PV) facility and associated infrastructure with a total combined generating capacity of up to 240MW is proposed by Seelo Beta Solar PV (RF) (Pty) Ltd on a site located approximately 13km north west of the town of Carletonville, in the North West Province. The proposed project and associated maximum contracted capacity are as follows:

- Seelo Beta Solar PV: 240MW

The sites are located within the JB Marks Local Municipality and the Dr Kenneth Kaunda District Municipality. The preferred project site area for the facility consists of the following affected property:

- Portion 1 of Farm 96 (Rooipan).

The development area is located to the south of the N14. Access to the Project is proposed off District Road 331 approximately 150m from the most southern border of Portion 2 of the Farm Rooipan No. 96. The internal access road will utilise an existing servitude right of way along the southern boundary of Portion 2 of Farm 96 for approximately 1km before following an existing internal road heading in a northerly direction for approximately 700m on Portion 1 of Farm No. 96 until it reaches the southern boundary of the Project.

To connect the facility to the national grid, a dedicated grid connection for each facility is required. The grid connection for the facility will include the development of 132kV switching substation/s and a 132k power line(s) within a 300m wide corridor to a point of connection at the Carmel Major Transmission Substation approximately 12.5km south of the site. The grid connections will be assessed within a separate BA process.

3.3 Technical Details of the PV Plants

Area occupied by inverter / transformer stations / substations:	10 ha including BESS, Substation, Office/ Parking and temporary and permanent laydown
Capacity of on-site substation	Each substation will have a capacity of 132/ 33 kV
PV array	PV modules and mounting structures (monofacial or bifacial) with fixed, single or double axis tracking mounting structures. The height of the PV modules will be between 1- 6 in height, depending on the mounting type. The total PV array area will be up to 350ha.
Area occupied by both permanent and construction laydown areas	Forms part of 10 ha area in Point 1. Total permanent laydown area is 3ha. Total temporary plus permanent laydown area is 6ha. BESS area will be temporarily used a laydown area as well prior to its construction.
Area occupied by buildings	Approximately 8 ha per facility. This includes a O&M building (including site office and parking) of circa 1ha, switching substation of circa 3ha and BESS of circa 3ha)
Length of internal roads	18 km – internal
Width of internal roads	Up to 6m
Height of fencing	Up to 3.5m

3.4 Location

The proposed project is within the JB Marks Local Municipality and the Dr Kenneth Kaunda District Municipality on a site located approximately 13km north west of the town of Carletonville, in the North West Province (Figure 2 and Figure 3).

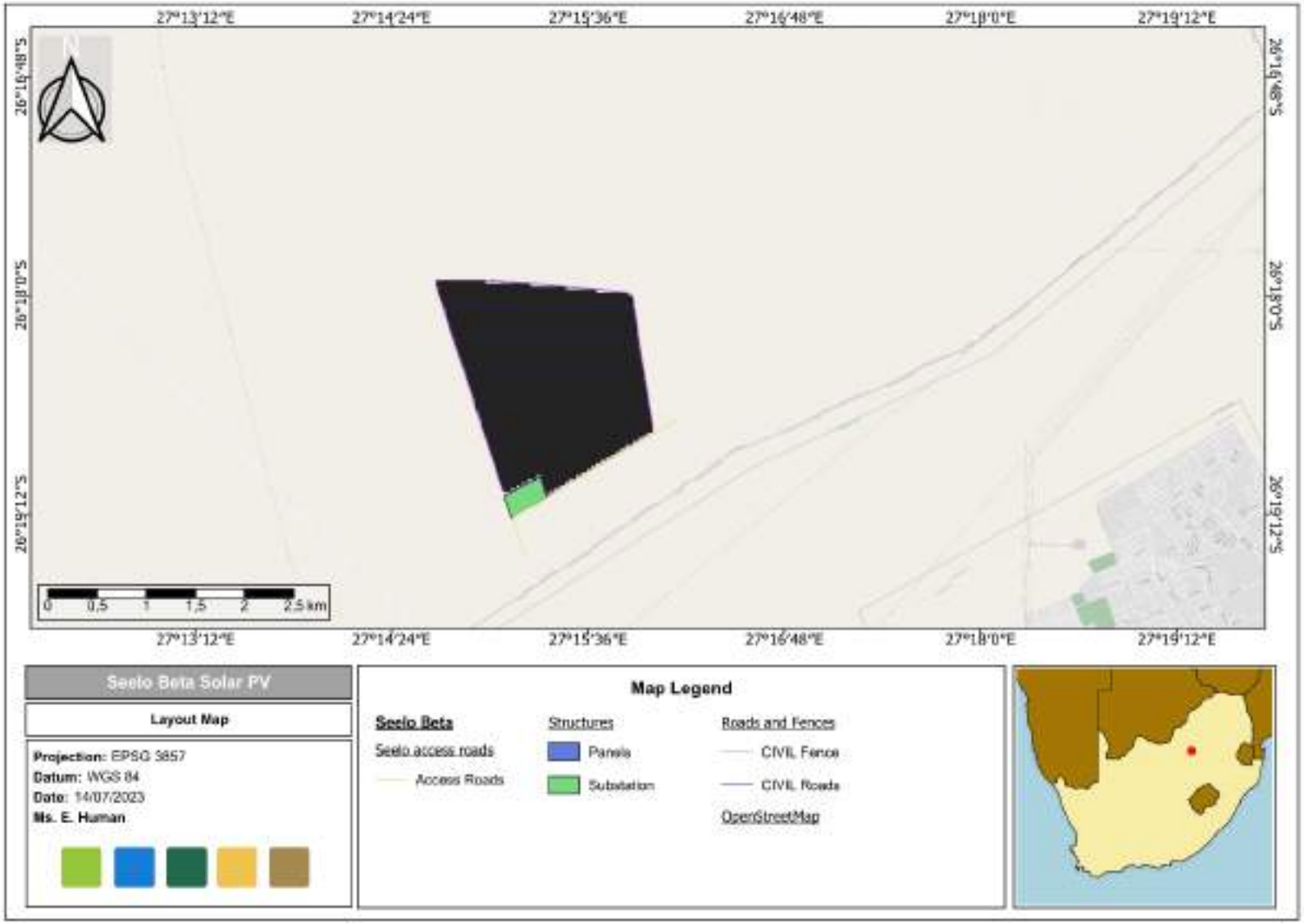


Figure 2: Project locality

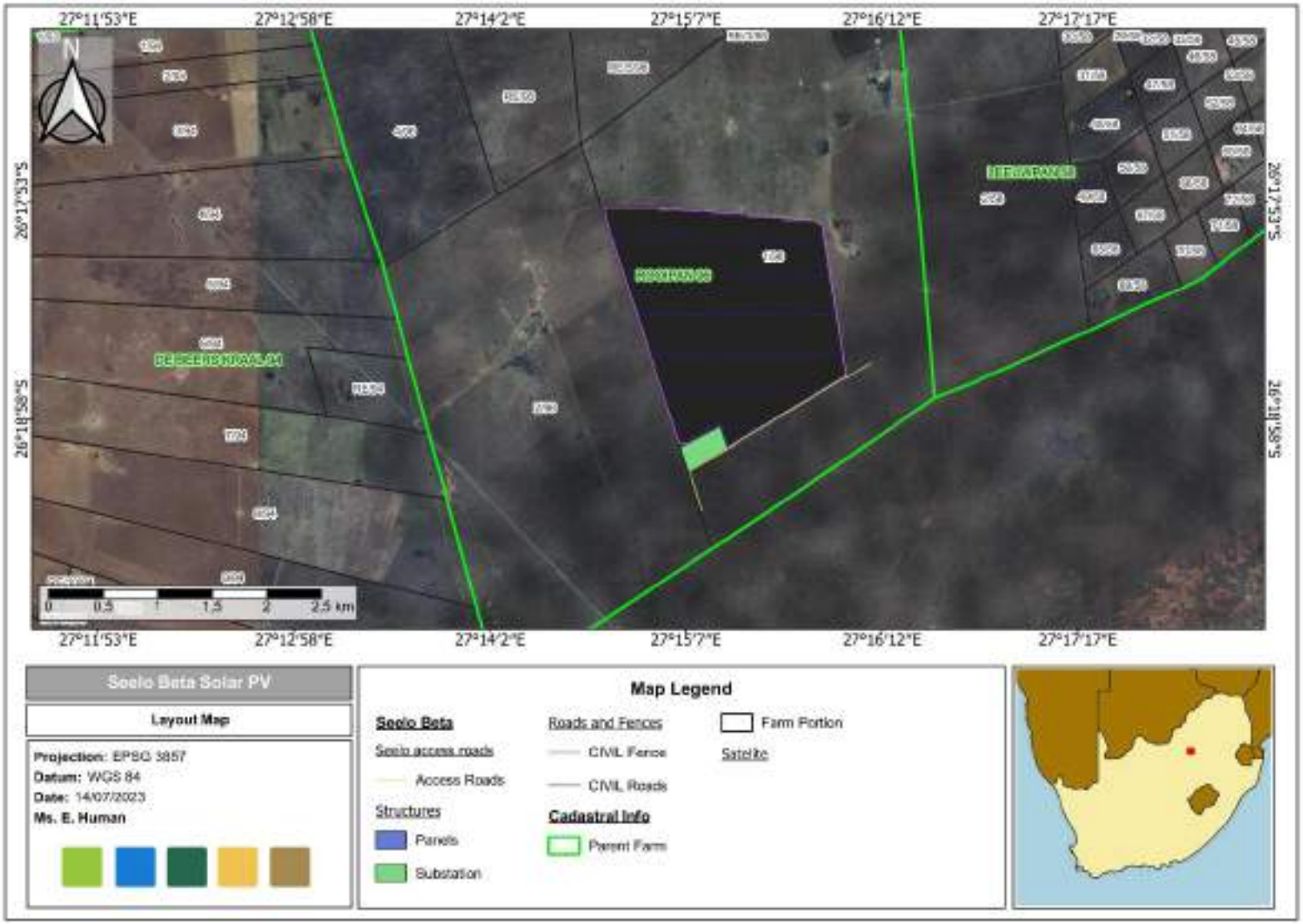


Figure 3: Project cadastral info

4 METHODS

4.1 Geographic Information Systems (GIS) Mapping

Existing data layers were incorporated into GIS software to establish how the proposed project might interact with any ecologically important entities. Emphasis was placed around the following spatial datasets:

- North-West Biodiversity Sector Plan of 2015 (North West Provincial Government , 2015)
- 2022 National Biodiversity Assessment ((DFFE, Revised national list of ecosystems that are threatened and in need of protection., 2022));
- Vegetation Map of South Africa, Lesotho and Swaziland ((Mucina & Rutherford, 2006);
- SA Protected and Conservation Areas Databases, 2022 (DFFE 2022);
- National Protected Areas Expansion Strategy, 2016 ((DEA, 2016));
- Important Bird and Biodiversity Areas, 2015 (Marnewick *et al.,* 2015);

Brief descriptions of the standardised methodologies applied are provided below. More detailed descriptions of survey methodologies are available upon request.

4.2 Desktop Vegetation and Botanical Assessment

The desktop vegetation and botanical assessment encompassed an assessment of all the vegetation units and habitat types within the project area. The focus was on an ecological assessment of pre-anthropogenic habitat types as well as the identification of any Red Data and protected species within the known distribution of the project area. The South African National Biodiversity Institute (SANBI) provides an electronic database system, namely the Botanical Database of Southern Africa (BODATSA-POSA, 2019), which was used to access distribution records on Southern African plants and generate an expected species list (Figure 4). This new database replaces the old Plants of Southern Africa database which provided distribution data of flora at the quarter degree square resolution. The Red List of South African Plants website (SANBI, 2016) was used to provide the most current account of the national conservation status of flora.

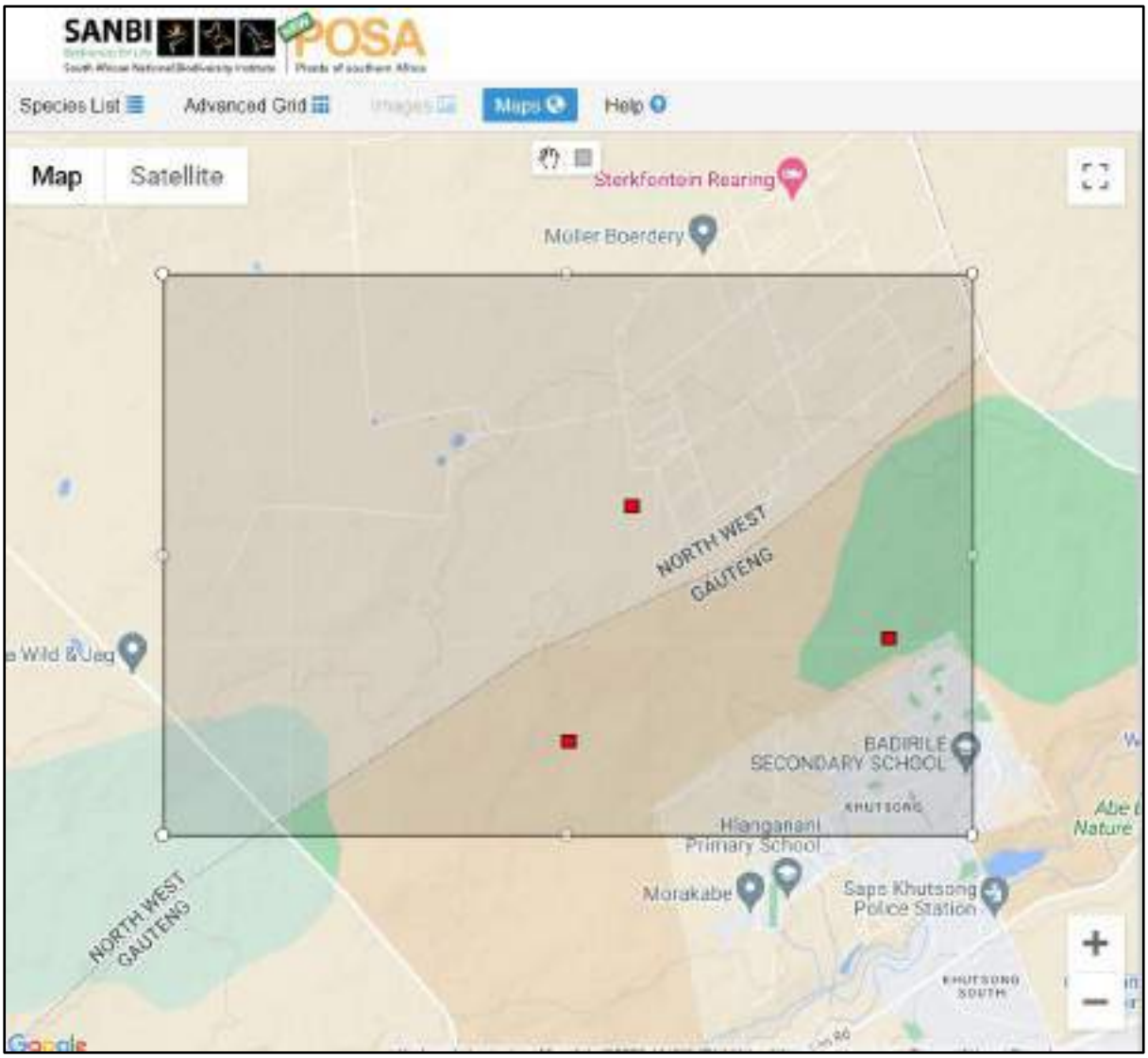


Figure 4: Plant distribution data.

Additional information regarding ecosystems, vegetation types, protected flora and Species of Conservation Concern (SCC) was obtained from the following sources:

- The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2012);
- Red List of South African Plants (Raimondo *et al.,* 2009; SANBI, 2016); and
- List of Protected Tree Species (South African Government, 2014).

4.3 Floristic Fieldwork Survey and Analysis

The wet season fieldwork (completed during January 2023) and sample sites were placed within targeted areas (i.e., target sites) perceived as ecologically sensitive based on the preliminary interpretation of satellite imagery (Google Corporation) and GIS analysis (which included the latest applicable biodiversity datasets) available prior to the fieldwork. The focus of the fieldwork was

therefore to maximise coverage and navigate to each target site in the field to perform a rapid vegetation and ecological assessment at each sample site. Emphasis was placed on sensitive habitats, especially those overlapping with the proposed project area.

Homogenous vegetation units were subjectively identified using satellite imagery and existing land cover maps. The floristic diversity and search for protected plants and flora SCC were conducted through timed meanders within representative habitat units delineated during the scoping fieldwork. Emphasis was placed on any sensitive habitats overlapping with the proposed project area.

The timed random meander method is a highly efficient method for conducting floristic analysis, specifically in detecting protected plants and flora SCC and maximising floristic coverage. In addition, the method is time and cost effective and highly suited for compiling observed flora species lists and therefore gives a rapid indication of flora diversity. The timed meander search was performed based on the original technique described by Goff et al. (1982). Suitable habitat for SCC were identified according to Raimondo et al. (2009) and targeted as part of the timed meanders.

At each sample site, notes were made regarding current impacts (e.g., roads, erosion etc.), and this included the subjective recording of dominant vegetation species and any sensitive features (e.g., old lands, rock outcrops etc.). In addition, opportunistic observations were made while navigating through the project area.

Relevant field guides and texts consulted for identification purposes in the field during the surveys included the following:

- A field guide to Wild flowers (Pooley, 1998);
- Field Guide to the Wild Flowers of the Highveld (van Wyk & Malan, 1998);
- Guide to the Aloes of South Africa (Van Wyk & Smith, 2014);
- Identification guide to southern African grasses. An identification manual with keys, descriptions and distributions (Fish et al., 2015); and
- Field guide to trees of Southern Africa, Struik Publishers (Van Wyk & Van Wyk, 1997).

The field work methodology included the following survey techniques:

Timed meanders:

- Sensitivity analysis based on structural and species diversity;
- Identification of protected floral species; and
- Identification of floral red-data or red-listed species (Species of Conservation Concern).

4.4 Faunal Assessment

4.4.1 Desktop Assessment

The faunal desktop assessment involved the following:

- Compilation of expected species lists;
- Identification of any red-data/red-listed species or Species of Conservation Concern potentially occurring in the area; and
- Emphasis was placed on the probability of occurrence of species of provincial, national, and international conservation importance.

Distribution and SCC data is generally obtained from the following information sources:

- Animal Demography Unit (https://vmus.adu.org.za/)); and Southern African Bird Atlas Project 2 (SABAP2, 2019);
- South African Reptile Conservation Assessment (SARCA) (sarca.adu.org);
- Atlas and Red list of Reptiles of South Africa, Lesotho and Swaziland (Bates et al., 2014);
- Red Data Book of Birds (Birdlife South Africa, 2015);
- Atlas and Red Data Book of Frogs of South Africa (Mintner et al., 2004);
- South Africa's official site for Species Information and National Red Lists (SANBI, 2022);
- The 2016 Red List of Mammals of South Africa (EWT, 2016); and
- The IUCN Red List of Threatened Species. Version 2021-3 (IUCN, 2021).

4.4.2 Field Survey

The field survey component of the assessment utilised a variety of sampling techniques including, but not limited to, the following:

- Visual observations (involving the use of binoculars and specialist camera equipment);
- Active hand-searches, used for species that shelter in or under particular micro-habitats (typically rocks, exfoliating rock outcrops, fallen trees, leaf litter, bark etc.);
- Identification of tracks and signs; and the utilization of local knowledge.

Relevant field guides and texts consulted for identification purposes in the field during the survey may include the following:

- Roberts Bird Guide, Second Edition (Chittenden et al., 2016);
- A Guide to the Reptiles of Southern Africa (Alexander & Marais, 2007);
- Field guide to Snakes and other Reptiles of Southern Africa (Branch, 1998);
- A Complete Guide to the Frogs of Southern Africa (du Preez & Carruthers, 2009);
- The Mammals of the Southern African Subregion (Skinner & Chimimba, 2005);
- Spiders of Southern Africa (Leroy & Leroy, 2003); and

4.5 Site Ecological Importance

The different habitat types within the assessment area were delineated and identified based on observations during the field assessment as well as information from available satellite imagery. These habitat types were assigned Ecological Importance (EI) categories based on their ecological integrity,

conservation value, the presence of Species of Conservation Concern (SCC) and their ecosystem processes.

Site Ecological importance (SEI) is a function of the biodiversity importance (BI) of the receptor (e.g., species of conservation concern, the vegetation/fauna community or habitat type present on the site) and its resilience to impacts (receptor resilience [RR]) as follows:

SEI = BI + RR

BI in turn is a function of conservation importance (CI) and the functional integrity (FI) of the receptor as follows:

BI = CI + FI

Conservation importance (CI) is evaluated in accordance with recognised established internationally acceptable principles and criteria for the determination of biodiversity-related value, including the IUCN Red List of Species, Red List of Ecosystems and Key Biodiversity Areas (KBA; IUCN, 2016; Table 2).

Table 2:Conservation importance (CI) criteria (South African National Biodiversity Institute, 2020).

Conservation importance	Fulfilling criteria
Very high	Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare[21] or Critically Rare[24] species that have a global EOO of < 10 km².
	Any area of natural habitat[15] of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent[26]) of natural habitat of EN ecosystem type.
	Globally significant populations of congregatory species (> 10% of global population).
High	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km². IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining.
	Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type.
	Presence of Rare species.
	Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals.
	Any area of natural habitat of threatened ecosystem type with status of VU.
	Presence of range-restricted species.
	> 50% of receptor contains natural habitat with potential to support SCC.
Low	No confirmed or highly likely populations of SCC.
	No confirmed or highly likely populations of range-restricted species.
	< 50% of receptor contains natural habitat with limited potential to support SCC.
Very low	No confirmed and highly unlikely populations of SCC.
	No confirmed and highly unlikely populations of range-restricted species.
	No natural habitat remaining.

[21] For butterflies, as per Armstrong *et al.* (2013).
[24] For plants, as per Raimondo *et al.* (2009).
[26] This excludes areas of transformed habitat within a defined ecosystem even if these are partially restored, e.g. Highveld grasslands that have been converted to maize fields and then abandoned so that some form of functional grassland is restored; this is not natural habitat as it does not and will not in the future have species composition representative of the original natural habitat.
[15] This can be calculated from the threatened ecosystem of South Africa shapefile available from the SANBI (current available version 2011: http://bgis.sanbi.org/Projects/Detail/49).
[27] Persistent ecological disruptors must not include components that landowners are legally obliged to address or that should be addressed as norm for best practice. Wilful neglect of these legal obligations or the presence of invasive alien species that can practically be controlled through management actions should not negatively influence the FI score to a major extent.

Functional integrity (FI) of the receptor (e.g. the vegetation/fauna community or habitat type) is defined here as the receptors' current ability to maintain the structure and functions that define it, compared to its known or predicted state under ideal conditions (Table 3).

Table 3:Functional integrity (FI) criteria (South African National Biodiversity Institute, 2020.

Functional integrity	Fulfilling criteria
Very high	Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. No or minimal current negative ecological impacts with no signs of major past disturbance (e.g. ploughing).
High	Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types. Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches. Only minor current negative ecological impacts (e.g. few livestock utilising area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential.
Medium	Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	Small (> 1 ha but < 5 ha) area. Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.
Very low	Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.

Recalling that biodiversity importance (BI) is a function of conservation importance (CI) and the functional integrity (FI) of a receptor, BI can be derived from a simple matrix of CI and FI as follows:

Table 4:Determining the BI (South African National Biodiversity Institute, 2020).

Biodiversity importance		Conservation importance				
		Very high	High	Medium	Low	Very low
Functional integrity	Very high	Very high	Very high	High	Medium	Low
	High	Very high	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very low
	Low	Medium	Medium	Low	Low	Very low
	Very low	Medium	Low	Very low	Very low	Very low

Receptor resilience (RR) (Table 5) is defined here as: 'The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention'.

Table 5: Resilience criteria (South African National Biodiversity Institute, 2020).

Resilience	Fulfilling criteria
Very high	Habitat that can recover rapidly (~ less than 5 years) to restore > 75%[10] of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (~ 5-10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.
Medium	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.
Very low	Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

Finally, after the successful evaluation of both BI and RR as described above, it is possible to evaluate SEI from the final matrix as follows (Table 6) and interpreted accordingly (Table 7):

Table 6: Determining the SEI (South African National Biodiversity Institute, 2020).

Site ecological importance		Biodiversity importance				
		Very high	High	Medium	Low	Very low
Receptor resilience	Very low	Very high	Very high	High	Medium	Low
	Low	Very high	Very high	High	Medium	Very low
	Medium	Very high	High	Medium	Low	Very low
	High	High	Medium	Low	Very low	Very low
	Very high	Medium	Low	Very low	Very low	Very low

Table 7: Guidelines for interpreting SEI in the context of the proposed development activities (South African National Biodiversity Institute, 2020).

Site ecological importance	Interpretation in relation to proposed development activities
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.
Very low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

The SEI evaluated for each taxon can be combined into a single multi-taxon evaluation of SEI for the assessment area. Either a combination of the maximum SEI for each receptor should be applied, or the SEI may be evaluated only once per receptor but for all necessary taxa simultaneously. For the latter, justification of the SEI for each receptor is based on the criteria that conforms to the highest CI and FI, and the lowest RR across all taxa.

4.6 Limitations and Assumptions

The following limitations and assumptions should be noted for the assessment:

- It is assumed that all information received from the client is accurate;
- All datasets accessed and utilised for this assessment are considered to be representative of the most recent and suitable data for the intended purposes;
- The handheld GPS utilised for the fieldwork had a maximum accuracy of 5 m. As such, any features spatially logged and mapped as part of this report may be offset by approximately 5 m; and
- Only a single season survey was conducted for the respective studies, this would constitute a wet season survey, however the data received is considered sufficient to derive a meaningful baseline;

5 Receiving Environment

5.1 Desktop Spatial Baseline

Table 8: Desktop Spatial features examined below has been produced in terms of the spatial data collected and analysed (as provided by various sources such as the national and provincial

environmental authorities and SANBI). It presents a summative breakdown of the ecological boundaries considered and the associated relevance that each has to the region or project area. Where a feature is regarded as relevant it is considered an ecologically important landscape feature and discussed further as part of the sub-sections that follow.

Table 8: Desktop Spatial features examined

Desktop Information considered	Relevant	Reasoning	Section
North-West Biodidversity Sector plan of (2015)	No	Project area is not found in any CBA, ESA or Other Natural Area	5.1.1
Ecosystem Protection Level (SANBI & DFFE, Red List of Terrestrial Ecosystems of South Africa., 2021)	Yes	The project falls within an ecosystem of "Least Concern"	5.1.2.1
National Protected Areas Expansion Strategy, 2016 (DEA, 2016)	Yes	The project area does not overlap with any priority focus areas but does border such an area	5.1.3
Important Bird and Biodiversity Areas, 2015	No	No IBAs occur nearby	-
South African Protected and Conservation Areas Databases, 2021	Yes	The study site borders a protected area and is within 1 km of the protected area.	-

5.1.1 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.
- 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 does not fall in any CBA category and is designated as “other” (Figure 5).

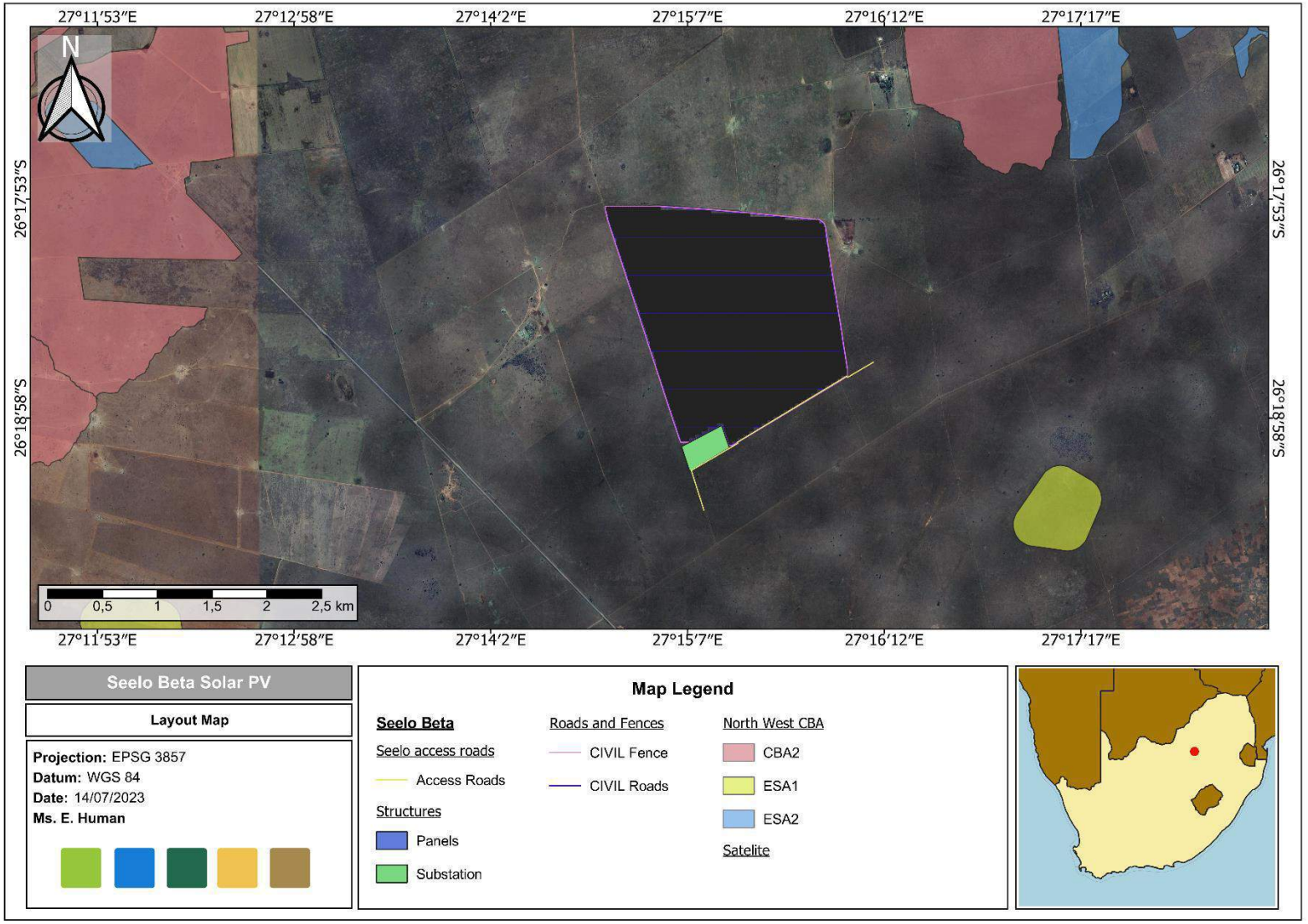


Figure 5: CBA areas for study site.

5.1.2 The National Biodiversity Assessment

5.1.2.1 Ecosystem Protection Level

The 2011 list focussed on terrestrial ecosystems and is referred to in Listing Notice 3 (Government Notice R985, published under NEMBA in 2014) which identifies activities that require environmental authorisation when undertaken in a threatened ecosystem, as identified in the list.

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 was superimposed on the Ecosystem Protection Level map to assess the protection status of the terrestrial ecosystem associated with the project area. Based on the dataset, the ecosystem is rated as least concern and there is uncertainty about the endemism status (Figure 6, Figure 7and Figure 8).

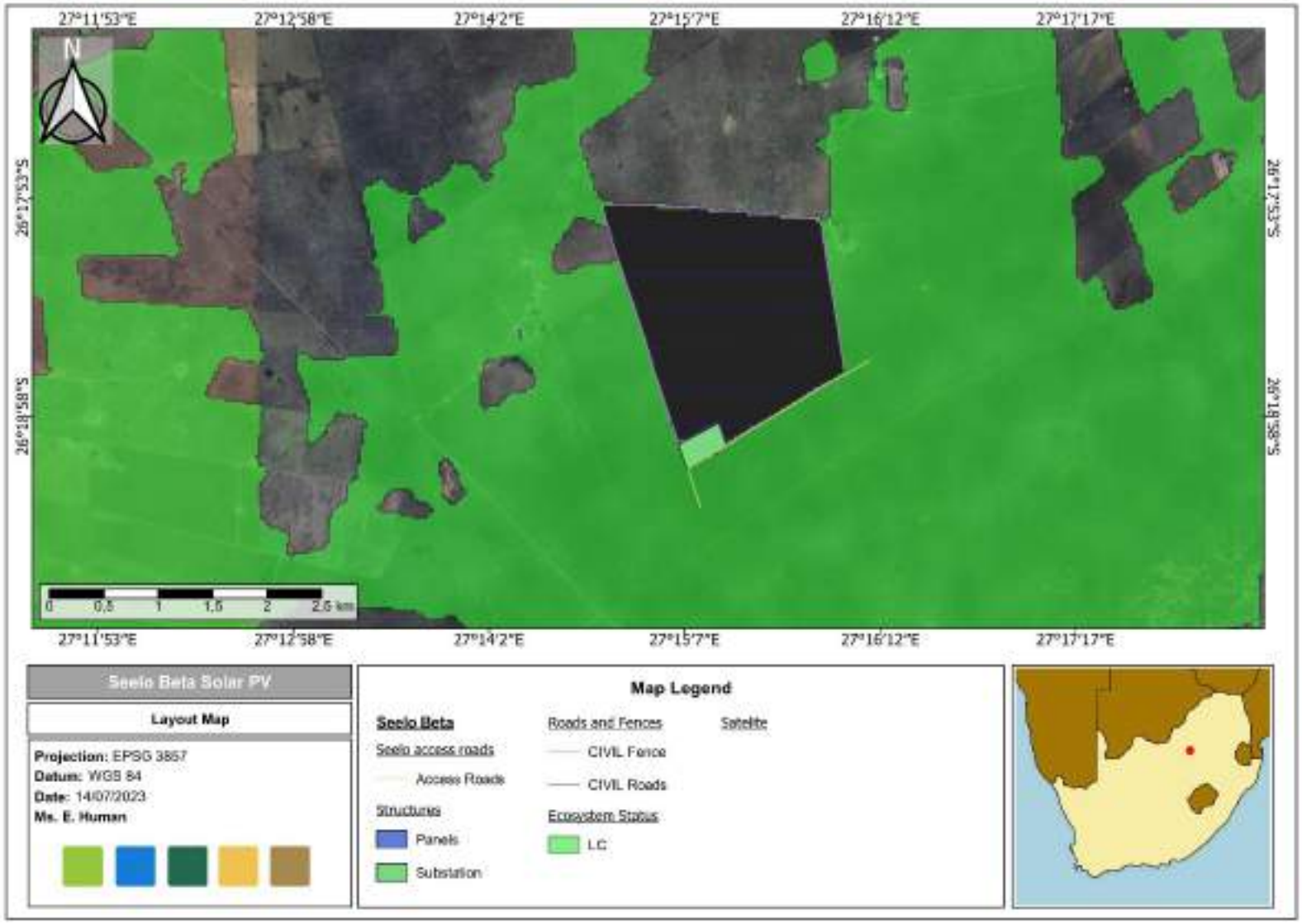


Figure 6: Red list Ecosystem status.

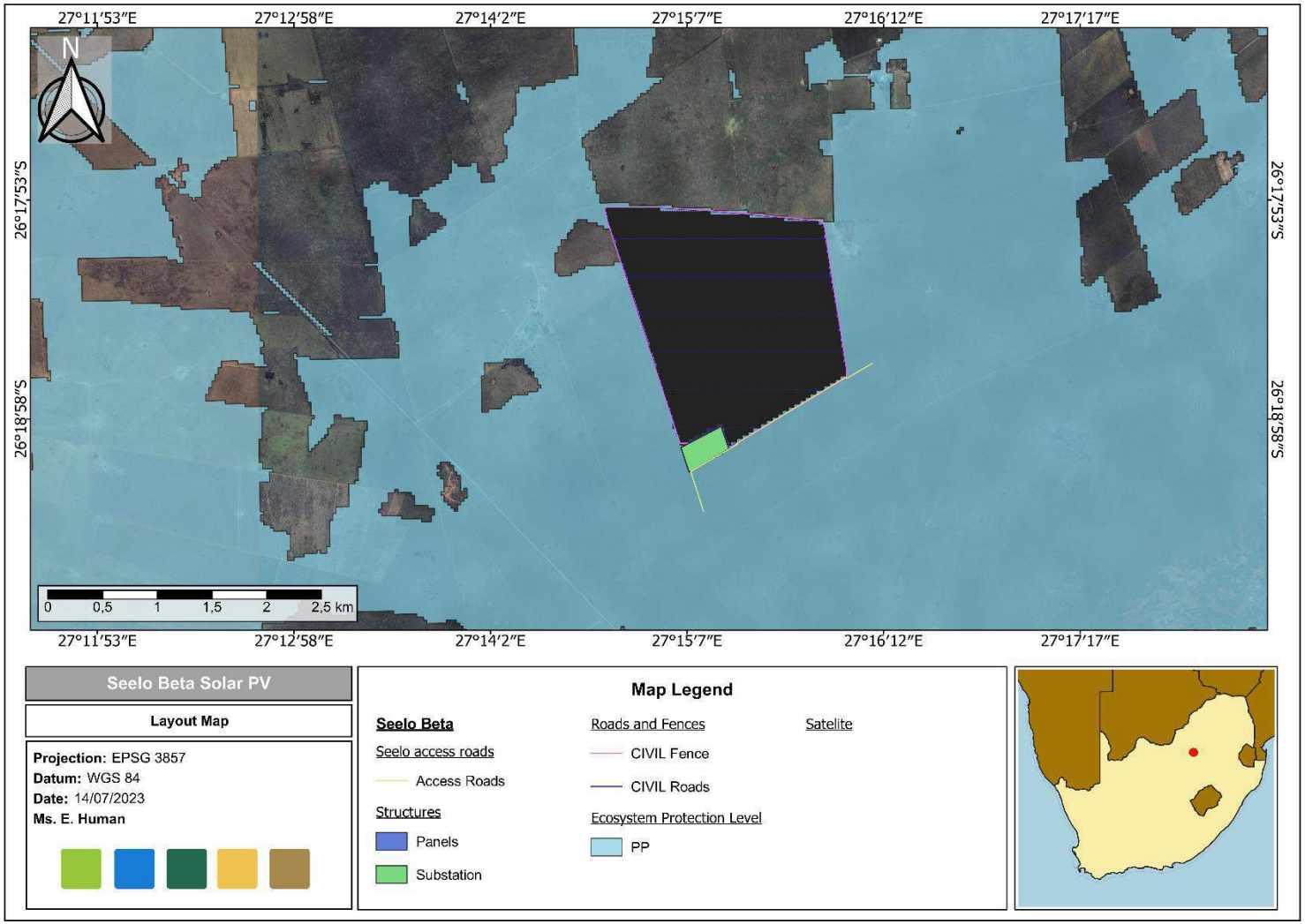


Figure 7: Ecosystem Protection status of the project area

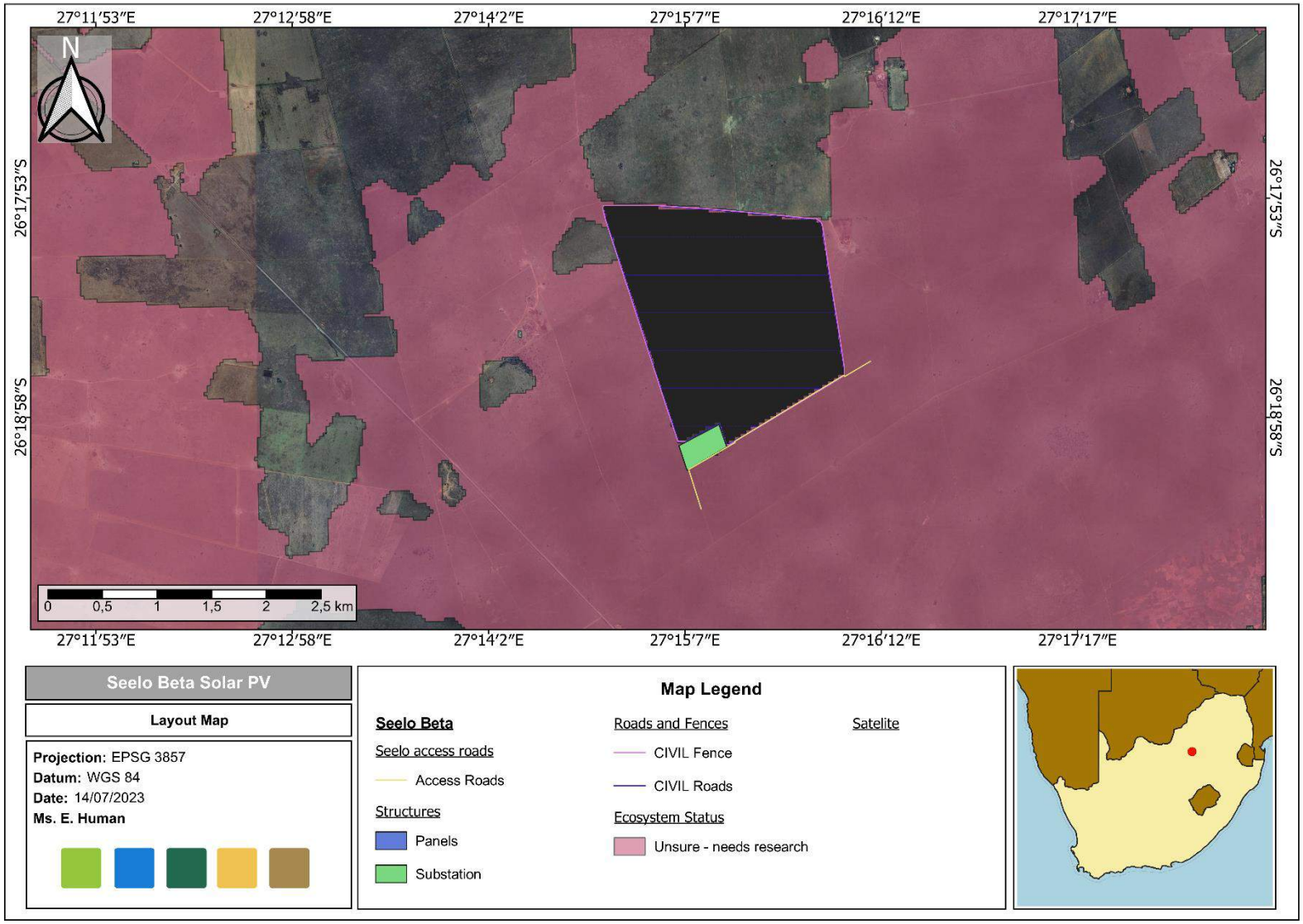


Figure 8: Ecosystem endemism status.

5.1.3 South African Protected and Conservation Areas

The Department of Environmental Affairs (now the Department of Forestry, Fisheries and the Environment) led the development of the National Protected Areas Expansion Strategy (NPAES) in consultation with the protected area agencies and other key private and public sector stakeholders. The need for the development of the NPAES was established in the National Biodiversity Framework in 2009. The NPAES is a 20-year strategy with 5-year implementation targets aligned with a 5-year revision cycle. (DEA, 2016).

South Africa's protected area network currently falls far short of representing all ecosystems and maintaining healthy functioning ecological processes. In this context, the goal of the NPAES is to achieve cost effective protected area expansion thus enabling better ecosystem representation, ecological sustainability, and resilience to climate change. A comprehensive set of priority areas was compiled based on the priorities identified by provincial and other agencies in their respective protected area expansion strategies. These focus areas are generally large, intact and unfragmented and are therefore of high importance for biodiversity, climate resilience and freshwater protection (DEA, 2016).

The project area does not overlap with priority focus areas for expansion according to the 2016 NPAES dataset but does border a priority focus area and is within 1 km of a Protected area (Abe Bailey Nature Reserve) (Figure 9).

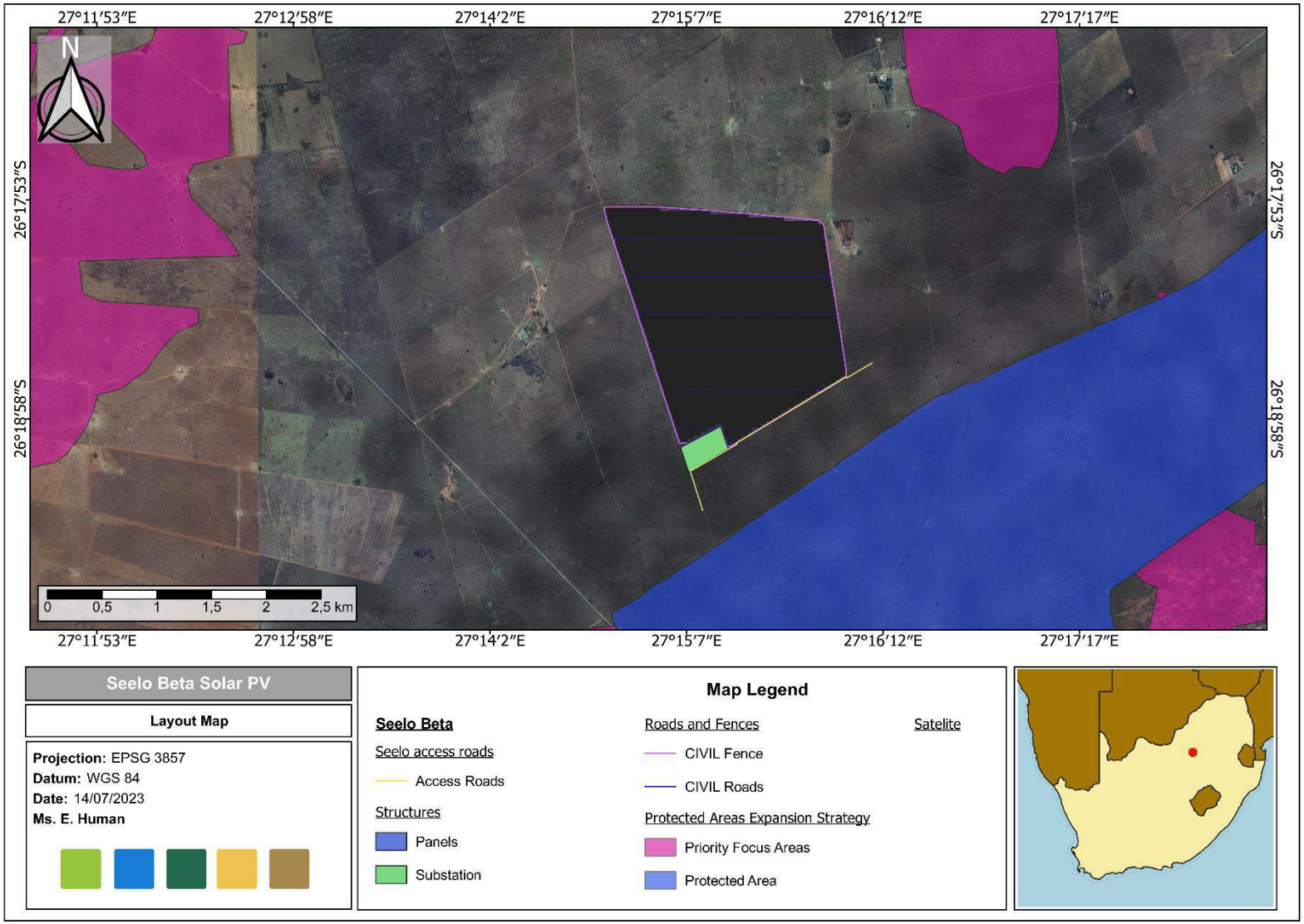


Figure 9: Protected Areas Expansion Framework for study site.

5.2 Ecological Desktop Baseline

5.2.1 Vegetation Assessment

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). Major macroclimatic traits that characterise the Grassland Biome include:

• Summer to strong summer rainfall and winter drought; and

• Frost is common, and fog is found on the upper slopes of the Great Escarpment and seaward scarps (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 largely situated within the Carletonville Dolomite Grassland (Figure 10).

5.2.1.1 Carletonville Dolomite Grassland

Distribution: North-West (mainly) and Gauteng and marginally into the Free State Province: In the region of Potchefstroom, Ventersdorp and Carletonville, extending westwards to the vicinity of Ottoshoop, but also occurring as far east as Centurion and Bapsfontein in Gauteng Province.

Altitude: 1 360–1 620 m, but largely 1 500–1 560 m.

Vegetation & Landscape Features: Slightly undulating plains dissected by prominent rocky chert ridges. Species-rich grasslands forming a complex mosaic pattern dominated by many species.

Geology & Soils: Dolomite and chert of the Malmani Subgroup (Transvaal Supergroup) supporting mostly shallow Mispah and Glenrosa soil forms typical of the Fa land type, dominating the landscapes of this unit. Deeper red to yellow apedal soils (Hutton and Clovelly forms) occur sporadically, representing the Ab land type.

Climate: Warm-temperate, summer-rainfall region, with overall MAP of 593 mm. Summer temperatures high. Severe frequent frost occurs in winter. See also climate diagram for Gh 15 Carletonville Dolomite Grassland.

Important Taxa

Graminoids: *Aristida congesta (d), Brachiaria serrata (d), Cynodon dactylon (d), Digitaria tricholaenoides (d), Diheteropogon amplectens (d), Eragrostis chloromelas (d), E. racemosa (d), Heteropogon contortus (d), Loudetia simplex (d), Schizachyrium sanguineum (d), Setaria sphacelata (d), Themeda triandra (d), Alloteropsis semialata subsp. eckloniana, Andropogon schirensis, Aristida canescens, A. diffusa, Bewsia biflora, Bulbostylis burchellii, Cymbopogon caesius, C. pospischilii, Elionurus muticus, Eragrostis curvula, E. gummiflua, E. plana, Eustachys paspaloides, Hyparrhenia hirta, Melinis nerviglumis, M. repens subsp. repens, Monocymbium ceresiiforme, Panicum coloratum, Pogonarthria squarrosa, Trichoneura grandiglumis, Triraphis andropogonoides, Tristachya leucothrix, T. rehmannii. Herbs: Acalypha angustata, Barleria macrostegia, Chamaecrista mimosoides, Chamaesyce inaequilatera, Crabbea angustifolia, Dianthus mooiensis, Dicoma anomala, Helichrysum caespititium, H. miconiifolium, H. nudifolium var. nudifolium, Ipomoea ommanneyi, Justicia anagalloides, Kohautia amatymbica, Kyphocarpa angustifolia, Ophrestia oblongifolia, Pollichia campestris, Senecio coronatus, Vernonia oligocephala.*

Geophytic Herbs: *Boophone disticha, Habenaria mossii.*

Low Shrubs: *Anthospermum rigidum subsp. pumilum, Indigofera comosa, Pygmaeothamnus zeyheri var. rogersii, Rhus magalismontana, Tylosema esculentum, Ziziphus zeyheriana.*

Geoxylic Suffrutices: *Elephantorrhiza elephantina, Parinari capensis subsp. capensis.*

Conservation Status: The ecosystem is rated as Least concern according to the 2022 Red List ecosystem data since there is 61% remaining of this ecosystem. It is not highly fragmented and 6.1% is currently formally protected (DFFE, Revised national list of ecosystems that are threatened and in need of protection., 2022).

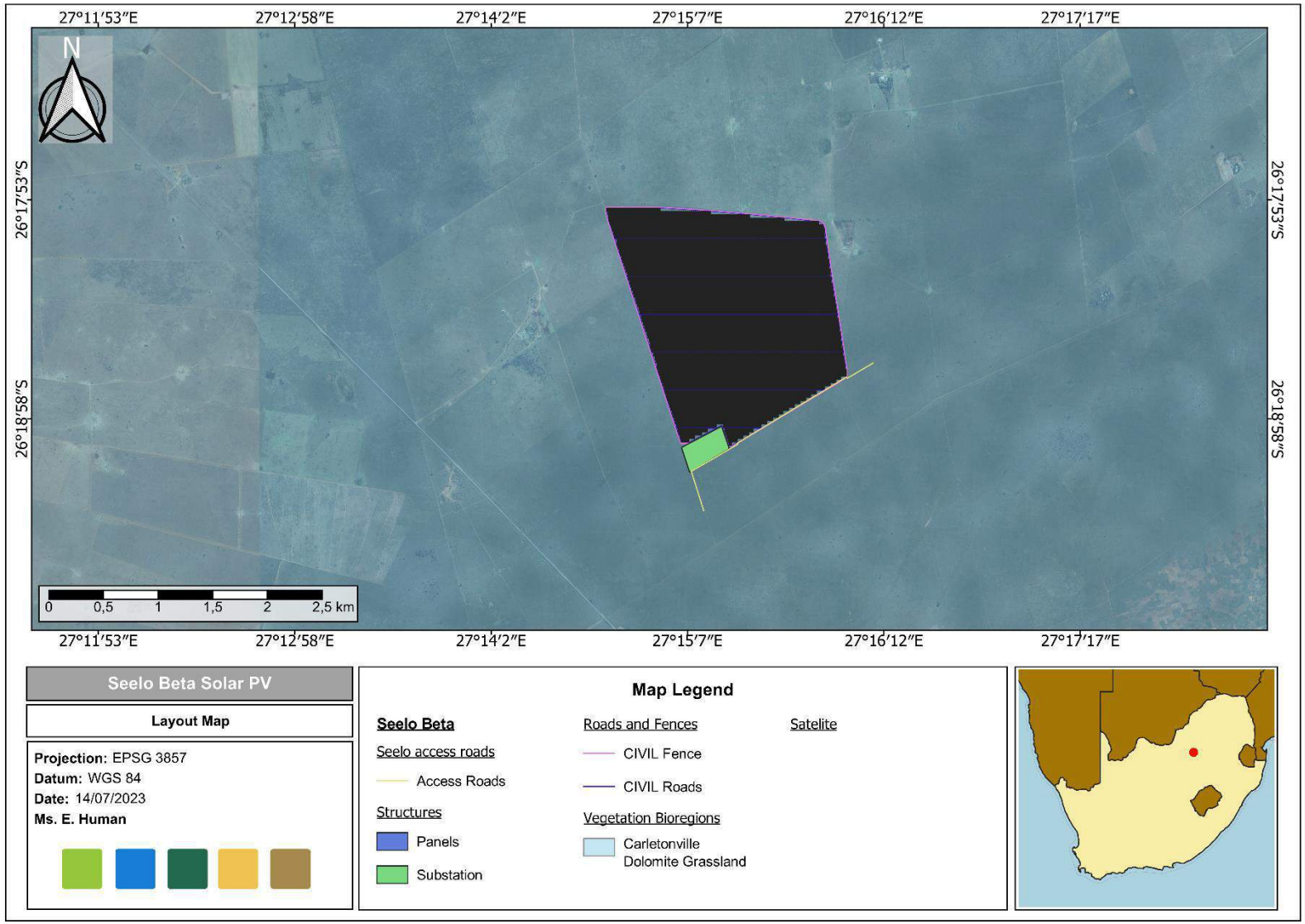


Figure 10: Vegetation region of study site.

5.2.1.2 Botanical Assessment

Based on the Plants of Southern Africa (BODATSA-POSA, 2019) database, three plant species have the potential to occur within the project area and its surroundings. None of these species are listed as being SCC, and Table 9 below outlines these species identified through the desktop assessment. The screening tool identifies two more potential sensitive species possibly occurring on the study site. None of the SCC are likely to occur on the study site due to degradation and disturbance of the site.

Table 9: Predicted species to occur on study site

Family	Genus	Species	Ecology
Solanaceae	*Cestrum*	*parqui*	Not indigenous; Naturalised; Invasive
Amaryllidaceae	*Boophone*	*disticha*	Indigenous
Lobeliaceae	*Cyphia*	*persicifolia*	Indigenous; Endemic
Orchidaceae	*Sensitive species*	*1147*	Indigenous; Endemic, Endangered
Hyacinthaceae	*Sensitive species*	*1248*	Indigenous, Vulnerable

5.2.2 Faunal Assessment

Largely based on the South African Bird Atlas Project Version 2 (SABAP2, 2022), IUCN Digital Distribution Maps (IUCN, 2016), and the Animal Demography Unit (ADU, 2020) databases, Table 10summarises the total number of animal species that have the potential to occur in or around the project area, and the corresponding number of SCC.

Table 10: Total number of potential fauna species present, and corresponding SCC

Fauna type		Total potential number	Number of SCC
Avifauna		121	
Mammals		71	8
Herpetofauna	Amphibians	11	0
	Reptiles	26	1

These numbers include animals that only occur within nature reserves and private reserves. Of the 2 avifaunal SCC, none are likely to be found resident in the project area due to a lack of suitable habitat and the associated modified nature of the project area and surrounds.

Of the 71 total mammal SCC listed, none of the mammal SCC are likely to be found resident within the project area.

None of the herpetofauna SCC are likely to be found within the project area.

The general modified state of the area coupled with the with high levels of sensory disturbance associated with Kusile, results in a high level of persecution and unsuitable environmental conditions.

5.3 Field Survey

This section details the observations recorded during an on-site field survey conducted to ground truth the floral, faunal, and habitat features of the project area. These observations pertain to the current state of the area as on the 19th January 2023.

5.3.1 Terrestrial Flora and Fauna

During the terrestrial survey the floral and faunal communities within the project area were assessed and photographs were captured, some of which are provided in this section of the report. For ease of reading, the observations and discussions pertaining to the floral and the faunal species recorded are separated below.

5.3.1.1 Flora and Vegetation Condition

The project area was found in a heavily modified condition, mainly attributed to the agricultural practices and its impacts associated, resulting in the area being largely disturbed in some way. Grazing practices, old lands and piospheres have degraded the veld severely. These aspects further limit the functional capacity of the project area. Much of the development footprint is located within or along roads or transformed areas and their associated servitudes, which are considered with very low sensitivity. No protected trees or SCC flora species were observed.

Refer to the images below for photographs showing the habitats and the overall state of the project area.

5.3.1.2 Fauna

Mammal activity was low, due to the extent of disturbance in general and cattle grazing the area, as well as the poor habitat condition. The species present are most likely not resident due to the modified state of the area. No SCC were observed during the field survey.

Figure 11: General condition of the study site

5.3.2 Habitat Survey and Site Ecological Importance

The main habitat types identified across the project area were initially identified and pre-delineated largely based on aerial satellite imagery. These habitat types were then refined based on the field coverage and data collected during the survey.

The disturbed habitat has been modified from its natural state, and it represents habitat that has been historically impacted, and has subsequently recovered to some degree. This habitat is largely limited to areas that have been impacted through effects from agricultural grazing practices and associated impacts, roads, and land use, as well as mismanagement and inadequate rehabilitation procedures. These habitats are not entirely transformed, but exist in a constant disturbed state, as they cannot recover to a more natural state, due to the ongoing disturbances and impacts received.

Transformed habitat was present in the form of the existing road, existing infrastructure, or any other areas devoid of vegetation, artificially. Due to the transformed nature of this habitat, it is regarded as having a very low sensitivity.

Based on the criteria provided in section 4.5 of this report, the two delineated habitat types have each been allocated a sensitivity category, or SEI, and this breakdown is presented in Table 11 below. To identify and spatially present sensitive features in terms of the relevant specialist discipline, the sensitivities of each of the habitat types delineated within the project area are mapped in (Figure 12).

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

Table 11: Site Ecological Importance assessment summary of the habitat types delineated within the project area.

Habitat Type	Conservation Importance	Functional Integrity	Biodiversity importance	Receptor resilience	Site Ecological Importance
Disturbed Grassland	Low	Medium	Low	Medium	Low
Transformed	Low	Medium	Low	Medium	Low

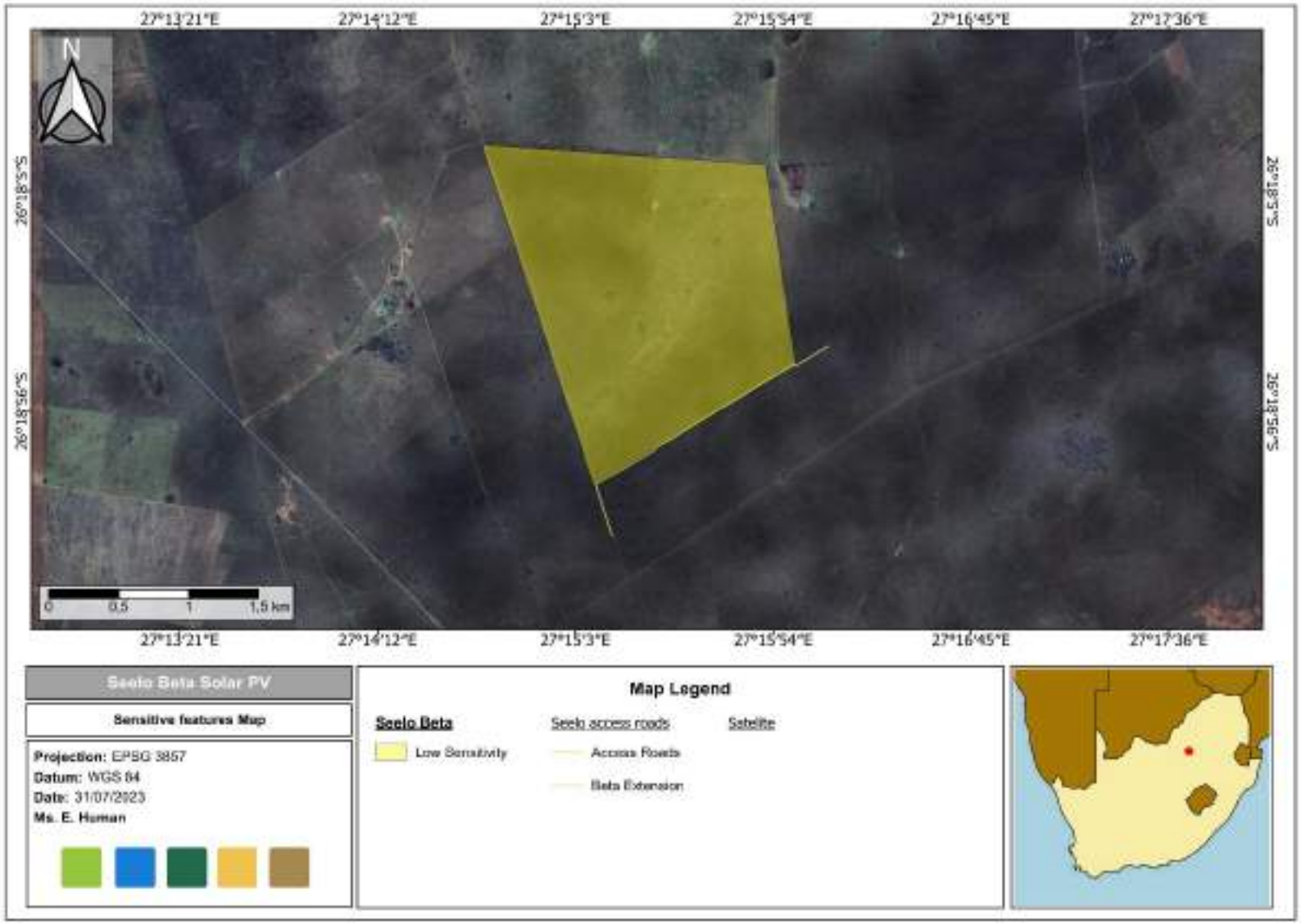
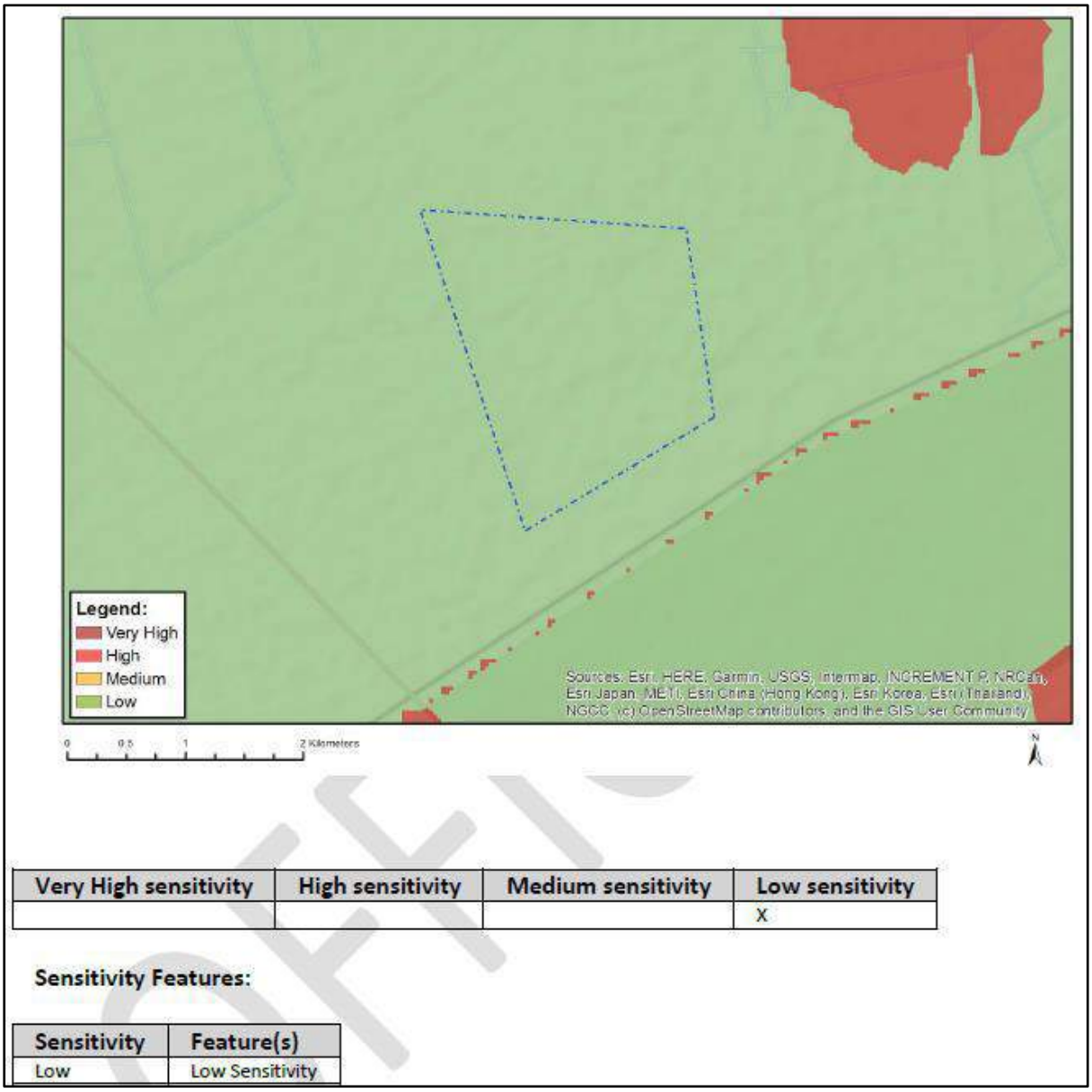


Figure 12:Biodiversity SEI delineation relevant to the project area

The terrestrial biodiversity theme sensitivity as indicated in the screening report (compiled by the National Web based Environmental Screening Tool) was derived to be 'Low' (Figure 13).



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

Figure 13: Biodiversity Sensitivity of the project area according to the Screening Report.

The completion of the terrestrial desktop and field studies confirms the 'Low' sensitivity presented by the screening report. As discussed above, the project area is largely modified and as such is assigned a sensitivity rating of 'Low'.

The screening report classified both the animal and plant theme sensitivity as 'medium'. Following the field survey findings, both the animal and plant species themes may be re-classified as having 'Low' sensitivities. This is since there is limited suitable habitat available to support the regular occurrence of any faunal or floral SCC within the project area.

6 PROPOSED IMPACT MANAGEMENT PLAN

6.1 Project impacts

The aim of the management outcomes is to present mitigation actions in such a way that they can be incorporated into the Environmental Management Programme (EMPr) for the project, which should in turn allow for a more successful implementation and auditing of the mitigations and monitoring guidelines. Table 12 presents the recommended mitigation measures relative to the terrestrial study.

The focus of mitigation measures is to reduce the significance of potential impacts associated with the development and thereby to:

- Prevent the further loss and fragmentation of vegetation communities within the CBA and ESA areas in the vicinity of the project area;
- Reduce the negative fragmentation effects of the development and enable the safe movement of faunal species; and
- Prevent the direct and indirect loss and disturbance of floral and faunal species and communities (including any potential Species of Conservation Concern nearby).

Table 12: Mitigation measures from the terrestrial assessment.

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 and operational	
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
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	**Direct mortality of fauna**
Problem	Mortality of fauna due to higher traffic (Vehicles and staff) on site
Type	Direct

Nature	Negative
Phases	Construction and Operational
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
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**
Type	Direct and Indirect
Nature	Negative
Phases	Construction and Operational

Monitoring	
Recommendations	Diligence checks as per storage SOP according to management pans
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
Mitigation actions	
Recommendations	Keep within footprint, drive within speed limits, do no 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
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

The following mitigation measures are recommended to address known potential impacts:

- Restrict impact to development footprint only and limit disturbance in surrounding areas.
- Prior to commencement of construction, compile a Rehabilitation Plan including monitoring specifications, to be included into the EMPr during final approval.
- Prior to commencement of construction, compile an Alien Plant Management Plan, to be included into the EMPr during final approval.
- 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.
- Undertake regular monitoring to detect alien invasions early so that they can be controlled.
- Prior to commencement of construction, compile and implement a stormwater management plan including monitoring specifications.
- Monitor surfaces for erosion, repair and/or upgrade, where necessary.
- Prior to decommissioning commencing, compile a Rehabilitation Plan in compliance with the regulatory requirements at the time of decommissioning.

Specific monitoring recommendations should be provided in the Alien Invasive Management Plan, and the Rehabilitation Plan. The following are broad recommendations:

Alien Invasive Species:

- 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 botanist. 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.

- Monitor for the effect of management actions on non-target species and habitats.

Rehabilitated areas:

- Rehabilitation Plan must be compiled by an approved ecologist prior to achieving COD and prior to the start of decommissioning.
- All management actions associated with rehabilitation must be recorded after each management action has taken place.
- All rehabilitated areas should be monitored to assess vegetation recovery. This should be for a minimum of three years after post-construction rehabilitation, but depends on the assessed trajectory of rehabilitation (whether it is following a favourable progression of vegetation establishment or not – this depends on the total vegetation cover present, and the proportion that consists of perennial growth of desired species). For each monitoring site, an equivalent comparative site in adjacent undisturbed vegetation should be similarly monitored. Monitoring data collection should include the following:
    - total vegetation cover and height, as well as for each major growth form;
    - species composition, including relative dominance;
    - soil stability and/or development of erosion features;
    - representative photographs should be taken at each monitoring period.
- Monitoring of rehabilitated areas should take place at the frequency and for the duration determined in the rehabilitation plan, or until vegetation stability has been achieved.

6.2 Cumulative Impacts

Cumulative impacts are assessed in context of the extent of the proposed project area; other developments in the area; and general habitat loss and transformation resulting from other activities in the area.

Localised cumulative impacts include the cumulative effects from operations that are close enough to potentially cause additive effects on the environment or sensitive receivers (such as nearby renewable energy activities within the area). These include dust deposition, noise and vibration, disruption of corridors or habitat, groundwater drawdown, groundwater and surface water quality, and transport.

Long-term cumulative impacts due to extensive solar farm footprint, powerlines and substations can lead to the loss of endemic species and threatened species, loss of habitat and vegetation types and even degradation of well conserved areas, this however needs to be quantified by monitoring.

The PV panels and associated infrastructure are expected to have a low cumulative impact when considering the project in isolation, while the cumulative impacts associated with the proposed

project as well as other projects in the area are moderate due to planned applications for renewable developments in the vicinity of the project area.

The closest approved renewable energy project in the vicinity is 30km to the east of the project.

7 CONCLUSION

The area has experienced long-term and continuous disturbance, mostly due to the agricultural grazing practices and associated impacts. The project area is modified and as such is assigned a sensitivity rating of 'Low'.

The screening report classified both the animal and plant theme sensitivity as 'medium' respectively. Following the field survey findings, both the animal and plant species themes may be re-classified as having 'Low' sensitivities. This is since there is limited suitable habitat available to support the regular occurrence of any faunal SCC within the project area.

Completion of the Terrestrial Biodiversity Assessment led to a confirmation of 'Low' classification for the terrestrial biodiversity theme sensitivity as allocated by the National Environmental Screening Tool but dispute the 'High' classification for the animal theme sensitivity as allocated by the National Environmental Screening Tool. The project area has instead been assigned a 'Low' sensitivity, because of the extent of environmental disturbance that has taken place, and the fact that limited SCC were observed and are unlikely to frequently occur within the project area.

7.1 Specialist Statement

The development of the project area is likely to result in negligible negative impacts, especially considering the extent of 'Low' sensitivity areas confirmed. Therefore, the specialist is of the opinion that the development of the project area may be favourably considered for environmental authorisation, provided that the mitigation measures and recommendation presented above be adhered to.

Consider the following guidelines when interpreting SEI in the context of any proposed development or disturbance activities:

- Very Low: Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.
- Low: Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.

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9 APPENDIX A: SPECIALIST DECLARATION

I, **Helena Elizabeth Human**, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and

I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

_____ **02/05/2023**

Helena Elizabeth Human (Pr. Sci. Nat. 147031) **Date**

Terrestrial Biodiversity Specialist

10 APPENDIX B: SPECIALIST CV

1 PERSONAL PARTICULARS

Profession:	Biodiversity Specialist
Date of Birth:	13 March 1987
Name of Firm:	Nitai Consulting
Name of Staff:	Elzet Human
Nationality:	RSA
Membership of Professional Societies	SACNASP (Pr. Sci. Nat. 147031)

2 EDUCATION:

M-Tech Nature Conservation, (Plant DNA Barcoding and phylogenetics), TUT, South Africa, 2021

B-Tech Nature Conservation, (Resource Management, Vegetation ecology and rehabilitation) TUT, South Africa, 2011

N. Dip Nature Conservation, TUT, South Africa, 2008

3 EMPLOYMENT RECORD:

2022 – Present Biodiversity Specialist, Nitai Consulting

Conduct Biodiversity Impact Assessments.

Conduct Plant Ecological Assessments.

Conduct Animal Ecological Assessments

Biodiversity monitoring programs; and,

GIS Mapping

2013 – 2022 Lecturer: Nature Management, Centurion academy

Lectured various subjects for undergraduate students in Nature Management:

Botany and Vegetation Ecology, Zoology, Animal Health, Conservation Development, Ecology, Game Ranch Management, Biostatistics, Research Methodology, Genetics, Soil Science

2009 – 2013 HOD Rangers Department, Zebula Gold Estate and Spa

Ecological Monitoring, Reserve Maintenance, Animal Husbandry, Neonatal care of Endangered carnivore species, Zoological display, and permit compliance

2008 – Conservation Student, Ann van Dyk Cheetah Research Centre

Neonatal Care of Carnivore species,

Veterinary assistance work – vaccine, diets, Endo scoping, pregnancy tests, health monitoring, quarantine care of species, emergency c-sections, bleeding procedures on vultures

Enclosure Maintenance

Tracking wild cheetahs

Rewilding cheetahs

Anatolian Shepard project assistance

4 SELECTED CONSULTANCIES

4.1 Ecological assessment for Victorius Game farm, Visgat, Ellisras, Limpopo

2018, Ecologist, Ecological condition assessment and game carrying capacity for game farm. Habitat evaluation and rehibition program for problem areas

4.2 Elephant impact study on Mabula Game Reserve, Bela-Bela, Limpopo,

2019, Ecologist, Ecological impact study on Private Nature reserve to see extent of elephant utilisation and impact. Woody species analysis – structure classification and net primary production. Elephant movement patterns and carrying capacity. Identification of vulnerable habitats and management program.

4.3 Faan Meintjies Municipal Nature Reserve, Matlosana, North West

2018-2022, Ecologist, Habitat assessments, game carrying capacities, ecological condition assessments, game counts and game recommendations, ecological rehabilitation programs, white rhino monitoring, anti-poaching programs, Environmental Education programs.

4.4 Kroonstad Solar PV Facilities

2022, Biodiversity Specialist. Development of three Solar PV facilities near Kroonstad, Free State Province, South Africa, Assess and map all wetlands associated with the three solar PV facilities as well as perform aquatic biomonitoring of the Vals River.

4.5 Kroonstad South Solar PV Facilities

2022, Biodiversity Specialist. Development of five Solar PV facilities near Kroonstad, Free State Province, South Africa, Assess and map all wetlands associated with the five solar PV facilities as well as perform aquatic biomonitoring of the Blomspruit.

4.6 CCUS 3D Seismic Survey & Drilling

2023, Biodiversity Specialist. Proposed 3D Seismic Survey within the Leandra area, Mpumalanga Province, South Africa Assess and map all biodiversity, plant and animal features within the footprint of the survey area.

4.7 Rustenburg Solar PV Facilities

2023, Biodiversity Specialist. Development of three Solar PV facilities near Rustenburg, North West Province, South Africa, Assess and map all biodiversity, plant and animal features associated with the three solar PV facilities.

4.8 Grootvlei Solar PV Facility

2023, Biodiversity Specialist. Development of three Solar PV facilities near Carletonville, North West Province, South Africa, Assess and map all biodiversity, plant and animal features associated with the one solar PV facility.

4.9 Paulputs 400 kV Strengthening (Transmission Line Loop in Loop Out) Project

2023, Biodiversity Specialist. Proposed Paulputs 400kv Strengthening Project (Transmission Line Loop In Loop Out From Aries – Kokerboom Transmission Line), South Africa, Assess and map all biodiversity, plant and animal features within the power line footprint as well as perform biodiversity monitoring.

4.10 400kV Transmission and 132kV distribution power lines for the Apollo-Lepini-Mesong Project

2023, Biodiversity Specialist. Proposed development of a 400kV transmission and 132kV power lines for the Apollo-Lepini-Mesong Project, Gauteng Province, South Africa, undertake assessments and map all biodiversity, plant, and animal features along the proposed routes for the 400kV and 132kV power lines.

5 LANGUAGES:

English - excellent speaking, reading, and writing

Afrikaans – excellent speaking, reading and writing

Seelo Beta Solar (RF) (PTY) Ltd.

Terrestrial Biodiversity site verification report for the proposed Seelo Beta Solar PV, JB Marks Local Municipality, North West

16 MARCH 2023

Prepared by:

Ms. E. Human

Nitai Consulting (PTY) Ltd.

147 Bram Fischer Drive

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SPECIALIST ENVIRONMENTAL CONSULTING

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Reviewed by	Qualification	Date	Signature	Version No.

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Randburg, 2194

Prepared for

Introduction & Project Description

Background

Seelo Beta Solar PV (RF) (PTY) Ltd. proposes the construction of a Solar PV facility (known as Seelo Beta) located on Portion 2 of the farm Rooipan No. 96, approximately 13km north west of the town Carletonville, in the North West Province. The Solar PV will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 240 MW. The proposed development will include PV modules, mounting structures, a substation, Batter Energy Storage System (BESS), site and internal roads, office/parking and a temporary and permanent laydown area.

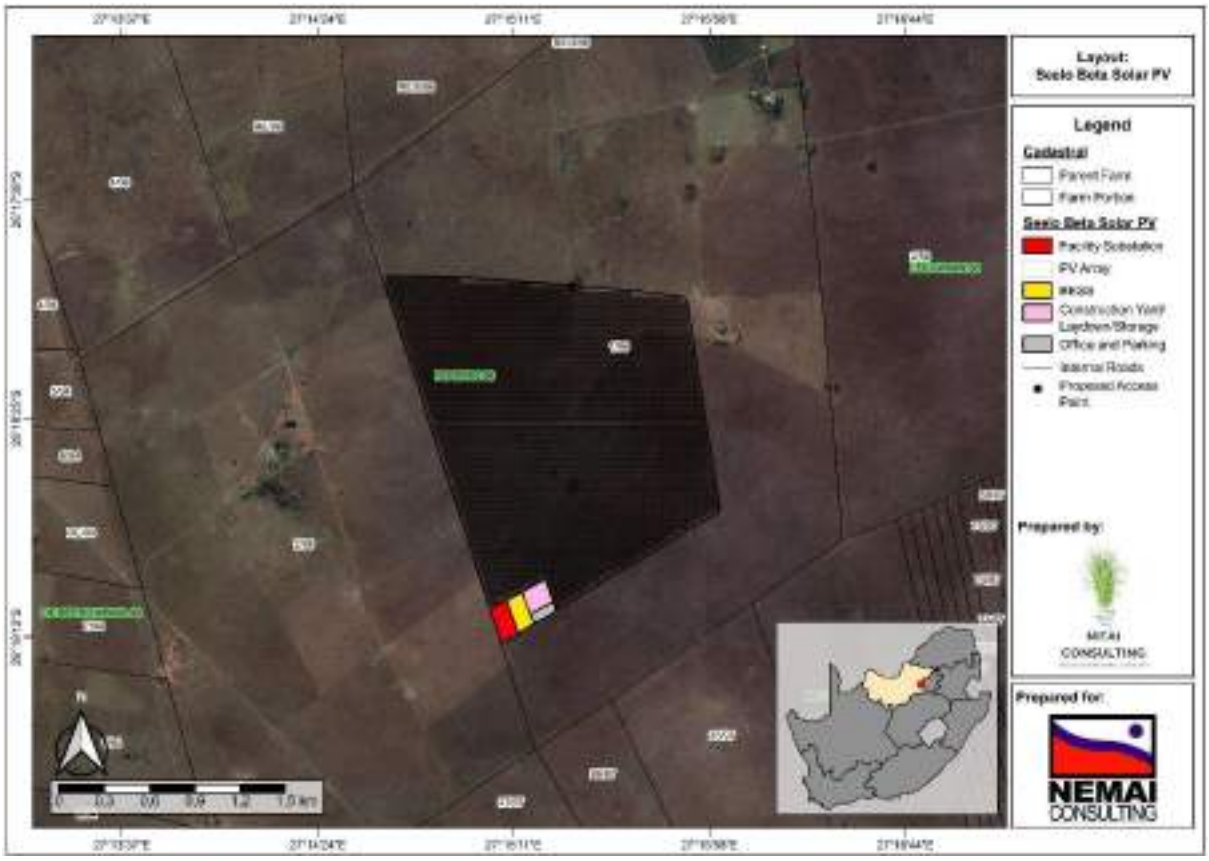

Figure 1: Layout of the Seelo Beta Solar PV Facility

Site Verification Report: Terrestrial Biodiversity Theme

During the Desktop study for the proposed Seelo Beta Solar PV development the Environmental Screening tool from Department of Forestry, Fisheries & the Environment (DFFE) was queried. The Screening Tool allows for the generation of a Screening Report referred to in Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended, whereby a Screening Report is required to accompany any application for Environmental Authorisation.

The report identified that Terrestrial Biodiversity Theme for the proposed study area is of very high sensitivity (Figure 2).

Figure 2: Terrestrial Biodiversity Sensitivity Theme from the Department of Forestry, Fisheries & the Environment Screening Tool

Current Status of the Surrounding Environment

The proposed site is situated in an agricultural landscape (small and large livestock). The site does not contain any sensitive features in ecological corridors. The proposed site is overgrazed, and vegetation suggests a disturbed area but not transformed. See Figure 3 below for an overview of the environment within the proposed footprint.

Figure 3: Photographs indicating the general environment within the proposed footprint of Seelo Beta Solar PV

Conclusion and Recommendations

The proposed Seelo Beta Solar PV facility is situated in the JB Marks Local Municipality within the North West Province. No sensitive features were identified to be within the proposed footprint of the PV facility and was validated by the absence of proper ecological functioning. The area was mostly characterised by pioneer vegetation and opportunistic forbs species with low cover.

It is of the opinion of the specialist that the area is low sensitivity and not as the DFFE screening tool suggests as very high.

Since no sensitive biodiversity features were recorded on this site, the specialist recommends that the PV facility may proceed without impact to regional watercourses, given that best practise mitigation measures, particularly in terms of rehabilitation, spread of alien invasives and erosion control measures, are implemented.

Introduction & Project Description

Background

Seelo Beta Solar PV (RF) (PTY) Ltd. proposes the construction of a Solar PV facility (known as Seelo Beta) located on Portion 2 of the farm Rooipan No. 96, approximately 13km north west of the town Carletonville, in the North West Province. The Solar PV will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 240 MW. The proposed development will include PV modules, mounting structures, a substation, Batter Energy Storage System (BESS), site and internal roads, office/parking and a temporary and permanent laydown area.

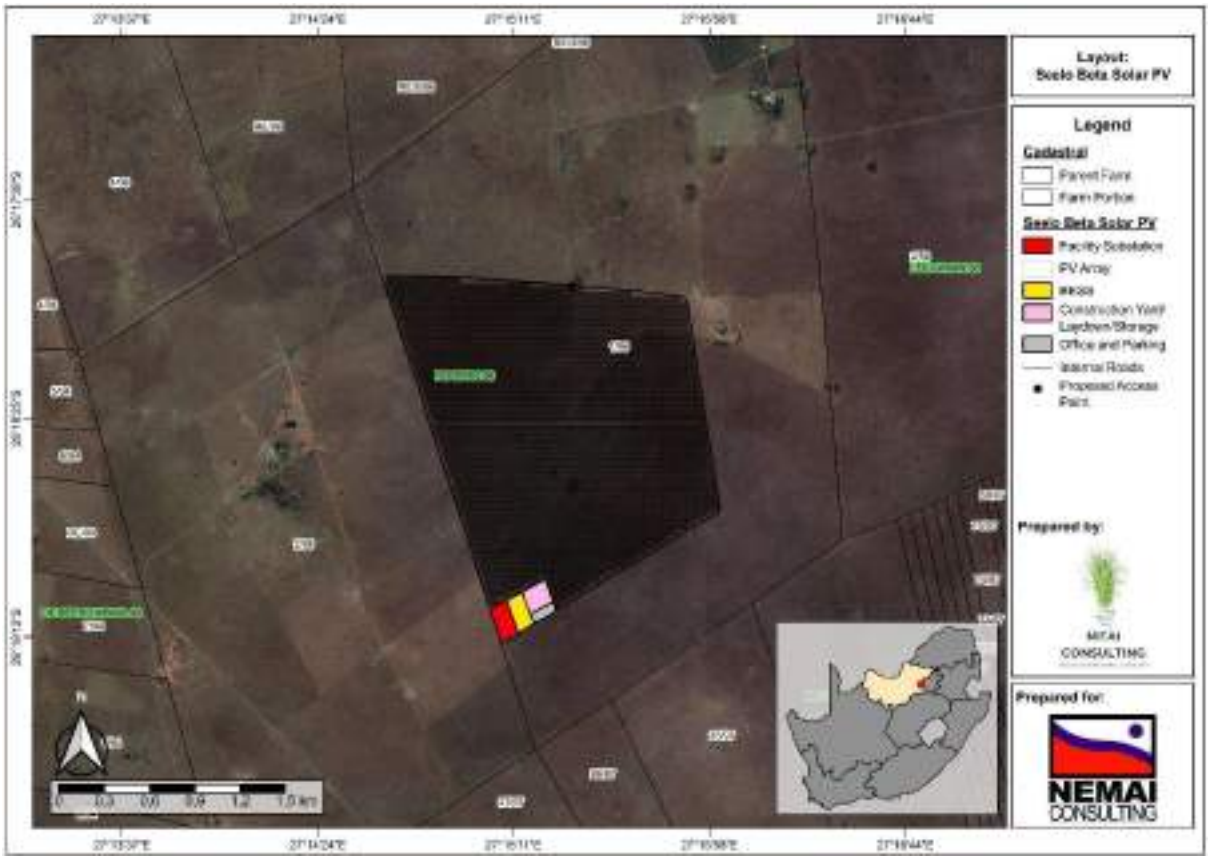

Figure 4: Layout of the Seelo Beta Solar PV Facility

Site Verification Report: Plant sensitivity Theme

During the Desktop study for the proposed Seelo Beta Solar PV development the Environmental Screening tool from Department of Forestry, Fisheries & the Environment (DFFE) was queried. The Screening Tool allows for the generation of a Screening Report referred to in Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended, whereby a Screening Report is required to accompany any application for Environmental Authorisation.

The report identified that Plant Sensitivity Theme for the proposed study area is of medium sensitivity due to the potential presence of two sensitive plant species (Figure 2).

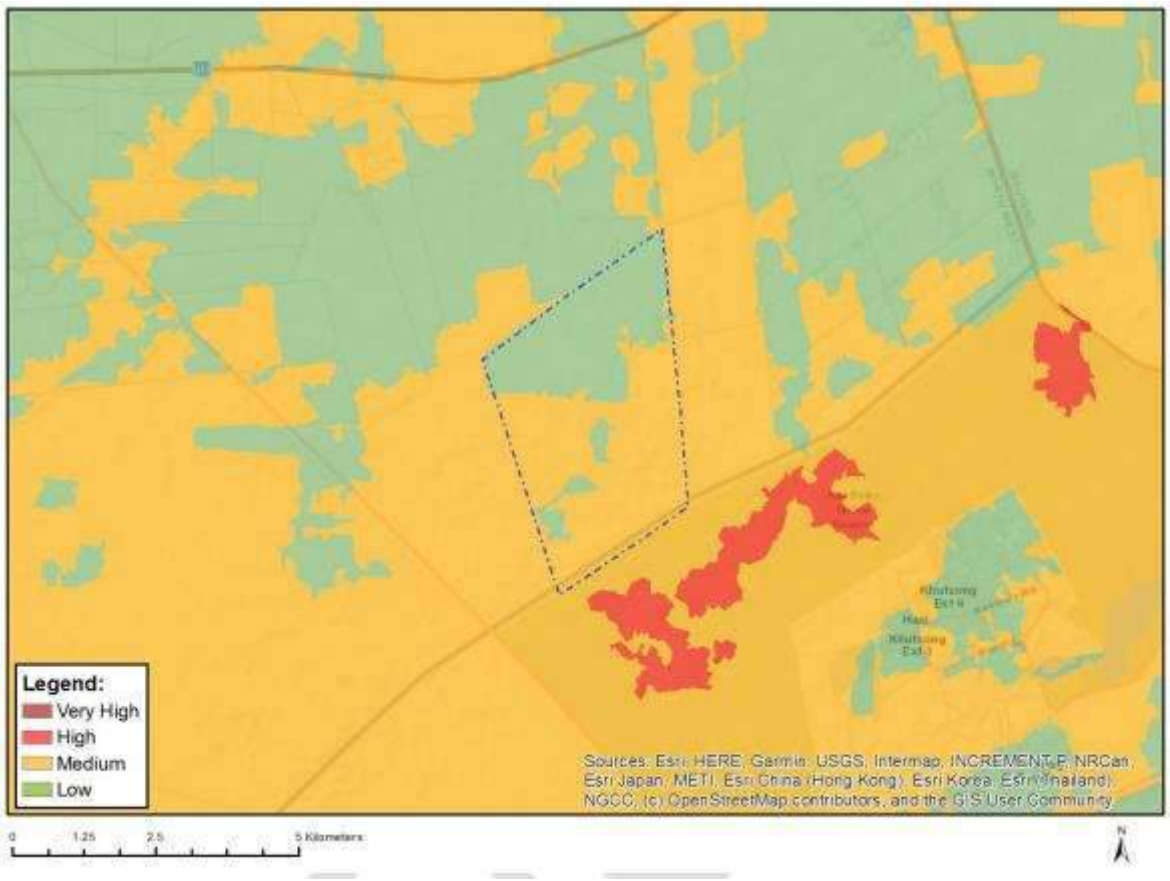

Figure 5: Plant Sensitivity Theme from the Department of Forestry, Fisheries & the Environment Screening Tool

Current Status of the Surrounding Environment

The proposed site is situated in an agricultural landscape (small and large livestock). The site does not contain any sensitive features in ecological corridors. The proposed site is overgrazed, and vegetation suggests a disturbed area but not transformed. See Figure 3 below for an overview of the environment within the proposed footprint.

Figure 6: Photographs indicating the general environment within the proposed footprint of Seelo Beta Solar PV

Conclusion and Recommendations

The proposed Seelo Beta Solar PV facility is situated in the JB Marks Local Municipality within the North West Province. No sensitive features were identified to be within the proposed footprint of the PV facility and was validated by the absence of proper ecological functioning, The area was mostly characterised by pioneer vegetation and opportunistic forbs species with low cover.

It is of the opinion of the specialist that the area is low sensitivity and not as the DFFE screening tool suggests as medium.

Since no sensitive biodiversity features were recorded on this site, the specialist recommends that the PV facility may proceed without impact to regional watercourses, given that best practise mitigation measures, particularly in terms of rehabilitation, spread of alien invasives and erosion control measures, are implemented.

Introduction & Project Description

Background

Seelo Beta Solar PV (RF) (PTY) Ltd. proposes the construction of a Solar PV facility (known as Seelo Beta) located on Portion 2 of the farm Rooipan No. 96, approximately 13km north west of the town Carletonville, in the North West Province. The Solar PV will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 240 MW. The proposed development will include PV modules, mounting structures, a substation, Batter Energy Storage System (BESS), site and internal roads, office/parking and a temporary and permanent laydown area.

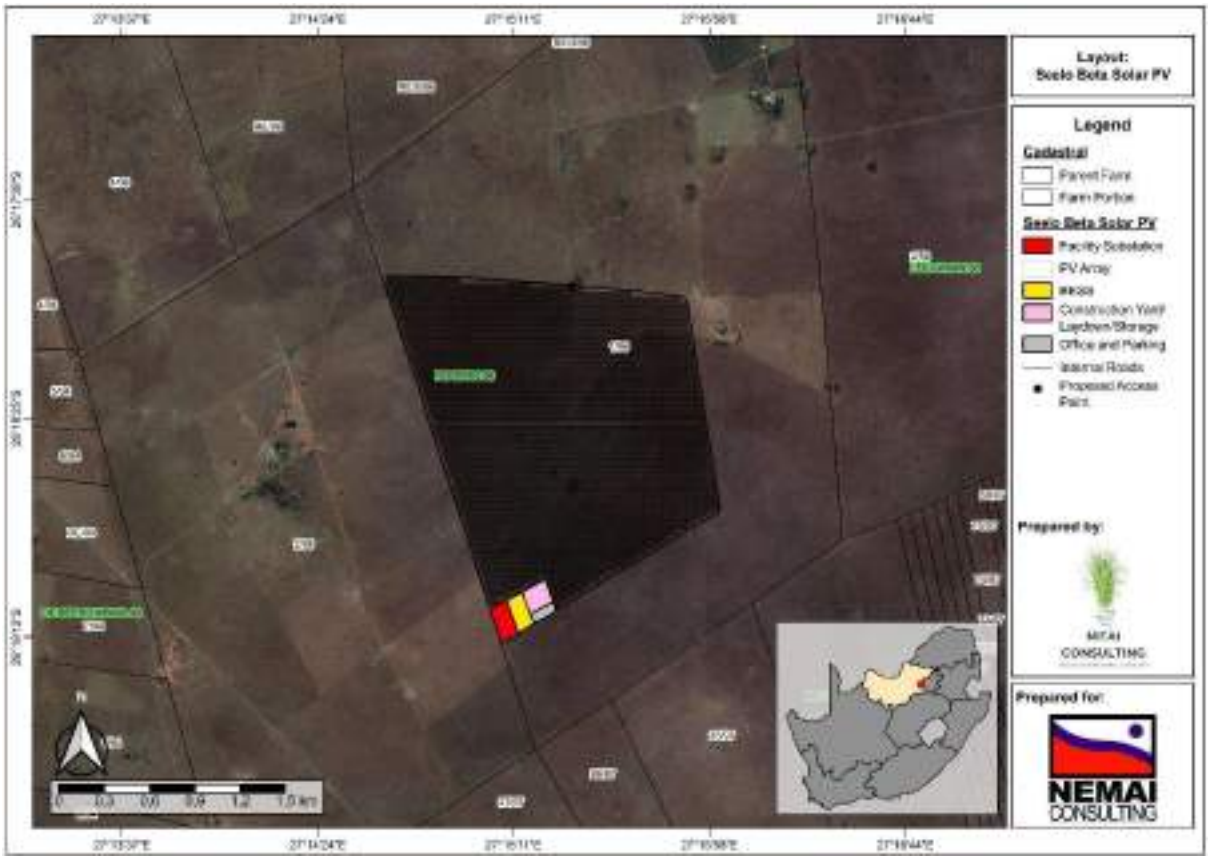

Figure 7: Layout of the Seelo Beta Solar PV Facility

Site Verification Report: Animal Sensitivity Theme

During the Desktop study for the proposed Seelo Beta Solar PV development the Environmental Screening tool from Department of Forestry, Fisheries & the Environment (DFFE) was queried. The Screening Tool allows for the generation of a Screening Report referred to in Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended, whereby a Screening Report is required to accompany any application for Environmental Authorisation.

The report identified that the Animal Sensitivity Theme for the proposed study area is of medium sensitivity (Figure 2) due to the potential presence of the following species:

- Aves-Tyto capensis
- Aves-Eupodotis senegalensis
- Mammalia-Crocidura maquassiensis
- Mammalia-Hydrictis maculicollis

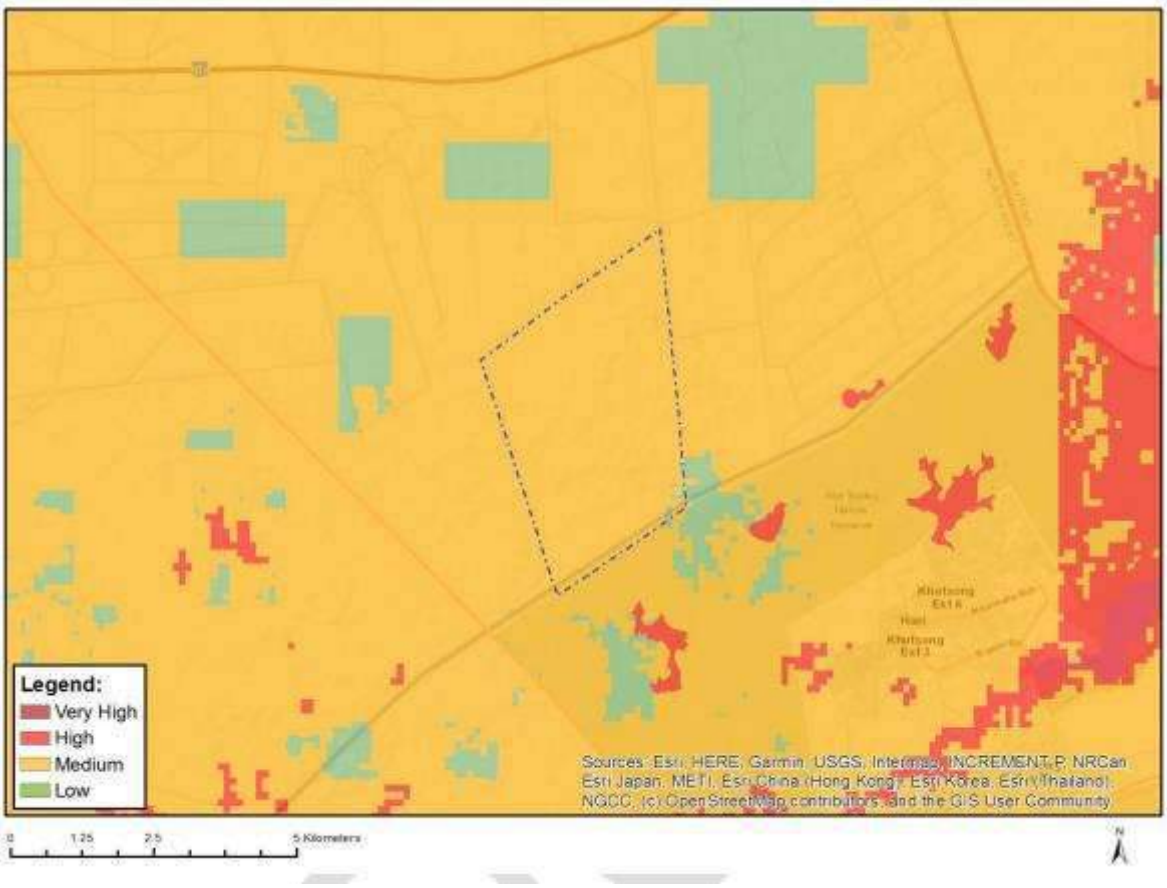

Figure 8: Animal Sensitivity Theme from the Department of Forestry, Fisheries & the Environment Screening Tool

Current Status of the Surrounding Environment

The proposed site is situated in an agricultural landscape (small and large livestock). The site does not contain any sensitive features in ecological corridors. The proposed site is overgrazed, and vegetation suggests a disturbed area but not transformed. See Figure 3 below for an overview of the environment within the proposed footprint.

Figure 9: Photographs indicating the general environment within the proposed footprint of Seelo Beta Solar PV

Conclusion and Recommendations

The proposed Seelo Beta Solar PV facility is situated in the JB Marks Local Municipality within the North West Province. No sensitive features were identified to be within the proposed footprint of the PV facility and was validated by the absence of proper ecological functioning, The area was mostly characterised by pioneer vegetation and opportunistic forbs species with low cover.

It is of the opinion of the specialist that the area is low sensitivity and not as the DFFE screening tool suggests as medium.

Since no sensitive biodiversity features were recorded on this site, the specialist recommends that the PV facility may proceed without impact to regional watercourses, given that best practise mitigation measures, particularly in terms of rehabilitation, spread of alien invasives and erosion control measures, are implemented.

APPENDIX E3: Avifaunal Impact Assessment

Avifauna Impact Assessment for the proposed Seelo Beta Solar Energy Facility

Ventersdorp, North- West Province

May 2023

CLIENT

Prepared by:

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Report Name	**Avifauna Impact Assessment for the proposed Seelo Beta Solar Energy Facility**
Submitted to	NEMAI CONSULTING
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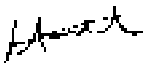
	Dewald Kleynhans is an MSc candidate in Zoology at the University of Pretoria. Dewald has vast experience with scientifically sound zoological monitoring from mammals to avifauna.
Report Writing	**Ryno Kemp** 
	Ryno Kmp is Pr Sci Nat registered (117462/17) in Zoological Science and is finalising his PhD in Zoology from the University of Pretoria. Ryno is a qualified Avifauna specialist with just over 2 year experience, three years of experience in conservation and more than eight years of scientific research experience across South Africa.
Report Reviewer	**Andrew Husted** 
	Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 12 years' experience in the environmental consulting field.
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

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List of Acronyms and Abbreviations

%	**Percent**
ADU	Animal Demography Unit
BESS	Battery Energy Storage System
BI	Biodiversity Importance
CAR	Coordinated Avifaunal Roadcounts
CBA	Critical Biodiversity Area
CI	Conservation Importance
CR	Critically Endangered
CWAC	Coordinated Waterbird Counts
DC	Direct Current
EAP	Environmental Assessment Practitioner
EGI	Electricity Grid Infrastructure
EI	Ecological Importance
EIA	Environmental Impact Assessment
EMPr	Environmental Management Plan report
EN	Endangered
EOO	Extent of occurrence
ESA	Ecological Support Area
EWT	Endangered Wildlife Trust
FFG	Functional Feeding Guild
FI	Functional Integrity
GIS	Geographic Information Systems
ha	hectares
IBA	Important Bird and Biodiversity Area
KBA	Key Biodiversity Area
km	kilometres
kV	kilo Volt
LC	Least Concern
m	metres
m^2	square metres
MTS	Main Transmission Substation
MW	Mega Watt
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act
NFEPA	National Freshwater Ecosystem priority Areas
NPAES	National Protected Areas Expansion Strategy
NT	Near Threatened
ONA	Other Natural Areas
PAOI	Project Area of Influence
PV	Photo Voltaic
REDZ	Renewable Energy Development Zones
REEA	Renewable Energy EIA Application
RR	Receptor Resilience
SABAP2	South African Bird Atlas Project 2
SACAD	South African Conservation Areas Database
SAIIAE	South African Inventory of Inland Aquatic Ecosystems
SANBI	South African National Biodiversity Institute
SAPAD	South African Protected Areas Database
SCC	Species of Conservation Concern
SEI	Site ecological Importance
TBC	The Biodiversity Company
V	Volt
VU	Vulnerable

1 Introduction

The Biodiversity Company was appointed to undertake an Avifauna Impact assessment for the proposed development of the Seelo Beta 240MW Solar PV and Battery Energy Storage Systems (BESS) Project near the town of Carletonville, in the North West Province (the "Project"). The electricity generated by the Project will be injected into the existing Eskom 132 kV distribution system. The electricity generated by the project will be injected into the existing Eskom 132 kV distribution system. The Applicant intends to bid for the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows. The Project Area of Influence (PAOI) has been defined as the area assessed to fully understand the avifauna community for the area. Whereas, the PV area has been defined as a buffer around the proposed development area.

The Project is located in the most eastern part of the North West Province (at the boundary between North West and Gauteng) and falls within the Dr Kenneth Kaunda District Municipality (DKKDM) and the JB Marks Local Municipality (JBMLM). The site is located approximately 13km to the north-west of the town of Carletonville.

The property earmarked for the Project covers a combined area of approximately 1130 ha, of which the buildable area determined by the engineering team is approximately 355 ha.

Table 1-1 Details of the affected properties

Farm Details	21-digit Surveyor General No.
Portion 1 of Farm 96 IQ (Rooipan)	T0IQ00000000009600001

Components of the Proposed Solar PV Plant

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

- PV panel arrays, which are the subsystems which convert incoming sunlight into electrical energy;
- Mounting structures to support the PV panels;
- On-site inverters to convert DC to facilitate AC connection between the solar energy facility and electricity grid;
- BESS);
- IPP substation;
- Eskom switching substation;
- Cabling between the Project's components, to be laid underground (where practical);
- Administration Buildings (Offices);
- Workshop areas for maintenance and storage;
- Temporary and permanent laydown areas;
- Internal access roads and perimeter fencing of the footprint;
- High Voltage (HV) Transformers; and
- Security Infrastructure.

The National Web-based Environmental Screening Tool (Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended) indicated that the Animal Species Theme Sensitivity was rated as 'High' due to the possible presence of Species of Conservation Concern (see section 2.2 of this report for the definition), including avifauna species. Accordingly, The Biodiversity Company was sub-contracted to undertake an Avifauna Impact Assessment to inform on the impact of the proposed PV to the avifauna community within the receiving environment. The approach was informed by the Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The approach has taken cognisance of the recently published Government Notices 320 (20 March 2020) in terms of NEMA, dated 20 March and 30 October 2020: "*Procedures for the Assessment and Minimum Criteria for Reporting on 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*" (Reporting Criteria). Based on the size of the PV project and the associated risks, a Regime 2 assessment was undertaken. Due to additional data for the area being available and deemed sufficient to supplement the project, only one survey was conducted during the wet season (BirdLife South Africa, 2017).

This report, after taking into consideration the findings and recommendations provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision-making, as to the ecological viability of the proposed project.

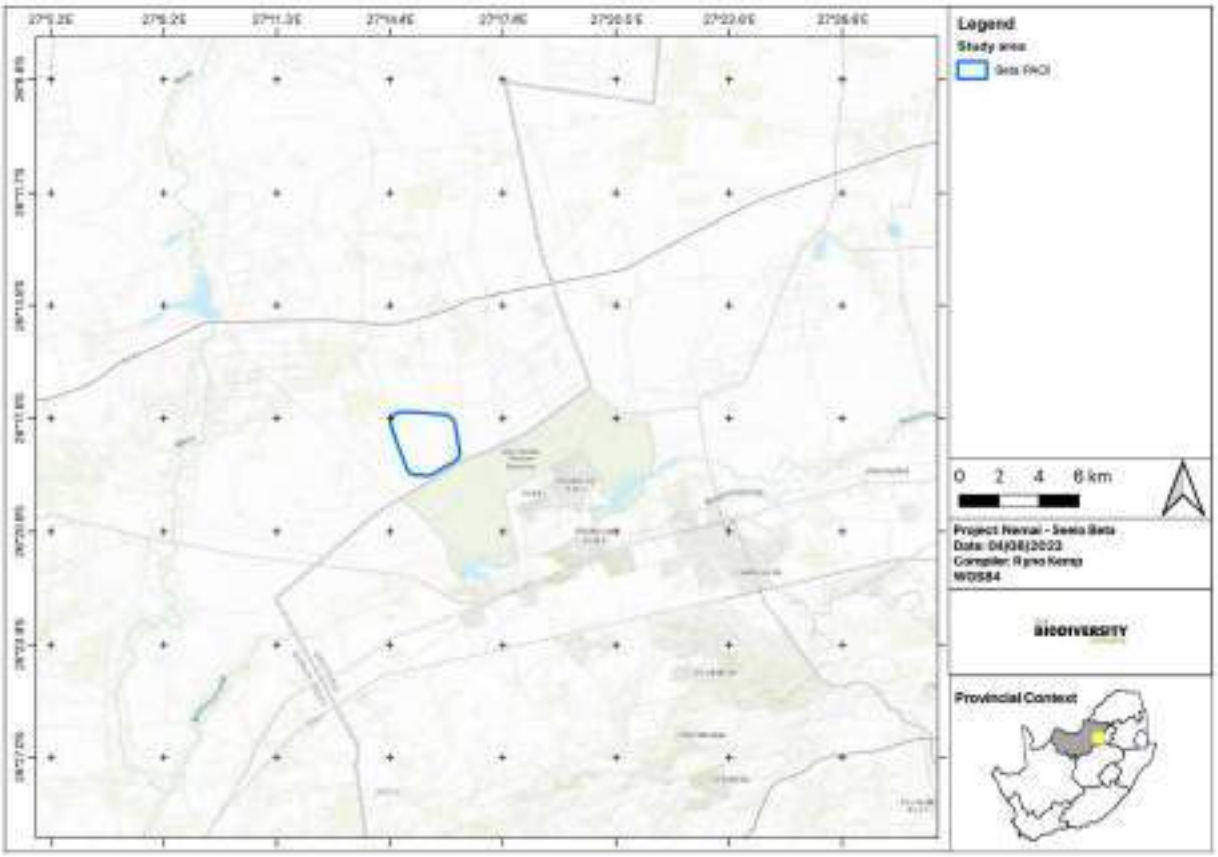

Figure 1-1 Map illustrating the location of the proposed PV Project

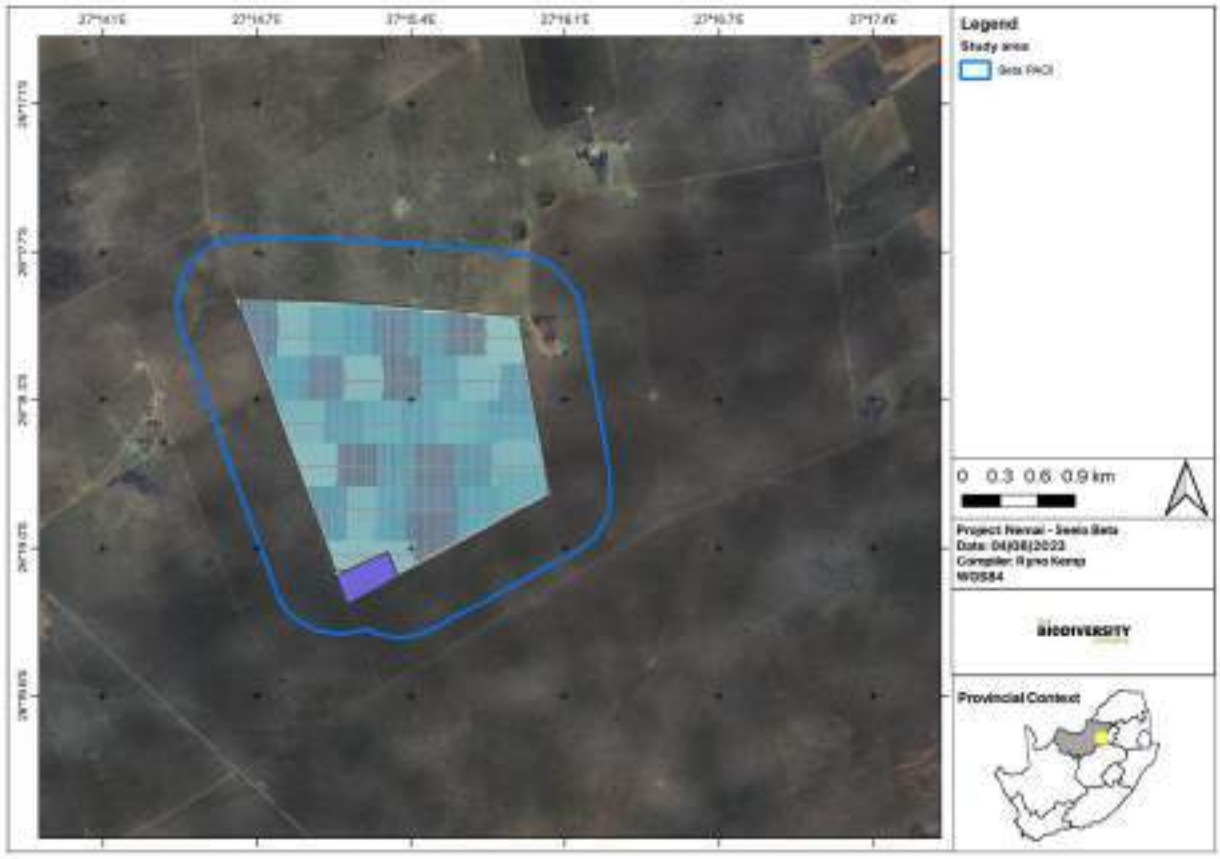

Figure 1-2 Proposed Solar Energy Facility study area and infrastructure

1.1 Terms of Reference

The assessment was achieved under the Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes in terms of Section 24(5) (a) and (h) and 44 of NEMA ("the Protocols") promulgated in GN No. 320 of 20 March 2020. Where no specific environmental theme protocol has been prescribed, the level of assessment must be based on the findings of the site verification and must comply with Appendix 6 of the EIA Regulations of 2014 (as amended), and the best-practice guidelines and principles for Avifaunal Impact Assessments within the context of PVs as outlined by BirdLife South Africa (2017).

The scope of the Avifaunal Impact Assessment included the following:

- Desktop assessment to identify the relevant ecologically important geographical features within the Project Area of Influence (PAOI) and surrounding landscape
- Desktop assessment to compile an expected species list and possible avifauna Species of Conservation Concern (SCC) that potentially occur within the PAOI;
- Description of the baseline avifauna species and Functional Feeding Guild (FFG) composition assemblage within the PAOI;
- Delineate site sensitivity or sensitivities i.e., the Site Ecological Importance (SEI) within the context of the avifauna species assemblage of the PAOI;
- Identify the manner that the proposed development impacts the avifauna community and evaluate the level of risk of these potential impacts; and

- Provide mitigation measures to prevent or reduce the possible impacts.

1.2 Assumptions and Limitations

The following assumptions and limitations should be noted for the assessment:

- The Project Area of Influence (PAOI) was based on the project footprint area as provided by the client. See section 2.1 of this report for additional details. 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;
- Two site visits were conducted for the purpose of this regime 2 assessment. The first field investigation was conducted in the summer, over 3 days from the 17th to the 19th of February 2023. The second field investigation was conducted during late summer, over 3 days from the 21st to the 23rd of April 2023.
- 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.

1.3 Key Legislative Requirements

The legislation, policies and guidelines listed below in Table 1-2 are applicable to the proposed project. The list below, although extensive, may not be complete and other legislation, policies and guidelines may apply in addition to those listed below.

Table 1-2 A list of key legislative requirements relevant to biodiversity and conservation in the North West Province

Region	Legislation / Guideline
National	Constitution of the Republic of South Africa (Act No. 108 of 1996)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998)
	The National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
	The National Environmental Management: Biodiversity Act (Act No. 10 of 2004), Threatened or Protected Species Regulations
	Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 320 of Government Gazette 43310 (March 2020)
	Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 1150 of Government Gazette 43855 (October 2020)
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);
	The Environment Conservation Act (Act No. 73 of 1989)
	National Protected Areas Expansion Strategy (NPAES)
	Natural Scientific Professions Act (Act No. 27 of 2003)
	National Biodiversity Framework (NBF, 2009)
	National Forest Act (Act No. 84 of 1998)
	National Veld and Forest Fire Act (101 of 1998)
	National Water Act (NWA) (Act No. 36 of 1998)
	National Spatial Biodiversity Assessment (NSBA)
	World Heritage Convention Act (Act No. 49 of 1999)

Region	Legislation / Guideline
	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations and, Alien and Invasive Species List 20142020, published under NEMBA
	South Africa's National Biodiversity Strategy and Action Plan (NBSAP)
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA)
	Sustainable Utilisation of Agricultural Resources (Draft Legislation).
	White Paper on Biodiversity
Provincial	North-West Biodiversity Sector Plan of 2015 (READ, 2015)

2 Definitions

2.1 Project Area of Influence (PAOI)

The Project Area of Influence (PAOI) encompasses the geographical extent of the potential impacts of the proposed development on the receiving environment. Essentially, the PAOI is defined according to the important ecosystem processes and functions that may be plausibly affected by the proposed development and its associated activities. In consideration that the project is not located within the Strategic Transmission Corridor, the PAOI was delineated as the project border.

2.2 Species of Conservation Concern (SCC)

According to the South African National Biodiversity Institute (SANBI), a Species of Conservation Concern (SCC) is a species with high conservation importance in terms of preserving South Africa's rich biodiversity. This classification covers a range of conservation status categories, as illustrated in Figure 2-1.

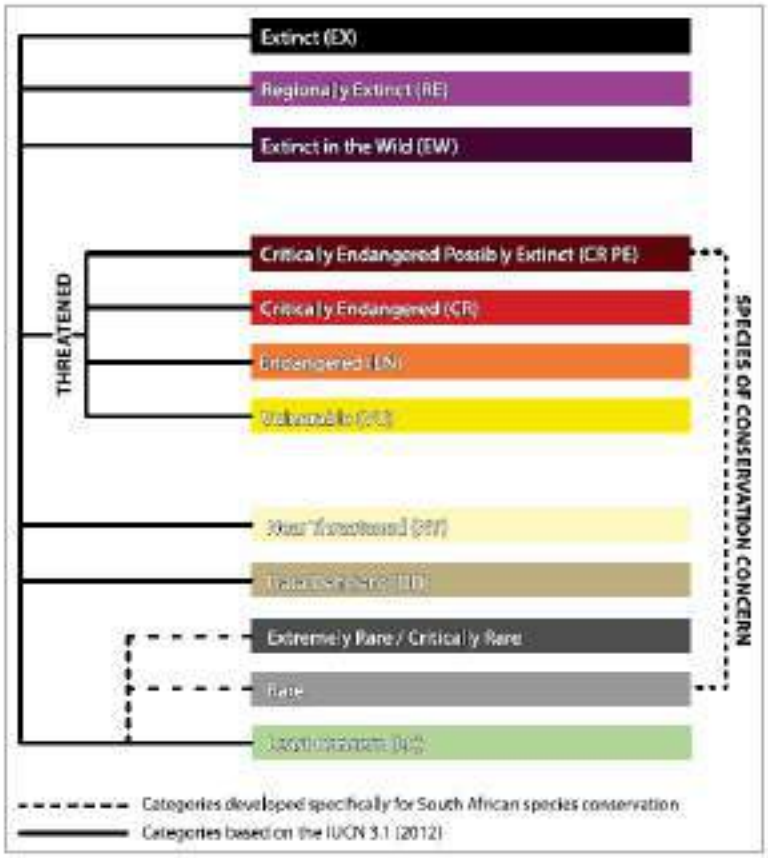

Figure 2-1 The different Species of Conservation Concern categories were modified from the IUCN's extinction risk categories. Source: SANBI (2020)

South Africa uses the internationally endorsed International Union for Conservation of Nature (IUCN) Red List Categories and Criteria (IUCN, 2021). This scientific system is designed to measure species' risk of extinction, and its purpose is to highlight those species that are in need of critical conservation action. As this system has been adopted from the IUCN, the definition of an SCC as described and categorised above is extended to all red list classifications relevant to fauna and the IUCN categories for this report.

2.3 2.3 Risk Species

Priority species are susceptible to impacts from energy developments (Ralston Paton *et al.* 2017). These species are typically susceptible to collisions. This list was initially developed for use with Wind Energy Facilities (Ralston Paton et al. 2017); however, the collision, electrocution and habitat loss risks are considered appropriate for renewable energy developments and re-utilised here. Also utilised here is the Eskom and Endangered Wildlife Trust (EWT) poster: Birds and Powerlines (Eskom & EWT, no date), identifying birds most prone to collision and electrocution from powerlines. Some birds are not included in these lists but are considered by the TBC avifauna specialists as risk species for collisions, electrocutions and habitat loss as a result of Solar PV infrastructure. All species are referred to collectively in this report as “Risk Species”.

3 Methods

3.1 Desktop Assessment

The desktop assessment was principally undertaken using GIS to access the latest available spatial datasets to develop digital cartographs and species lists. These datasets and their date of publishing are provided below.

3.2 Ecologically Important Landscape Features

Existing ecologically relevant data layers were incorporated into GIS to establish how the proposed development might interact with any ecologically important entities. Emphasis was placed around the following spatial datasets:

- Protected areas:

- South Africa Protected Areas Database (SAPAD) (DFFE, 2022) – The South African Protected Areas Database (SAPAD) contains spatial data for the conservation of South Africa. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. SAPAD is updated on a continuous basis and forms the basis for the Register of Protected Areas which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.

- National Protected Areas Expansion Strategy (NPAES) (DFFE, 2021) – The National Protected Area Expansion Strategy (NPAES) provides spatial information on areas that are suitable for terrestrial ecosystem protection. These focus areas are large, intact and unfragmented and are therefore, of high importance for biodiversity, climate resilience and freshwater protection.

- Important Bird and Biodiversity Areas (BirdLife South Africa, 2022) – Important Bird and Biodiversity Areas (IBAs) constitute a global network of over 13 500 sites, of which 112 sites are found in South Africa. IBAs are sites of global significance for bird conservation, identified through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria;

- Coordinated Water Bird Counts (CWAC) – The Animal Demography Unit (ADU) launched the Coordinated Waterbird Counts (CWAC) project in 1992 as part South Africa's commitment to international waterbird conservation. The primary aim of CWAC is to act as an effective long-term waterbird monitoring tool. This is being done by means of a programme of regular mid-summer and mid-winter censuses at several wetlands. The database is located at https://cwac.birdmap.africa/index.php.

- Coordinated Avifaunal Roadcounts (CAR) – The Coordinated Avifaunal Roadcounts (CAR) were pioneered in July 1993 in a joint Cape Bird Club/Animal Demography Unit (ADU) project to monitor the populations of two threatened species: *Anthropoides paradiseus* (Blue Crane) and *Neotis denhamii* (Denham's Bustard). Presently it monitors 36 species of large terrestrial birds along 350 fixed routes covering over 19 000 km using a standardised method.

- North West Biodiversity Sector Plan - The spatial component of the Biodiversity Sector Plan is based on systematic biodiversity planning undertaken by READ. The purpose of a Biodiversity Sector Plan is to inform land use planning, environmental assessments, land and water use authorisations, and natural resource management, undertaken by a range of sectors whose policies and decisions impact 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 (READ, 2015), and

- Hydrological Context

- South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer *et al.,* 2018) – A South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was established during the National Biodiversity Assessment of 2018. It is a collection of data layers that represent the extent of river and inland wetland ecosystem types as well as pressures on these systems.

- National Freshwater Ecosystem Priority Area (NFEPA) (Nel *et al.,* 2011) – The NFEPA database provides strategic spatial priorities for conserving the country's freshwater ecosystems and associated biodiversity as well as supporting sustainable use of water resources.

3.3 Expected Avifauna Species

The following resources were considered during the desktop assessment and for the compilation of the expected species list:

- South African Bird Atlas Project 2 (SABAP2). Full protocol data from 9 relevant pentads (2610_2710, 2610_2715, 2610_2720, 2615_2710, 2615_2715, 2615_2720, 2620_2710, 2620_2715, 2620_2720) were used to compile the expected species list;

- Coordinated Water Bird Counts (CWAC) – The Animal Demography Unit (ADU) launched the Coordinated Waterbird Counts (CWAC) project in 1992 as part of South Africa's commitment to international waterbird conservation. The primary aim of CWAC is to act as an effective long-term waterbird monitoring tool. This is done through a programme of regular mid-summer and mid-winter censuses at several wetlands. The database is located at https://cwac.birdmap.africa/index.php;

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- Important Bird and Biodiversity Areas (BirdLife South Africa, 2022) – Important Bird and Biodiversity Areas (IBAs) constitute a global network of over 13 500 sites, of which 112 are found in South Africa. IBAs are sites of global significance for bird conservation, identified through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria;

- Hockey *et al*. (2005), Roberts Birds of Southern Africa (7th edition). The primary source for species identification, geographic range, and life history information;

- Sinclair and Ryan (2010), Birds of Africa South of the Sahara. Secondary source for identification; and

- Taylor *et al*. (2015), Eskom Red Data Book of Birds of South Africa, Lesotho, and Swaziland. Used for conservation status, nomenclature, and taxonomical ordering.

3.4 Field Survey

Two site visits were conducted for the purpose of this regime 2 assessment. The first field investigation was conducted in the summer, over 6 days from the 17th to the 19th of February 2023. The second field investigation was conducted during late summer, over 3 days from the 21st to the 23rd of April 2023. Sampling consisted of Standardised Point Counts as well as random diurnal incidental surveys. Standardised Point Counts (Buckland et al., 1993) were conducted to gather data on the species composition and relative abundance of species within the broad habitat types identified. The Standardized Point Count technique was utilised as it was demonstrated to outperform line routes (Cumming & Henry, 2019). Each point count was run over 10 minutes. The horizontal detection limit was set at 150 m. At each point, the observer would document the date, start time, and end time, habitat, numbers of each species, detection method (seen or heard), behaviour (perched or flying) and general notes on habitat and nesting suitability for conservation important species. Diurnal and nocturnal incidental searches were conducted

to supplement the species inventory with cryptic and elusive species that may not be detected during the rigid point count protocol. This involved opportunistic species sampling between point count periods, random meandering and road cruising. The effort was made to cover all the different habitat types within the limits of time and access (Figure 3-1).

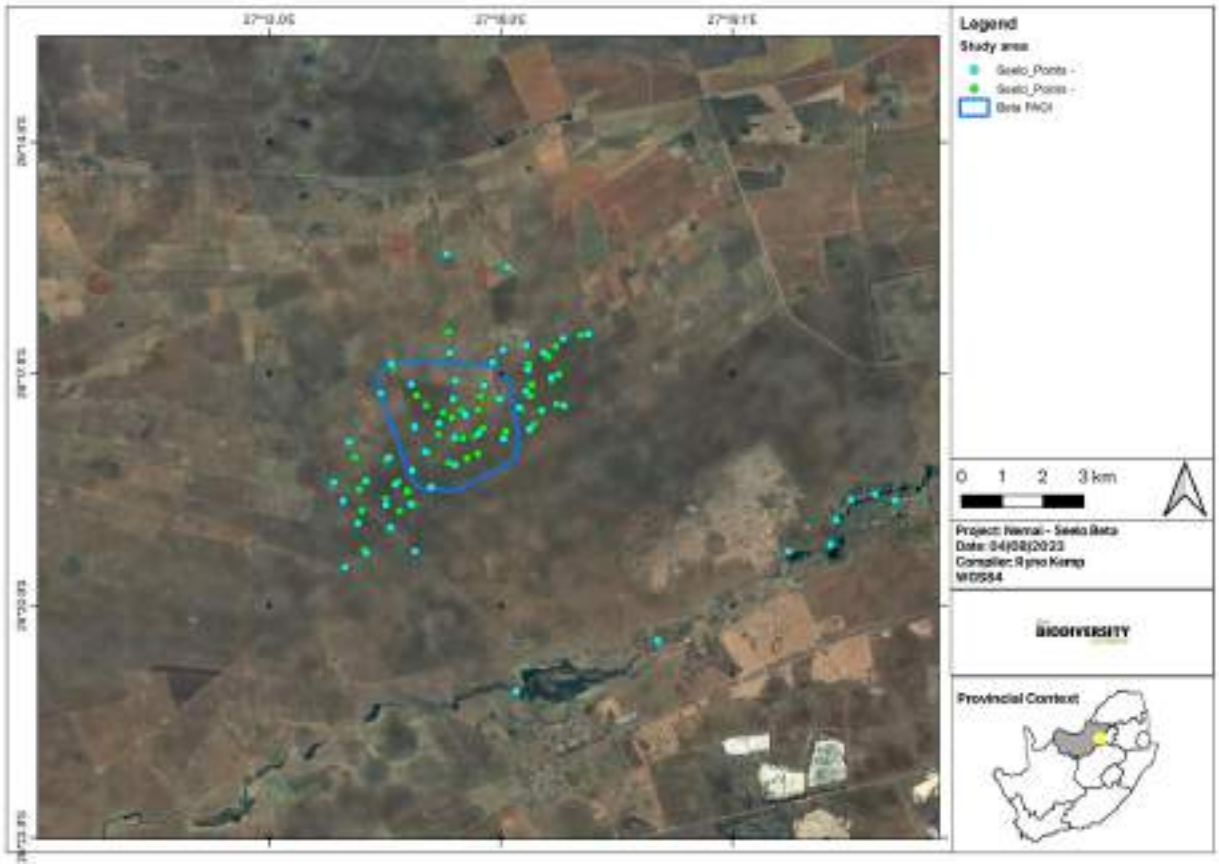

Figure 3-1 Map illustrating the field survey area and locations of Standardised Point Counts across the broader PAOI

3.5 Data Analysis

The analyses described below only used the data collected from the Standardised Point Counts. Raw count data was converted to relative abundance values and used to establish dominant species and calculate the diversity of each habitat. Present, and potentially occurring species were assigned to 13 major trophic guilds loosely based on the classification system developed by González-Salazar *et al.* (2014). Species were first classified by their dominant diet (carnivore, herbivore, granivore, frugivore, nectarivore, omnivore), then by the medium upon / within which they most frequently forage (ground, water, foliage, air) and lastly by their activity period (nocturnal or diurnal).

3.6 Site Ecological Importance (SEI)

The different habitat types within the project area were delineated and identified based on observations during the field assessment, and available satellite imagery. These habitat types were assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of species of conservation concern and their ecosystem processes.

Site Ecological Importance (SEI) is a function of the Biodiversity Importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present on the site) and Receptor Resilience (RR) (its resilience to impacts) as follows.

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows. The criteria for the CI and FI ratings are provided in Table 3-1 and

Table 3-2, respectively.

Table 3-1 Summary of Conservation Importance (CI) criteria

Conservation Importance	Fulfilling Criteria
Very High	Confirmed or highly likely occurrence of Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Extremely Rare or CR species that have a global extent of occurrence (EOO) of < 10 km^2. Any area of natural habitat of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent) of natural habitat of an EN ecosystem type. Globally significant populations of congregatory species (> 10% of global population).
High	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km^2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type. Presence of Rare species. Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	Confirmed or highly likely occurrence of populations of Near Threatened (NT) species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. Any area of natural habitat of threatened ecosystem type with status of VU. Presence of range-restricted species. > 50% of receptor contains natural habitat with potential to support SCC.
Low	No confirmed or highly likely populations of SCC. No confirmed or highly likely populations of range-restricted species. < 50% of receptor contains natural habitat with limited potential to support SCC.
Very Low	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

Table 3-2 Summary of Functional Integrity (FI) criteria

Functional Integrity	Fulfilling Criteria
Very High	Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. No or minimal current negative ecological impacts, with no signs of major past disturbance.
High	Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types. Good habitat connectivity, with potentially functional ecological corridors and a regularly used road network between intact habitat patches. Only minor current negative ecological impacts, with no signs of major past disturbance and good rehabilitation potential.
Medium	Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts, with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	Small (> 1 ha but < 5 ha) area. Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.
Very Low	Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.

BI can be derived from a simple matrix of CI and FI as provided in

Table 3-3.

Table 3-3 Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI)

Biodiversity Importance (BI)		Conservation Importance (CI)				
		Very High	High	Medium	Low	Very Low
Functional Integrity (FI)	Very High	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor, as summarised in Table 3-4.

Table 3-4 Summary of Receptor Resilience (RR) criteria

Resilience	Fulfilling Criteria
Very High	Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
Medium	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
Very Low	Habitat that is unable to recover from major impacts, or species that are unlikely to: (i) remain at a site even when a disturbance or impact is occurring, or (ii) return to a site once the disturbance or impact has been removed.

Subsequent to the determination of the BI and RR, the SEI can be ascertained using the matrix as provided in Table 3-5.

Table 3-5 Matrix used to derive Site Ecological Importance from Receptor Resilience (RR) and Biodiversity Importance (BI)

Site Ecological Importance		Biodiversity Importance (BI)				
		Very high	High	Medium	Low	Very low
sReceptor Resilience (RR)	Very Low	Very high	Very high	High	Medium	Low
	Low	Very high	Very high	High	Medium	Very low
	Medium	Very high	High	Medium	Low	Very low
	High	High	Medium	Low	Very low	Very low
	Very High	Medium	Low	Very low	Very low	Very low

Interpretation of the SEI in the context of the proposed project is provided in

Table 3-6.

Table 3-6 Guidelines for interpreting Site Ecological Importance in the context of the proposed development activities

Site Ecological Importance	Interpretation in relation to proposed development activities
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.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

The SEI evaluated for each taxon can be combined into a single multi-taxon evaluation of SEI for the assessment area. Either a combination of the maximum SEI for each receptor should be applied, or the SEI may be evaluated only once per receptor but for all necessary taxa simultaneously. For the latter, justification of the SEI for each receptor is based on the criteria that conforms to the highest CI and FI, and the lowest RR across all taxa. For the purposes of this assessment, only avifauna were considered.

3.7 Environmental Impact Assessment

The significance of the identified impacts was determined using an accepted methodology from the Department of Environmental Affairs and Tourism Guideline document on EIA Regulations, April 1998. As with all impact methodologies, the impact is defined in a semi-quantitative way and was assessed according to methodology as per the scale utilised for the evaluation of Environmental Impact Ratings in Table 3-7,

Table 3-8 and Table 3-9. First, the impact is assigned a score based on Likelihood descriptors Probability and Sensitivity (Likelihood = Probability + Sensitivity) (Table 3-7), and then assigned a Severity rating based on Consequence descriptors Severity, Scope and Duration (Severity = Severity + Scope + Duration) (

Table 3-8). Overall Consequence and Likelihood scores are then used to Determine the Significance Rating (Table 3-9).

Table 3-7 Environmental Impact Assessment: Likelihood Descriptors

Probability of impact	Rating
Highly unlikely	1
Possible	2
Likely	3
Highly likely	4
Definite	5

Sensitivity of receiving environment	Rating
Ecology not sensitive/important	1
Ecology with limited sensitivity/importance	2
Ecology moderately sensitive/ /important	3
Ecology highly sensitive /important	4
Ecology critically sensitive /important	5

Table 3-8 Environmental Impact Assessment: Consequence Descriptors

Severity of impact	Rating
Insignificant / ecosystem structure and function unchanged	1
Small / ecosystem structure and function largely unchanged	2
Significant / ecosystem structure and function moderately altered	3
Great / harmful/ ecosystem structure and function largely altered	4
Disastrous / ecosystem structure and function seriously to critically altered	5
Spatial scope of impact	**Rating**
Activity specific/ < 5 ha impacted / Linear features affected < 100m	1
Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	2
Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	3
Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	4
Entire habitat unit / Entire system/ > 2000ha impacted / Linear features affected > 3000m	5
Duration of impact	**Rating**
One day to one month: Temporary	1
One month to one year: Short Term	2
One year to five years: Medium Term	3
Life of operation or less than 20 years: Long Term	4
Permanent	5

Table 3-9 Environmental Impact Assessment: Significance Rating Matrix

	CONSEQUENCE (Severity + Spatial Scope + Duration)															
LIKELIHOOD (Probability of impact + Sensitivity of receiving environment)	0	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Absent
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	Low
	3	6	9	12	15	18	21	24	27	301	33	36	39	42	45	
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	Moderate
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	Moderately High
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105	High
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135	Critical
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	

4 Results & Discussion

4.1 Desktop Assessment

4.2 Ecologically Important Landscape Features

The following features describe the general area and habitat. This assessment is based on spatial data from various sources, such as the provincial environmental authority and SANBI. The desktop analysis and its relevance to this project are listed in Table 4-1.

Table 4-1 Summary of the relevance of the proposed development to ecologically important landscape features

Desktop Information Considered	Relevant/Irrelevant	Section
Biodiversity Spatial Plan	Relevant - The PAOI overlaps with CBA2	4.1.1.1
Ecosystem Threat Status	Relevant - The proposed PAOI overlaps with a LC ecosystem	4.1.1.2
Ecosystem Protection Level	Relevant - The proposed PAOI project overlaps mainly with PP ecosystem	4.1.1.3
Protected Areas	Relevant - The PAOI is in relatively close proximity to two nature reserves (±12km)	4.1.1.4
National Protected Areas Expansion Strategy	Relevant - The PAOI does overlap with NPAES areas	4.1.1.5
Important Bird and Biodiversity Areas	Irrelevant - The PAOI does not overlap with any IBA	4.1.1.6
Coordinated Avifaunal Road Count	Relevant - The PAOI overlaps with Coordinated Avifaunal Roadcount	4.1.1.7
Coordinated Waterbird Count	Relevant - The PAOI is in close proximity to 3 Coordinated Waterbird Count si	4.1.1.8
Strategic Water Source Areas	Irrelevant - The PAOI does not fall within any Strategic Water Source Areas	4.1.1.9
South African Inventory of Inland Aquatic Ecosystems	Irrelevant - The PAOI does not overlap with any threatened wetlands and	4.1.1.9
National Freshwater Priority Area	Relevant - The PAOI does not overlap with some FEPA wetlands	4.1.1.9
Powerline Corridor	Relevant - The PAOI overlaps with the EGI corridor	4.1.1.10
Renewable Energy Development Zone (REDZ)	Irrelevant - The PAOI does not overlap with any REDZ	4.1.1.11
Renewable Energy EIA Application Database (REEA)	Relevant - The PAOI is in close proximity to already approved REEA project	4.1.1.12

4.2.1.1 Limpopo Conservation Plan

The key output of a systematic biodiversity plan is a map of biodiversity priority areas. The CBA map delineates Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs), Other Natural Areas (ONAs), Protected Areas (PAs), and areas that have been irreversibly modified from their natural state.

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. CBAs are areas of high biodiversity value and need to be kept in a natural state, with no further loss of habitat or species. Thus, 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 (SANBI-BGIS, 2017).

Ecological Support Areas (ESAs) are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services. Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic (SANBI-BGIS, 2017).

Other Natural Areas (ONAs) consist of all those areas in a good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs. A biodiversity sector

plan or bioregional plan must not specify the desired state/management objectives for ONAs or provide land-use guidelines for ONAs (SANBI-BGIS, 2017).

Relevant - The PAOI overlaps with CBA2 (Figure 4-1).

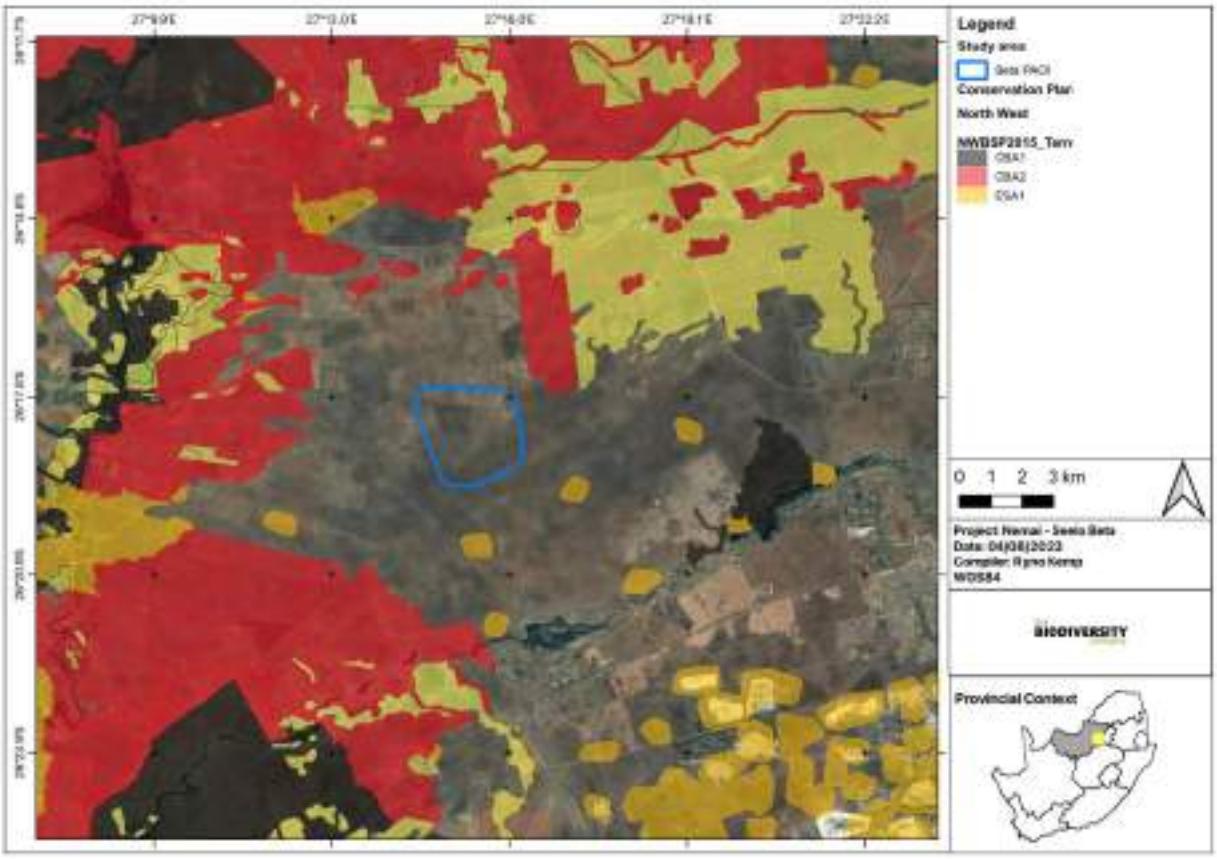

Figure 4-1 Map illustrating the location of Critical Biodiversity and Ecological Support Areas proximal to the Project Area of influence.

4.2.1.2 Ecosystem Threat Status

The Ecosystem Threat Status is an indicator of an ecosystem's well-being based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. Relevant - The proposed PAOI overlaps with a LC ecosystem (Figure 4-2).

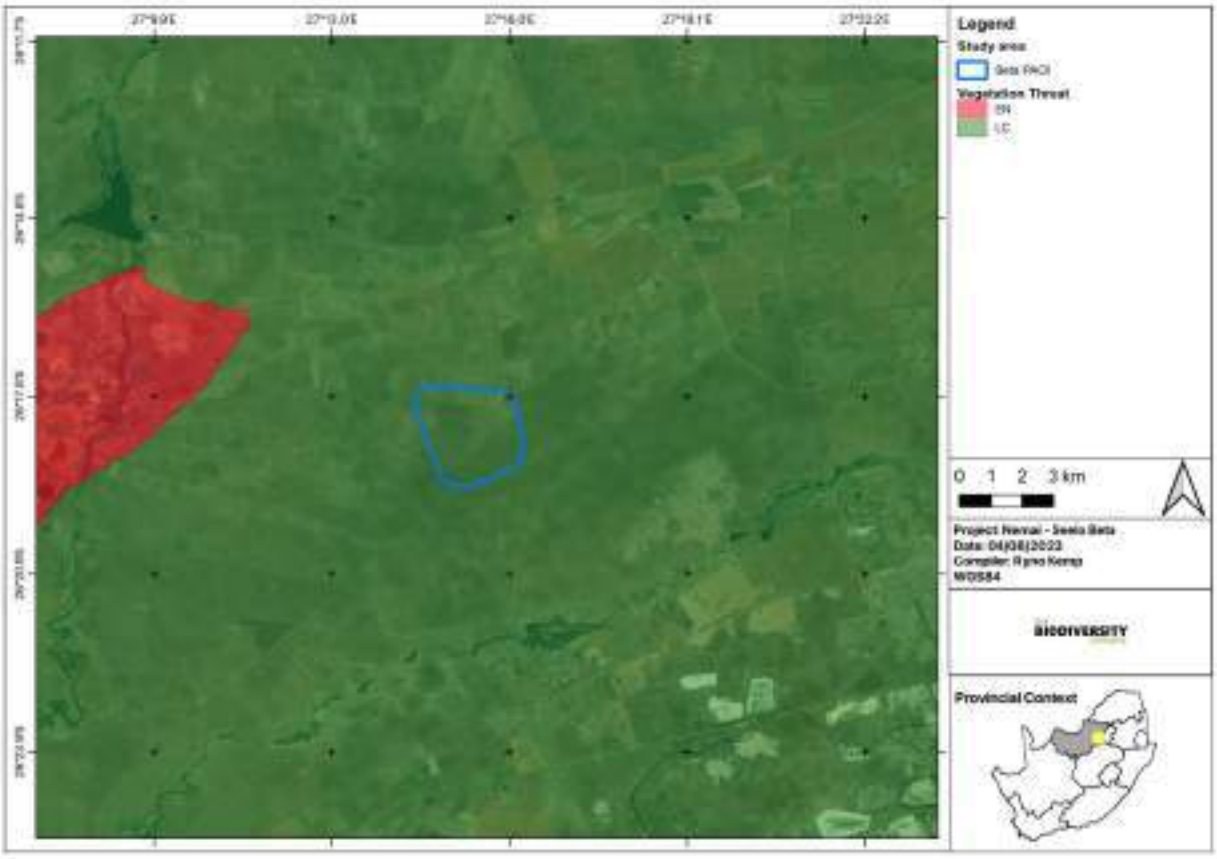

Figure 4-2 Map illustrating the ecosystem threat status associated with the PAOI.

4.2.1.3 Ecosystem Protection Level

This is an indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems. Relevant - The proposed PAOI project overlaps mainly with PP ecosystem (Figure 4-3).

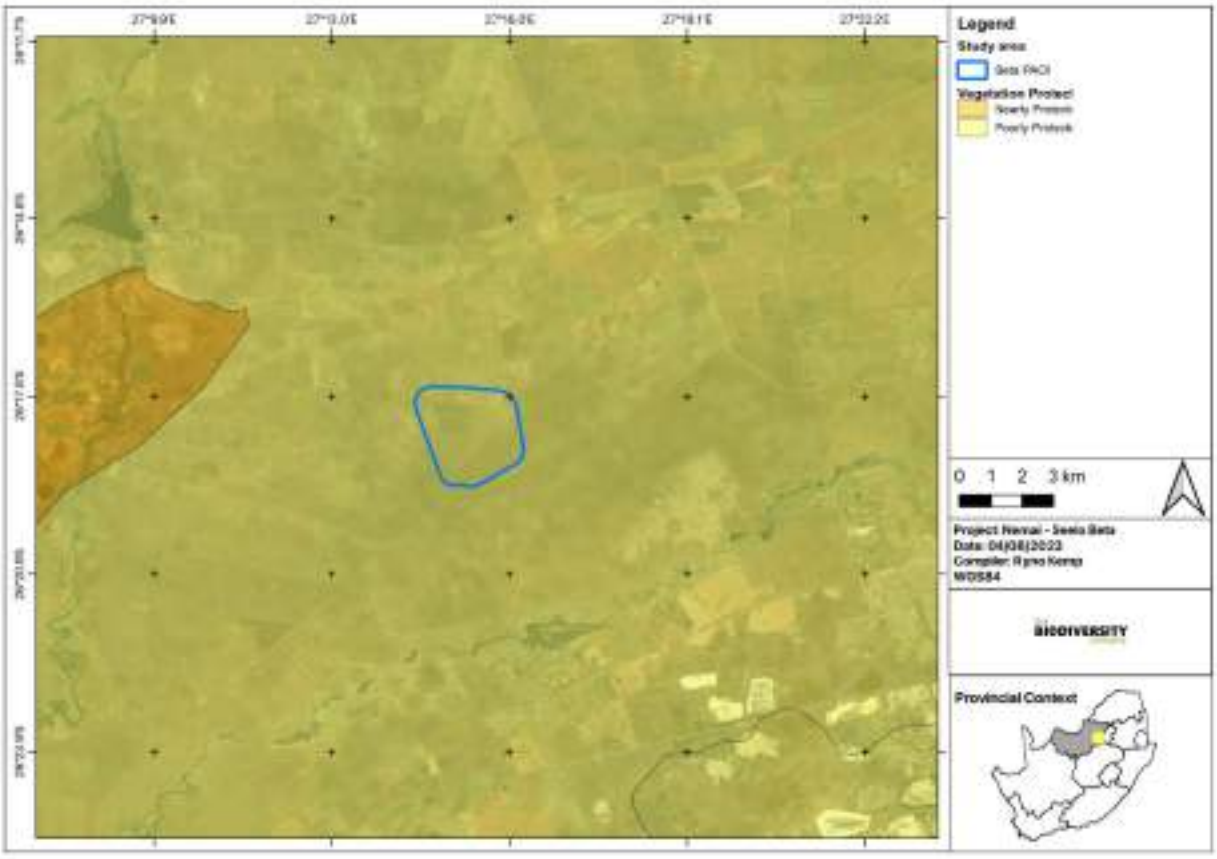

Figure 4-3 Map illustrating the ecosystem protection level associated with the PAOI

4.2.1.4 Protected Areas

According to the protected area spatial datasets from SAPAD (DFFE, 2022) and SACAD (DFFE, 2022). Relevant - The PAOI is in relatively close proximity to two nature reserves (±12km) (Figure 4-4).

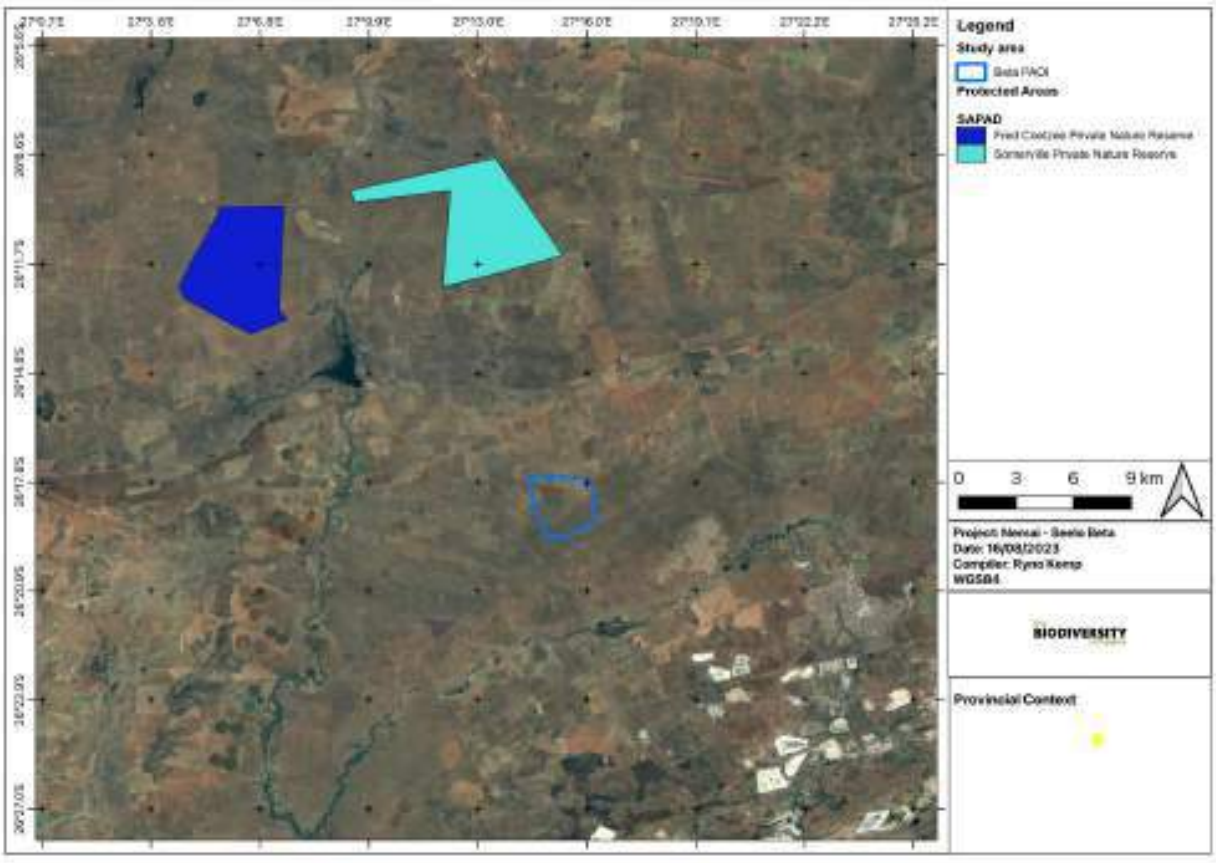

Figure 4-4 Map illustrating the Project Area of Influence (PAOI) in relation to Conservation and Protected Areas

4.2.1.5 National Protected Area Expansion Strategy

National Protected Area Expansion Strategy (NPAES) areas were identified through a systematic biodiversity planning process. They presented the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with a 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 different priority sites based on local requirements, constraints and opportunities (DFFE, 2021). Relevant - The PAOI does overlap with NPAES areas (Figure 4-5).

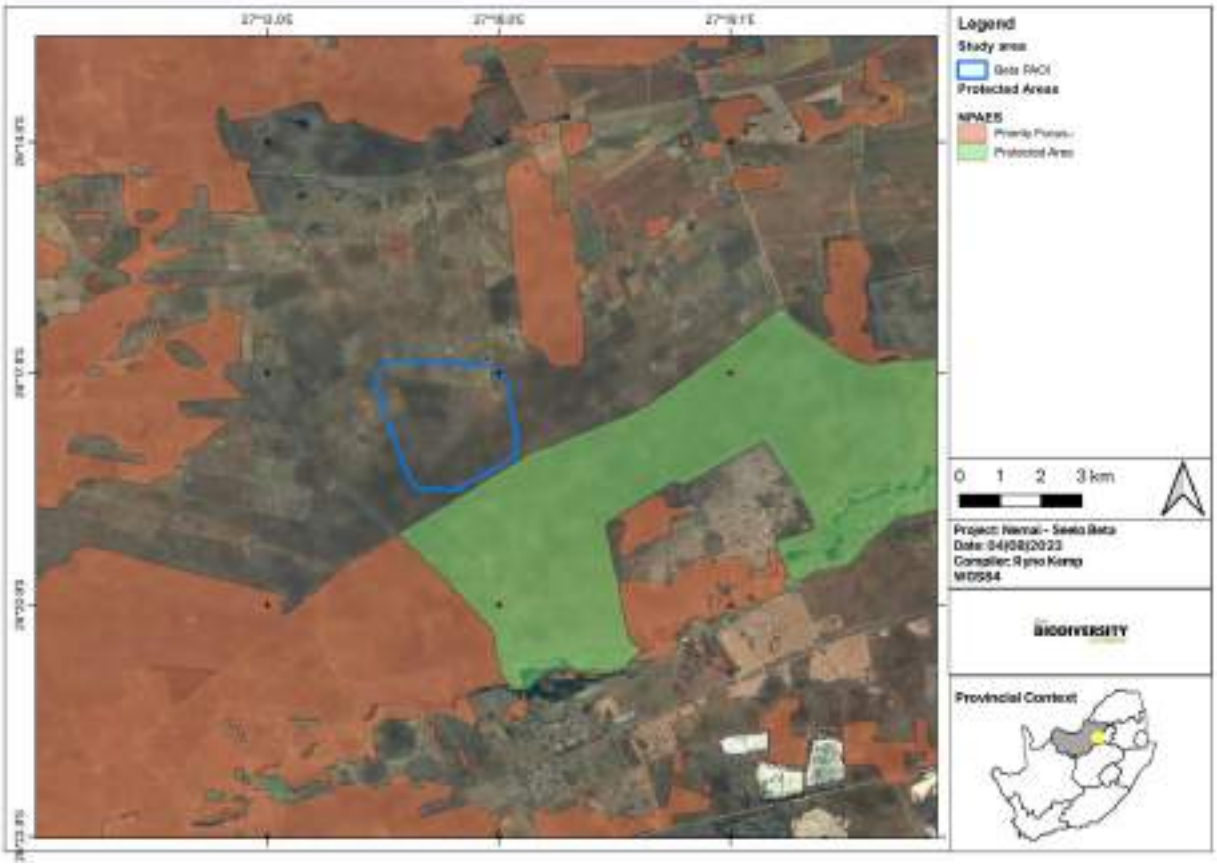

Figure 4-5 Map illustrating the Project Area of Influence (PAOI) in relation to NPAES Focus Areas

4.2.1.6 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).

According to Birdlife South Africa (2017), selecting IBAs is achieved by applying quantitative ornithological criteria grounded in up-to-date knowledge of the sizes and trends of bird populations. The criteria ensure that the sites selected as IBAs have true significance for the international conservation of bird populations and provide a common currency that all IBAs adhere to, thus creating consistency among and enabling comparability between sites at national, continental and global levels. Irrelevant - The PAOI does not overlap with any IBA (Figure 4-6).

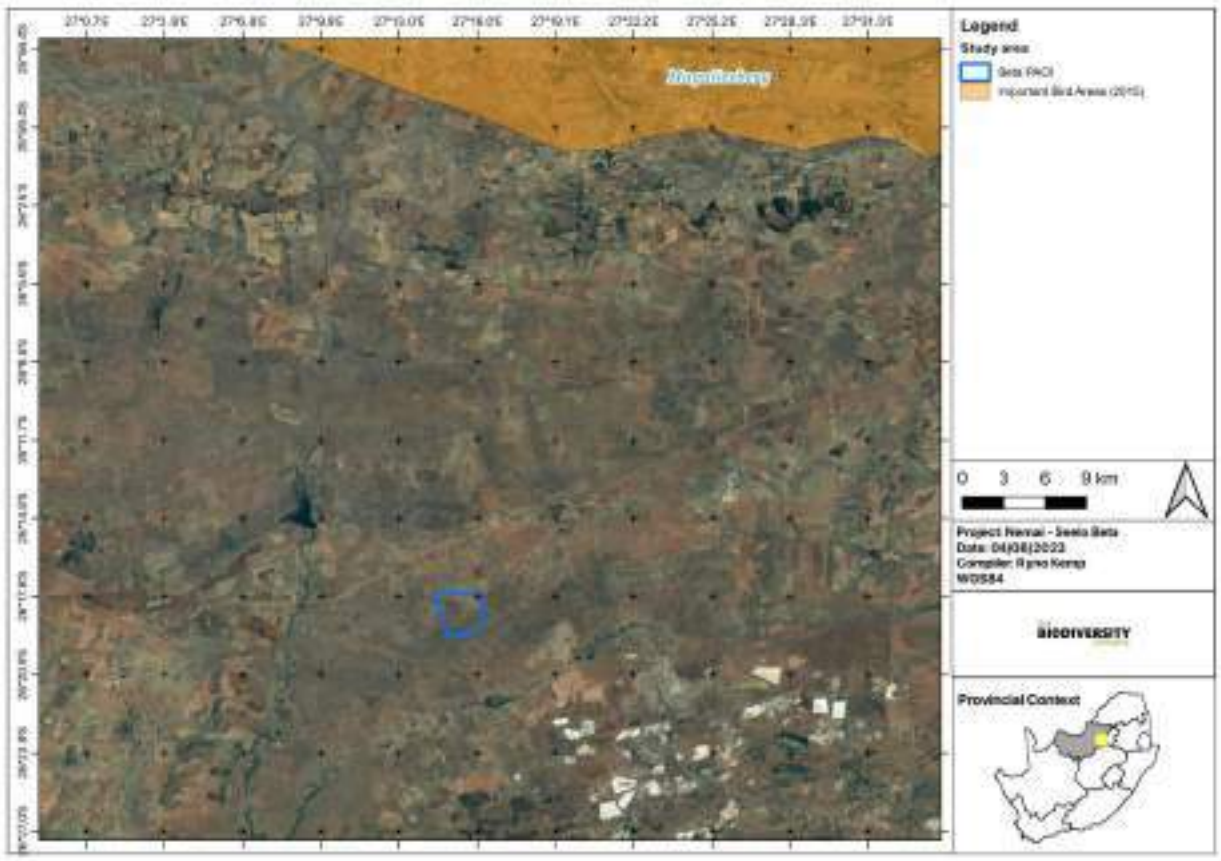

Figure 4-6 Map illustrating the locations of Important Bird and Biodiversity Areas proximal to the Project Area of Influence (PAOI)

4.2.1.7 Coordinated Avifaunal Roadcount (CAR)

The Animal Demographic Unit (ADU)/Cape bird club pioneered the avifaunal road counts of larger birds in 1993 in South Africa. Originally it was started to monitor the Blue Crane (*Anthropoides paradiseus*) and Denham's/Stanley's Bustard (*Neotis Denham*). Today it has been expanded to monitor 36 species of large terrestrial birds (cranes, bustards, korhaans and storks) along 350 fixed routes covering over 19 000 km. Road counts are carried out twice yearly in midsummer (the last Saturday in January) and midwinter (the last Saturday in July) using this standardised method. These counts are essential for conserving these larger species that are under threat due to habitat loss through land use changes, increases in crop agriculture and human population densities, poisoning, and man-made structures like powerlines. With the prospect of increasing wind and solar farms, using renewable energy sources and monitoring these species is most important (CAR, 2020). Relevant - The PAOI overlaps with Coordinated Avifaunal Roadcount Routes (Figure 4-7).

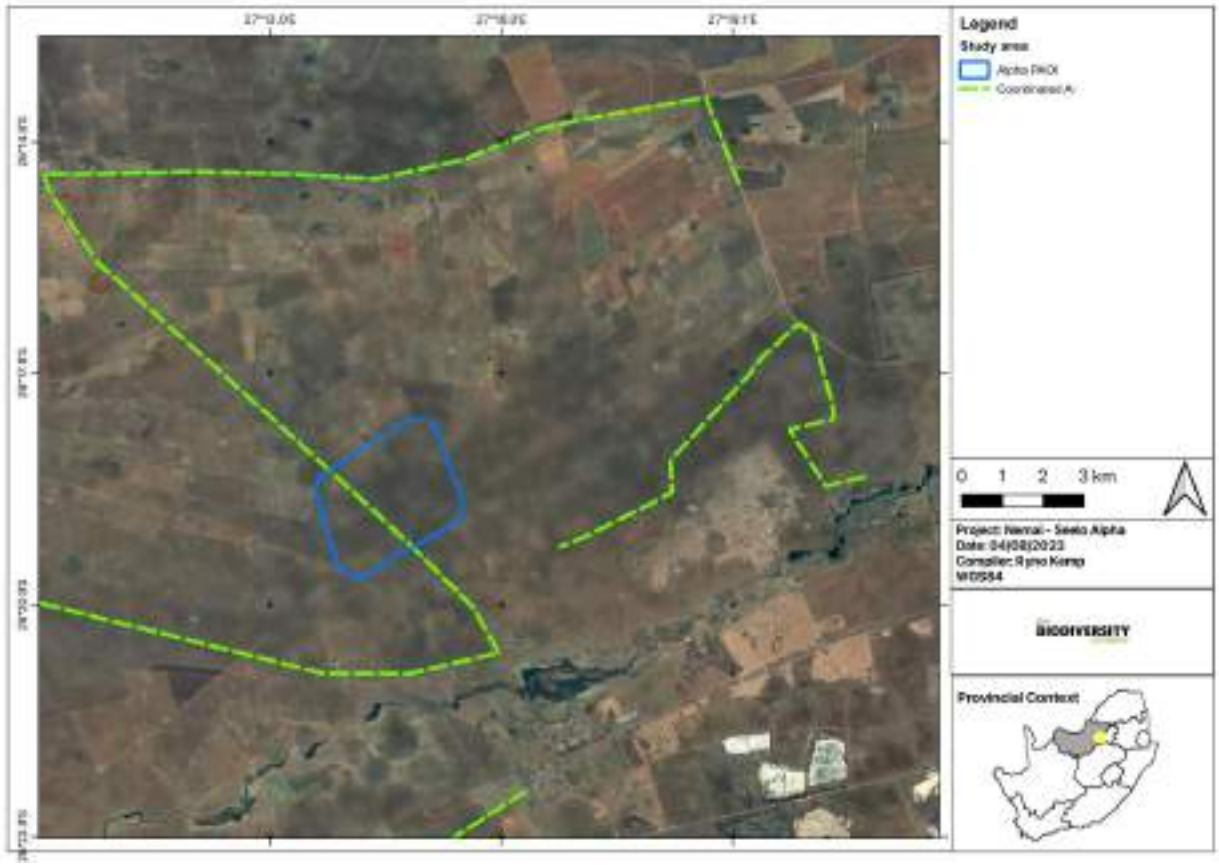

Figure 4-7 Map illustrating the locations of Coordinated Avifaunal Roadcount proximal to the Project Area of Influence (PAOI)

4.2.1.8 Coordinated Waterbird Count

The ADU launched the Coordinated Waterbird Counts (CWAC) project in 1992 as part of South Africa's commitment to international waterbird conservation. Regular mid-summer and mid-winter censuses are done to determine the various features of water birds, including population size, how waterbirds utilise water sources and determining the health of wetlands. For a full description of CWAC, please refer to http://cwac.birdmap.africa/about.php. Relevant - The PAOI is in close proximity to 3 Coordinated Waterbird Count site (Figure 4-8).

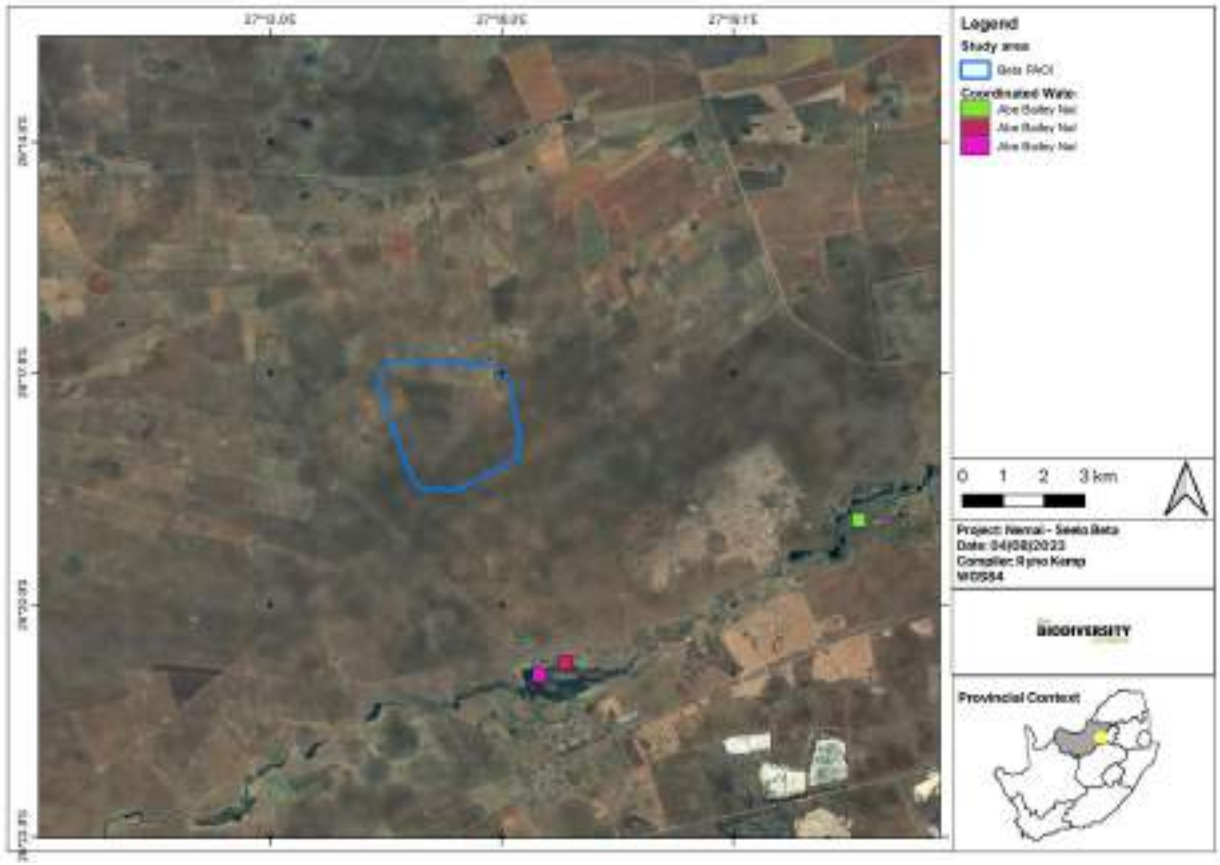

Figure 4-8 Map illustrating the locations of Coordinated Waterbird Counts proximal to the Project Area of Influence (PAOI)

4.2.1.9 Hydrological Context

Irrelevant - The PAOI does not fall within any Strategic Water Source Areas (SWSA) in terms of surface water.

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the NBA 2018. The ecosystem threat status (ETS) of the river and wetland ecosystem types is based on the extent to which each river ecosystem type has been altered from its natural condition. Ecosystem types are categorised as CR, EN, VU or LT, with CR, EN and VU ecosystem types collectively referred to as 'threatened' (Van Deventer et al., 2019; Skowno et al., 2019). Irrelevant - The PAOI does not overlap with any threatened wetlands and rivers (Figure 4-9).

In an attempt to better conserve aquatic ecosystems, South Africa has categorised its river systems according to set ecological criteria (i.e., ecosystem representation, water yield, connectivity, unique features, and threatened taxa) to identify Freshwater Ecosystem Priority Areas (FEPAs) (Driver et al., 2011). The FEPAs are intended to be conservation support tools and are envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act's (NEMBA) biodiversity goals (Nel et al., 2011). Relevant - The PAOI does not overlap with some FEPA wetlands (Figure 4-10).

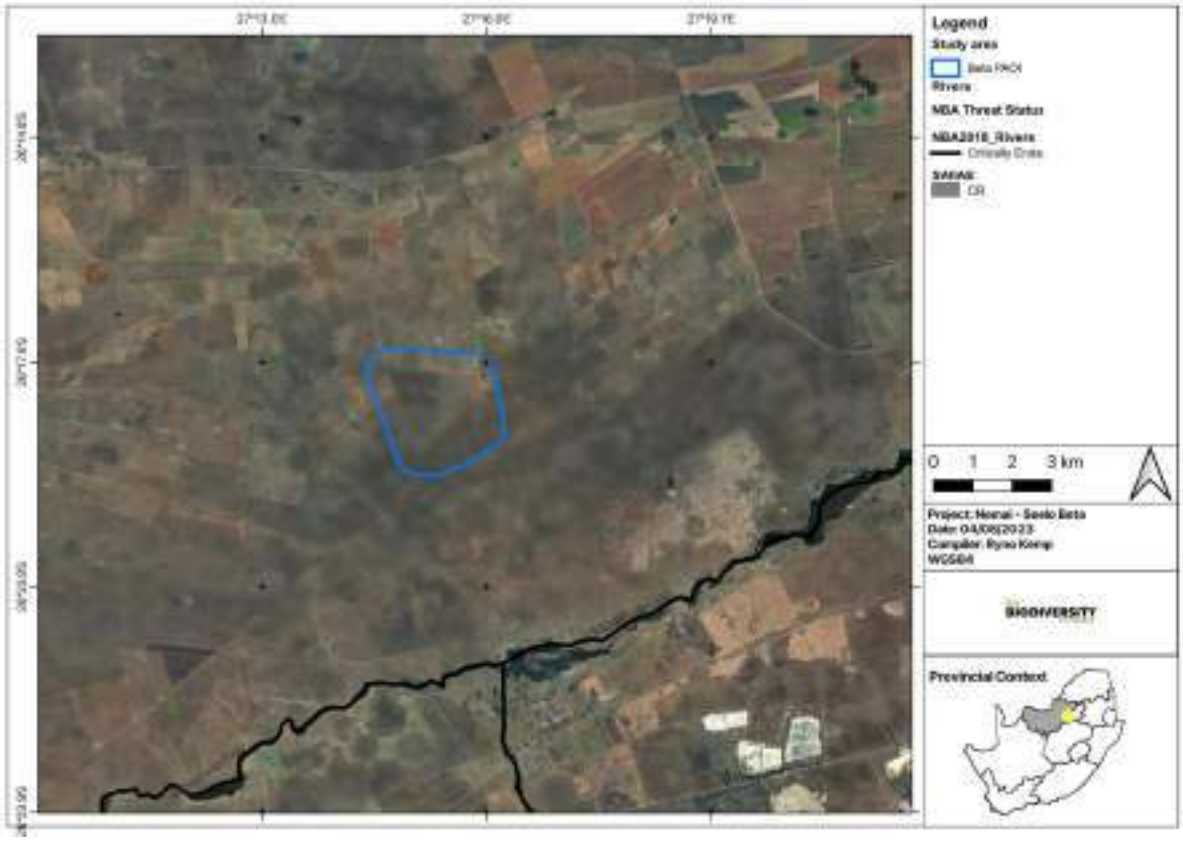

Figure 4-9 ***Map illustrating the Project Area of Influence (PAOI) in relation to South African Inventory of Inland Aquatic Ecosystems (SAIIAE) features***

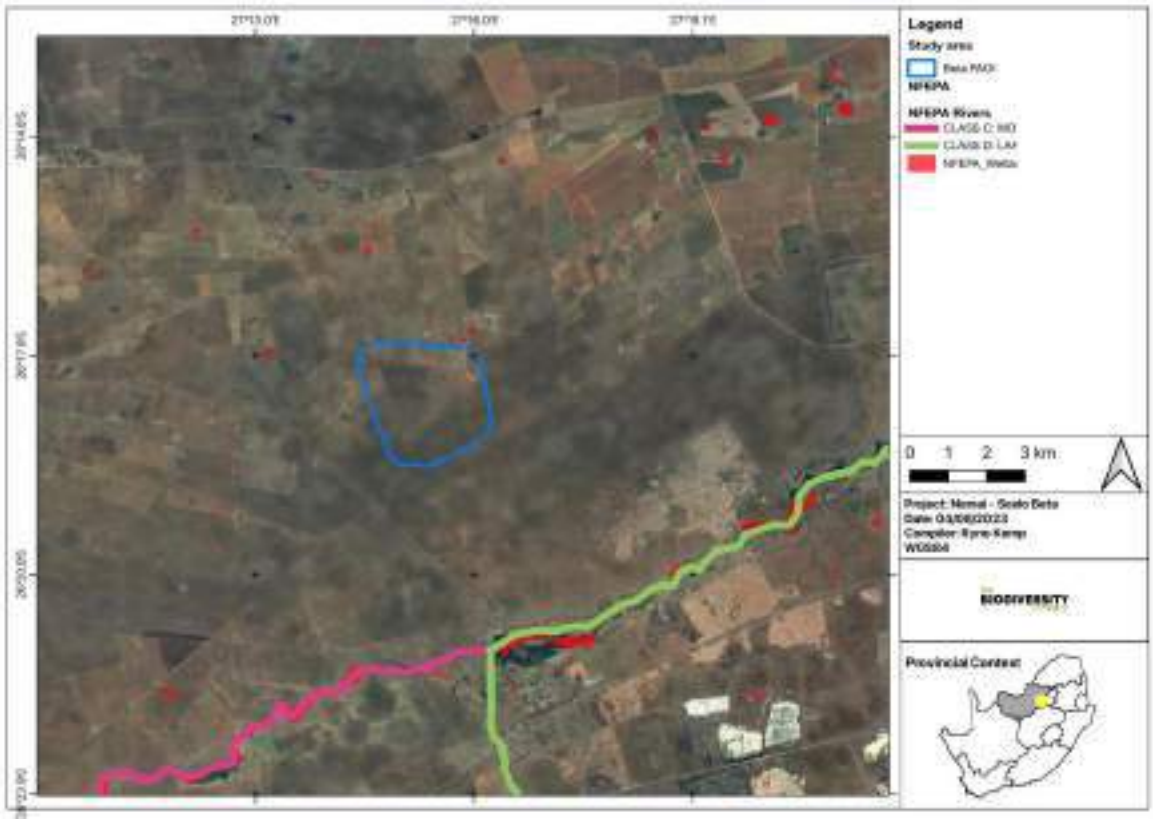

Figure 4-10 ***Map illustrating the Project Area of Influence (PAOI) in relation to the National Freshwater Ecosystem Priority Areas***

4.2.1.10 Strategic Transmission Corridors (EGI)

On the 16 February 2018, Minister Edna Molewa published Government Notice No. 113 in Government Gazette No. 41445, which identified 5 strategic transmission corridors important for the planning of electricity transmission and distribution infrastructure as well as the procedure to be followed when applying for environmental authorisation for electricity transmission and distribution expansion when occurring in these corridors.

On 29 April 2021, Minister Barbara Dallas Creecy published Government Notice No. 383 in Government Gazette No. 44504, which expanded the eastern and western transmission corridors and gave notice of the applicability of the application procedures identified in Government Notice No. 113, to these expanded corridors. More information on this can be obtained from https://egis.environment.gov.za/egi. Relevant - The PAOI overlaps with the EGI corridor. (Figure 4-11)

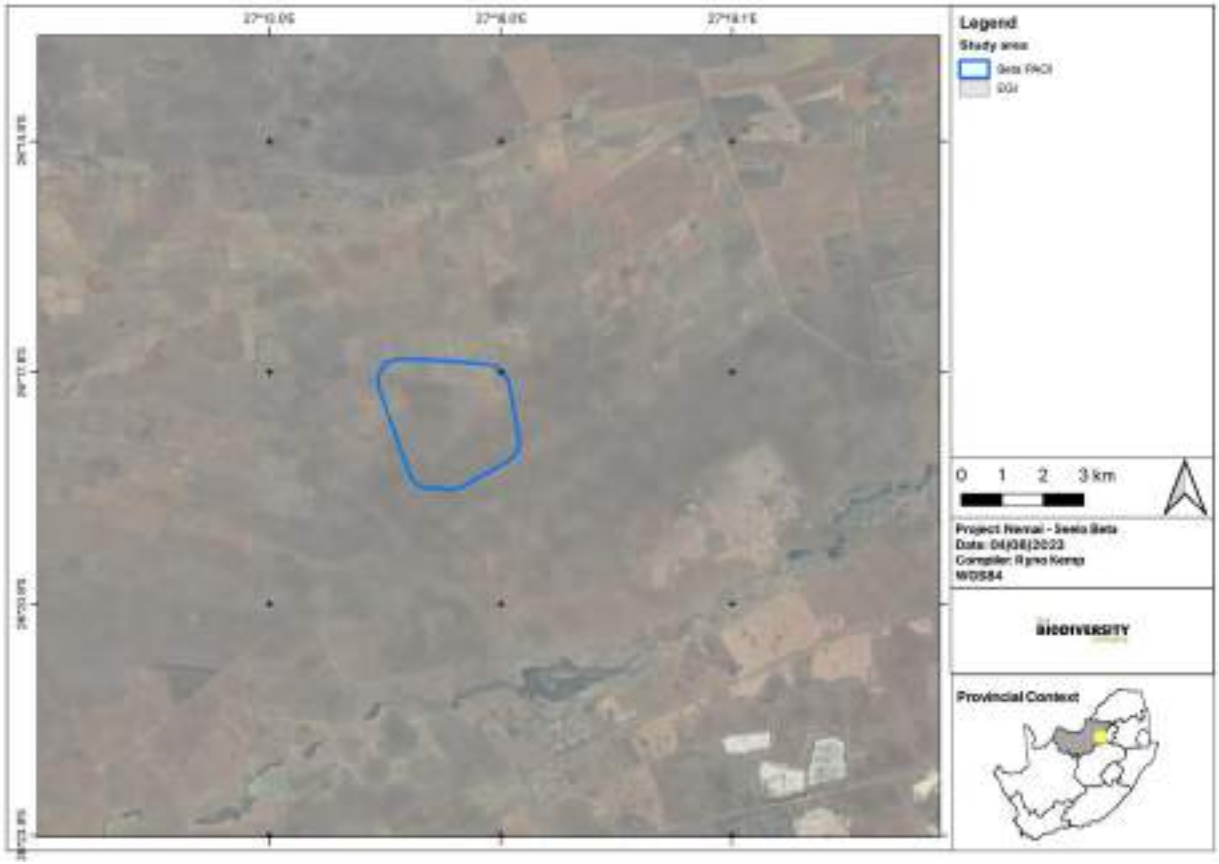

Figure 4-11 Map illustrating the locations of the Strategic Transmission Corridors proximal to the Project Area of Influence (PAOI)

4.2.1.11 Renewable Energy Development Zones (REDZ)

In 2018 the Government Notice No. 114 in Government Gazette No. 41445 was published where 8 renewable energy development zones important for the development of large-scale wind and solar photovoltaic facilities were identified. In 2021 an additional 3 sites were included. The REDZs were identified through the undertaking of 2 Strategic Environmental Assessments. Irrelevant - The PAOI does not overlap with any REDZ (Figure 4-12).

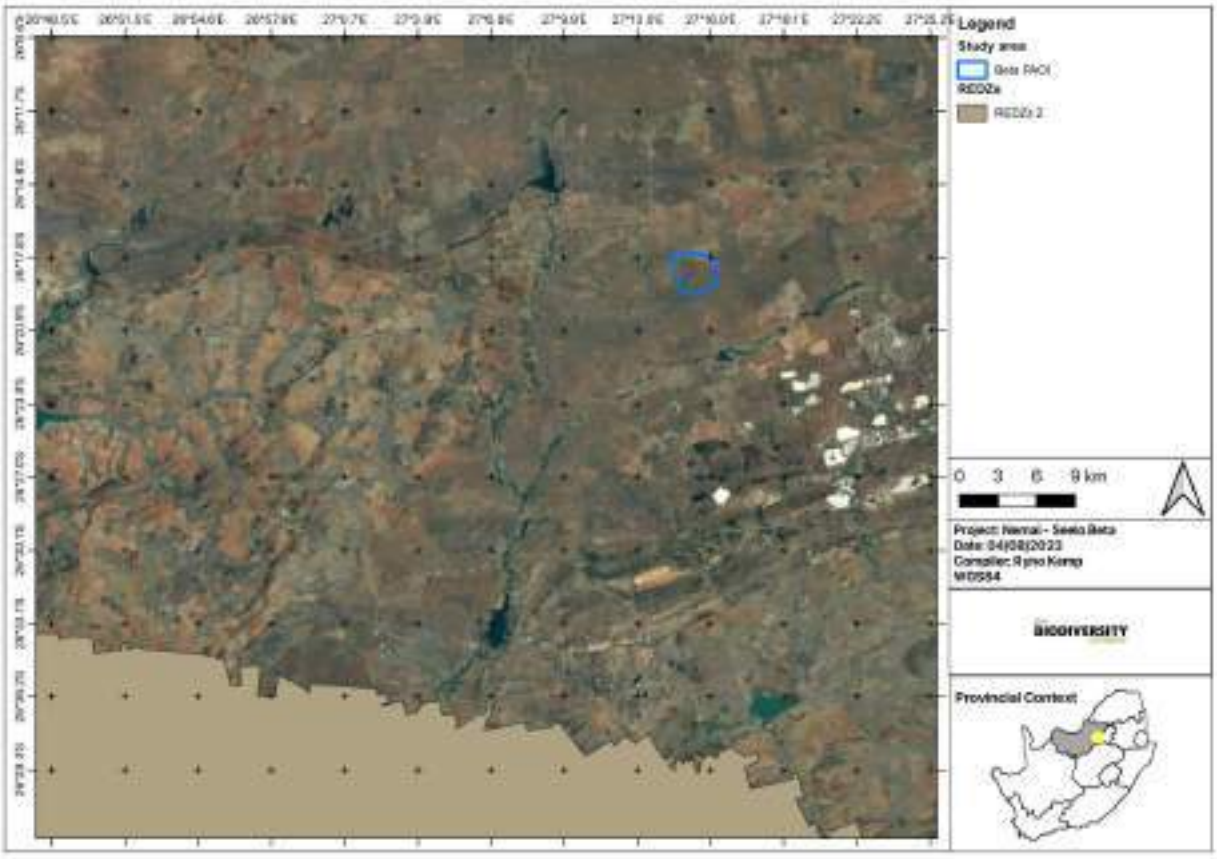

Figure 4-12 Map illustrating the locations of Renewable Energy Development Zones proximal to the Project Area of Influence (PAOI)

4.2.1.12 Renewable Energy EIA Application Database

The Renewable Energy Database (http://egis.environment.gov.za/), shows that there several other projects in the near vicinity (Figure 4-13). This increases the overall impact on the habitats in the area. Relevant - The PAOI is in close proximity to already approved REEA project (Figure 4-13).

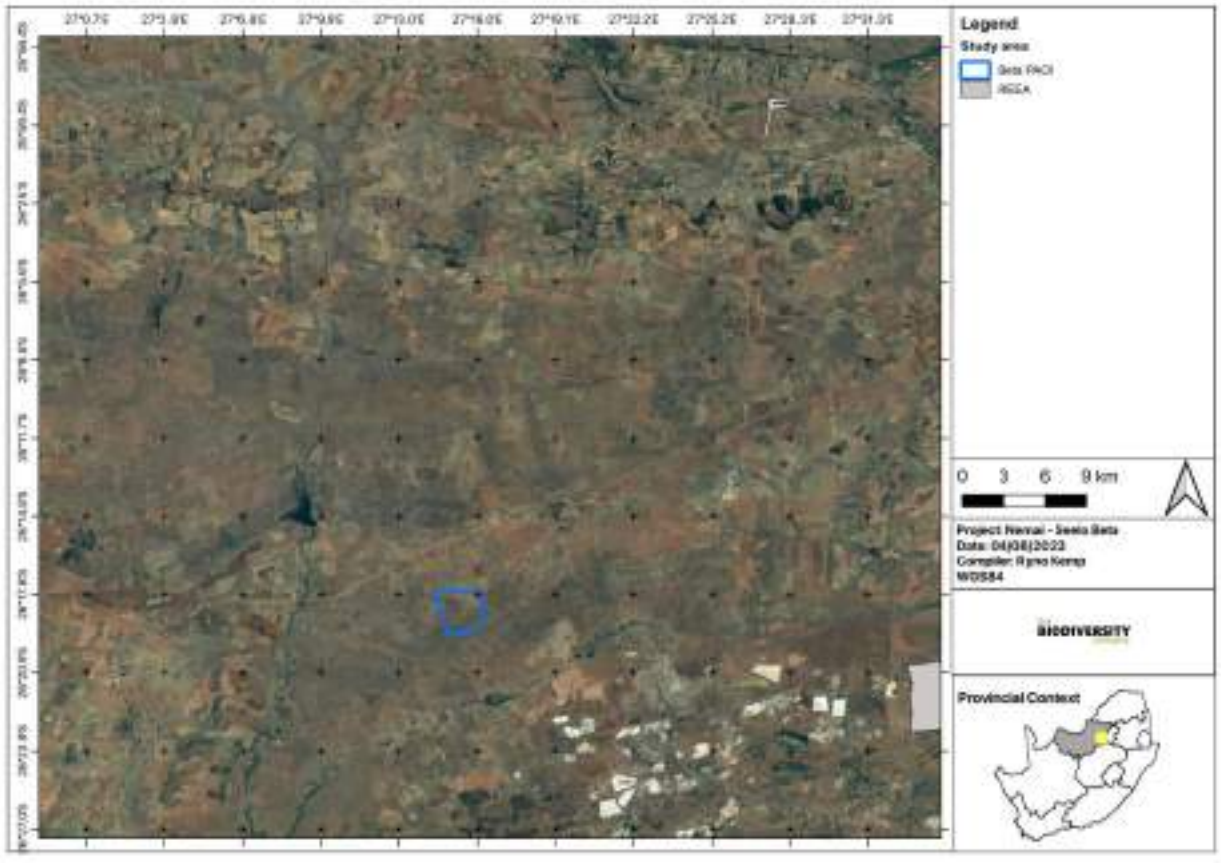

Figure 4-13 The PAOI in relation to the Renewable Energy EIA Application Database projects in the area.

4.3 Expected Species of Conservation Concern

The SABAP2 Data lists 320 indigenous avifauna species that could be expected to occur within the PAOI and surrounding landscape (Figure 4-14; Appendix A). Twenty (20) of these expected species are regarded as SCC (Table 4-2). These species are described below.

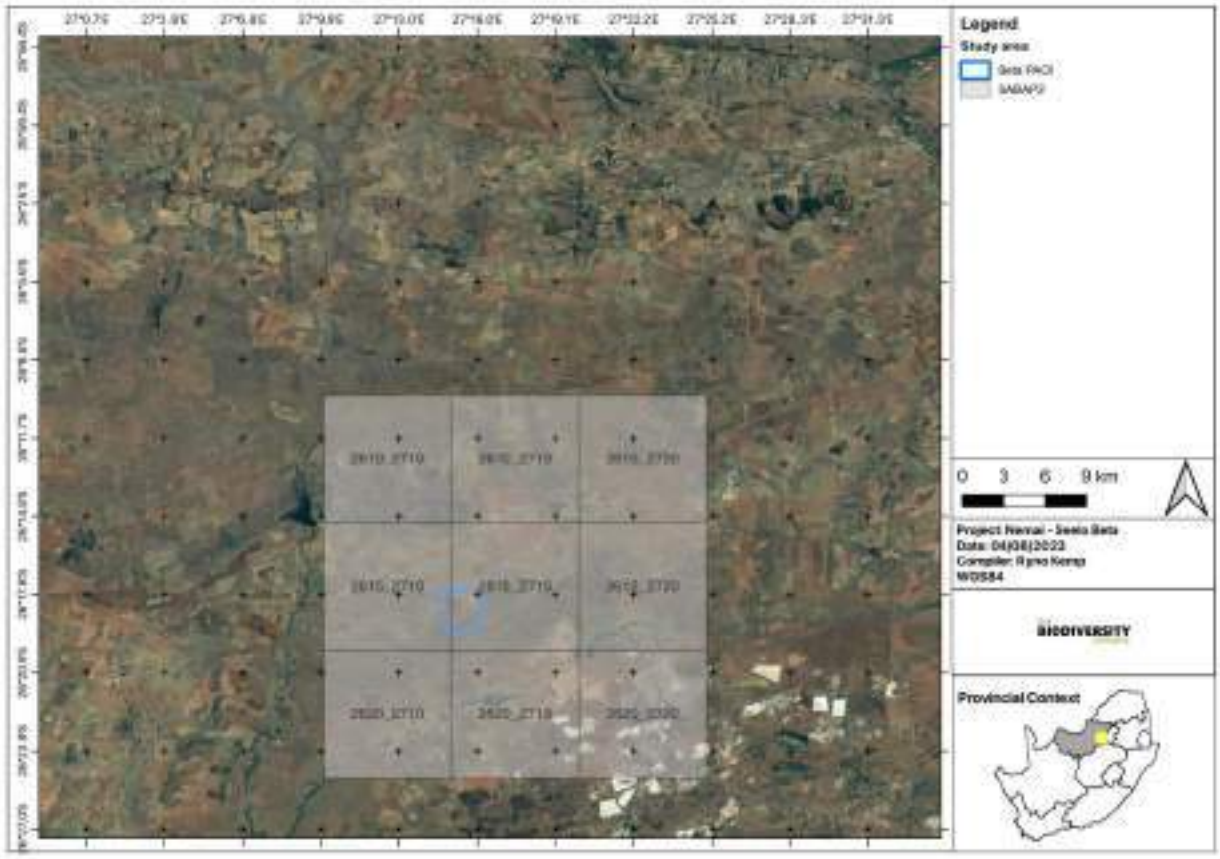

Figure 4-14 ***Map illustrating the SABAP2 pentads used to compile the expected species list***

Table 4-2 ***Expected avifauna Species of Conservation Concern that are expected to occur within the PAOI. CR = Critically Endangered, EN = Endangered, LC = Least Concern, NT = Near Threatened and VU = Vulnerable***

Scientific Name	Common Name	Conservation Status		Likelihood of Occurrence
		Regional	Global (IUCN)	
Alcedo semitorquata	Half-collared Kingfisher	NT	LC	Low
Anthropoides paradiseus	Blue Crane	NT	VU	High
Aquila verreauxii	Verreaux's Eagle	NA	LC	Low
Calidris ferruginea	Curlew Sandpiper	LC	NT	Low
Ciconia abdimii	Abdim's Stork	NT	LC	Low
Circus macrourus	Pallid Harrier	NT	NT	Low
Circus ranivorus	African Marsh Harrier	EN	LC	High
Falco biarmicus	Lanner Falcon	VU	LC	Medium
Falco vespertinus	Red-footed Falcon	NT	VU	Low
Glareola nordmanni	Black-winged Pratincole	NT	NT	Low
Gyps africanus	White-backed Vulture	CR	CR	Low
Gyps coprotheres	Cape Vulture	EN	VU	High
Hydropogne caspia	Caspian Tern	VU	LC	Low
Mycteria ibis	Yellow-billed Stork	EN	LC	Medium
Oxyura maccoa	Maccoa Duck	NT	EN	Low
Phoeniconaias minor	Lesser Flamingo	NT	NT	Medium
Phoenicopterus roseus	Greater Flamingo	NT	LC	Medium
Sagittarius serpentarius	Secretarybird	VU	EN	High
Torgos tracheliotos	Lappet-faced Vulture	EN	EN	Low
Tyto capensis	African Grass Owl	VU	LC	Medium

*(Taylor *et al*. 2015), + (IUCN 2021)

Anthropoides paradiseus (Blue Crane) is listed as NT on a regional scale and as VU on a global scale. This species has declined, largely owing to direct poisoning, power-line collisions and loss of its grassland breeding habitat owing to afforestation, mining, agriculture and development (IUCN, 2017). This species breeds in natural grass- and sedge-dominated habitats, preferring secluded grasslands at high elevations where the vegetation is thick and short.

Circus ranivorus (African Marsh Harrier) is listed as EN in South Africa (ESKOM, 2014). This species has an extremely large distributional range in sub-equatorial Africa. South African populations of this species are declining due to the degradation of wetland habitats, loss of habitat through over-grazing and human disturbance and possibly, poisoning owing to over-use of pesticides (IUCN, 2017). This species breeds in wetlands and forages primarily over reeds and lake margins.

Falco biarmicus (Lanner Falcon) is native to South Africa and inhabits a wide variety of habitats, from lowland deserts to forested mountains (IUCN, 2017). They may occur in groups up to 20 individuals, but have also been observed solitary. Their diet is mainly composed of small birds such as pigeons and francolins.

Gyps coprotheres (Cape Vulture) is listed as Endangered (EN) on both a regional and global scale. Cape Vultures are long-lived carrion-feeders specialising on large carcasses, they fly long distances over open country, although they are usually found near steep terrain, where they breed and roost on cliffs (IUCN, 2017). Individuals may be seen foraging within the area but are unlikely to be resident.

Mycteria ibis (Yellow-billed Stork) is listed as EN on a regional scale and Least Concern (LC) on a global scale. This species is migratory and has a large distributional range which includes much of sub-Saharan Africa. It is typically associated with freshwater ecosystems, especially wetlands and the margins of lakes and dams (IUCN, 2017).

Phoenicopterus roseus (Greater Flamingo) is listed as NT on a regional scale only. This species breed on large undisturbed alkaline and saline lakes, salt pans or coastal lagoons, usually far out from the shore after seasonal rains have provided the flooding necessary to isolate remote breeding sites from terrestrial predators and the soft muddy material for nest building (IUCN, 2017).

Phoeniconaias minor (Lesser Flamingo) is listed as NT on a global and regional scale whereas *Phoenicopterus roseus* (Greater Flamingo) is listed as NT on a regional scale only. Both species have similar habitat requirements and the species breed on large undisturbed alkaline and saline lakes, salt pans or coastal lagoons, usually far out from the shore after seasonal rains have provided the flooding necessary to isolate remote breeding sites from terrestrial predators and the soft muddy material for nest building (IUCN, 2017).

Sagittarius serpentarius (Secretary bird) occurs in sub-Saharan Africa and inhabits grasslands, open plains, and lightly wooded savanna. It is also found in agricultural areas and sub-desert (IUCN, 2017).

Tyto capensis (African Grass-owl) is rated as Vulnerable (VU) on a regional basis. The distribution of the species includes the eastern parts of South Africa. The species is generally solitary, but it does also occur in pairs, in moist grasslands where it roosts (IUCN, 2017). The species prefers thick grasses around wetlands and rivers which are not present in the project area. Furthermore, this species specifically has a preference for nesting in dense stands of the grass species *Imperata cylindrica*.

4.4 Field Assessment

4.5 Species List of the Field Survey

Two site visits were conducted for the purpose of this regime 2 assessment. The first field investigation was conducted in the summer, over 3 days from the 17th to the 19th of February 2023. The second field investigation was conducted during late summer, over 3 days from the 21st to the 23rd of April 2023,103 species were recorded during the point counts (Appendix B). The total number of individual species accounts for approximately 32.19% of the total number of expected species

Three of the expected SCC was recorded within the PAOI and surrounding area during the survey period within point counts, i.e., *Anthropoides paradiseus* (Blue Crane), *Phoenicopterus roseus* (Greater Flamingo) which was recorded outside the PAOI and *Sagittarius serpentarius* (Secretarybird)

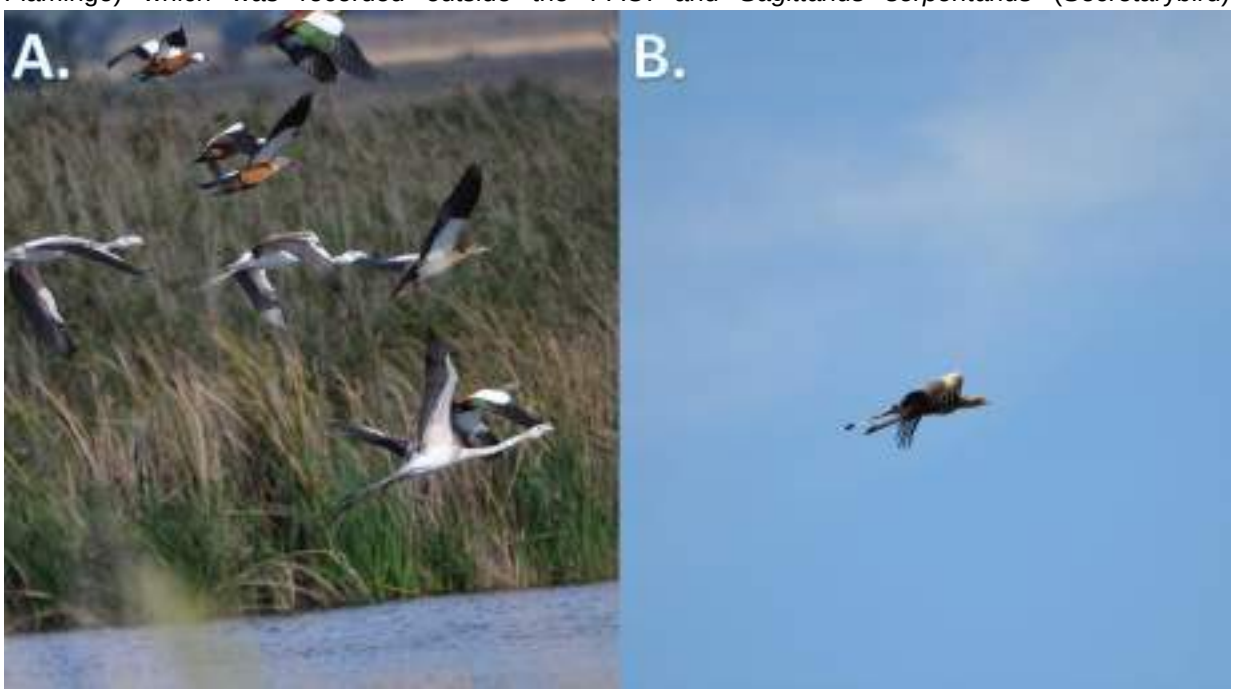

Figure 4-15 shows a photograph of the species, while

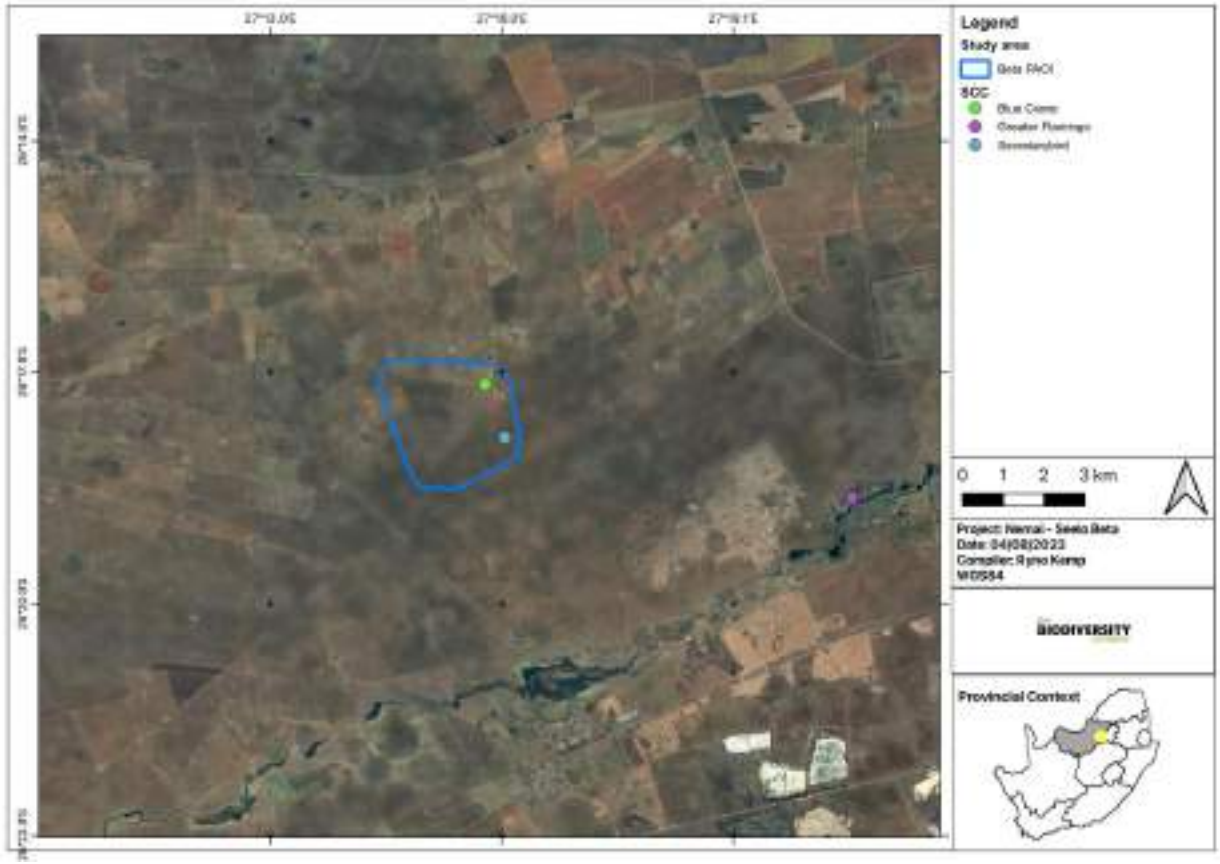

Figure 4-16 shows the location of the observed species.

Figure 4-15 Photograph illustrating the SCC recorded from the project area – A. Phoenicopterus roseus (Greater Flamingo) and B. Sagittarius serpentarius (Secretarybird)

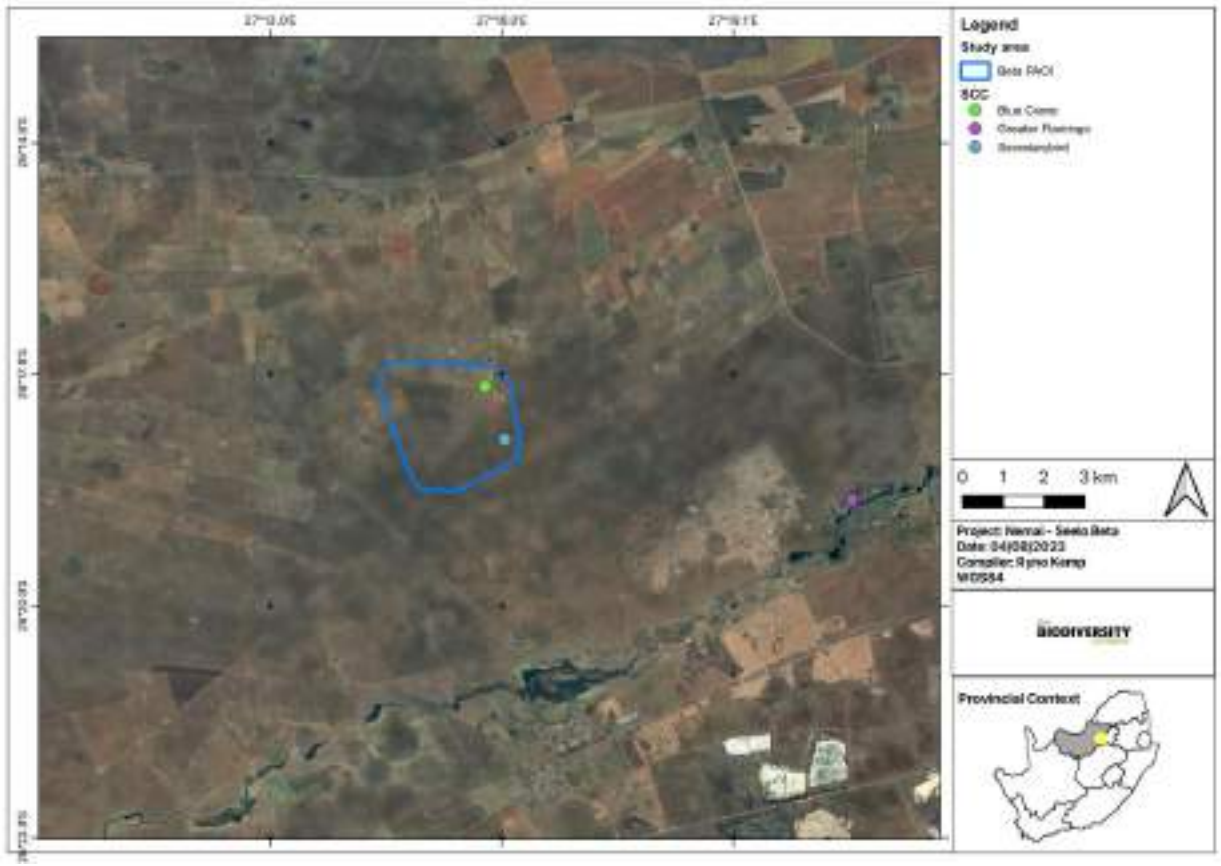

Figure 4-16 Map illustrating location of the recorded SCC within the PAOI

4.5.1.1 Risk Species

As aforementioned, Priority Species are considered threatened, rare or prone to impacts from energy development (Ralston Paton *et al*, 2017). TBC has defined Risk Species as those species that are listed in Ralston Paton *et al* (2017) as Priority Species, as well as those listed in the Eskom poster of Birds and Power Lines (Eskom and EWT, no date), which together include all species, common or red-listed that may be at risk of collision, electrocution or habitat loss as a result of the proposed activity. Eighteen (18) of the species observed within the PAOI and surrounding areas are regarded as priority species (Table 4-3).

Table 4-3 Summary of Priority Species recorded within and around the proposed development

Scientific Name	Common Name	Sources	Collision	Electrocution	Disturbance/Habitat Loss
Haliaeetus vocifer	African Fish Eagle	X	X	X	X
Elanus caeruleus	Black-winged Kite	X	X		
Anthropoides paradiseus	Blue Crane	X	X		X
Spatula hottentota	Blue-billed Teal	O	X		
Spatula smithii	Cape Shoveler	O	X		
Alopochen aegyptiaca	Egyptian Goose	O	X	X	
Phoenicopterus roseus	Greater Flamingo	X	X		X
Falco naumanni	Lesser Kestrel	X		X	
Afrotis afraoides	Northern Black Korhaan	X	X		X
Ardea purpurea	Purple Heron	O	X		X
Anas erythrorhyncha	Red-billed Teal	O	X		
Microcarbo africanus	Reed Cormorant	O	X		
Sagittarius serpentarius	Secretarybird	X	X		X
Tadorna cana	South African Shelduck	O	X		
Plectropterus gambensis	Spur-winged Goose	O	X		
Phalacrocorax lucidus	White-breasted Cormorant	O	X		
Dendrocygna viduata	White-faced Whistling Duck	O	X		
Anas undulata	Yellow-billed Duck	O	X		

Source (X - Ralston Paton *et al*, 2017; O - Eskom and EWT, no date)

4.5.1.2 Dominant Species

Table 4-4 provides the relative abundance of the dominant species as well as the frequency with which each species appeared in the point count samples. The most abundant species was the *Afrotis afraoides* (Northern Black Korhaan), with a relative abundance of 0.072 and a frequency of occurrence of 72.381% (Table 4-4). Additional ubiquitous species comprised of *Afrotis afraoides* (Northern Black Korhaan) and *Cisticola juncidis* (Wing-snapping cisticola) with a frequency of occurrence of 72.381% and 49.524%, respectively.

Table 4-4 Relative abundance and frequency of occurrence of dominant avifauna species recorded during the standardised point counts within and around the proposed development during the field survey.

Scientific Name	Common Name	Relative abundance	Frequency
Afrotis afraoides	Northern Black Korhaan	0.071	72.381
Tadorna cana	South African Shelduck	0.059	7.619

Cisticola ayresii	Wing-snapping Cisticola	0.053	49.524
Columba guinea	Speckled Pigeon	0.051	12.381
Cisticola juncidis	Zitting Cisticola	0.041	33.333
Hirundo rustica	Barn Swallow	0.038	39.048
Riparia cincta	Banded Martin	0.039	30.476
Cisticola aridulus	Desert Cisticola	0.034	40.000
Mirafra fasciolata	Eastern Clapper Lark	0.034	31.429
Mirafra africana	Rufous-naped Lark	0.029	33.333
Macronyx capensis	Cape Longclaw	0.029	36.190
Corvus albus	Pied Crow	0.028	26.667
Fulica cristata	Red-knobbed Coot	0.028	4.762
Cisticola textrix	Cloud Cisticola	0.025	31.429
Myrmecocichla formicivora	Ant-eating Chat	0.026	30.476
Anas erythrorhyncha	Red-billed Teal	0.025	5.714
Bubulcus ibis	Western Cattle Egret	0.022	20.000
Streptopelia capicola	Ring-necked Dove	0.019	25.714
Prinia flavicans	Black-chested Prinia	0.018	23.810
Eremopterix leucotis	Chestnut-backed Sparrow-Lark	0.017	1.905

4.5.1.3 Trophic Guilds

Trophic guilds are defined as a group of species that exploit the same class of environmental resources in a similar way (González-Salazar *et al,* 2014). The guild classification used in this assessment is as per González-Salazar *et al* (2014); they divided avifauna into 13 major groups based on their diet, habitat, and main area of activity. Although species to tend to exhibit varied diet with invertivores consuming fruit and frugivores consuming insects for example, the dominant composition of the diet was considered.

The analysis of the major avifaunal guilds reveals that the species composition during the survey was dominated by invertivores birds that feed on the ground during the day (IGD). Followed by Omnivores (OMD) and Granivores (GGD) (Figure 4-17). The species composition is spread throughout the various groups.

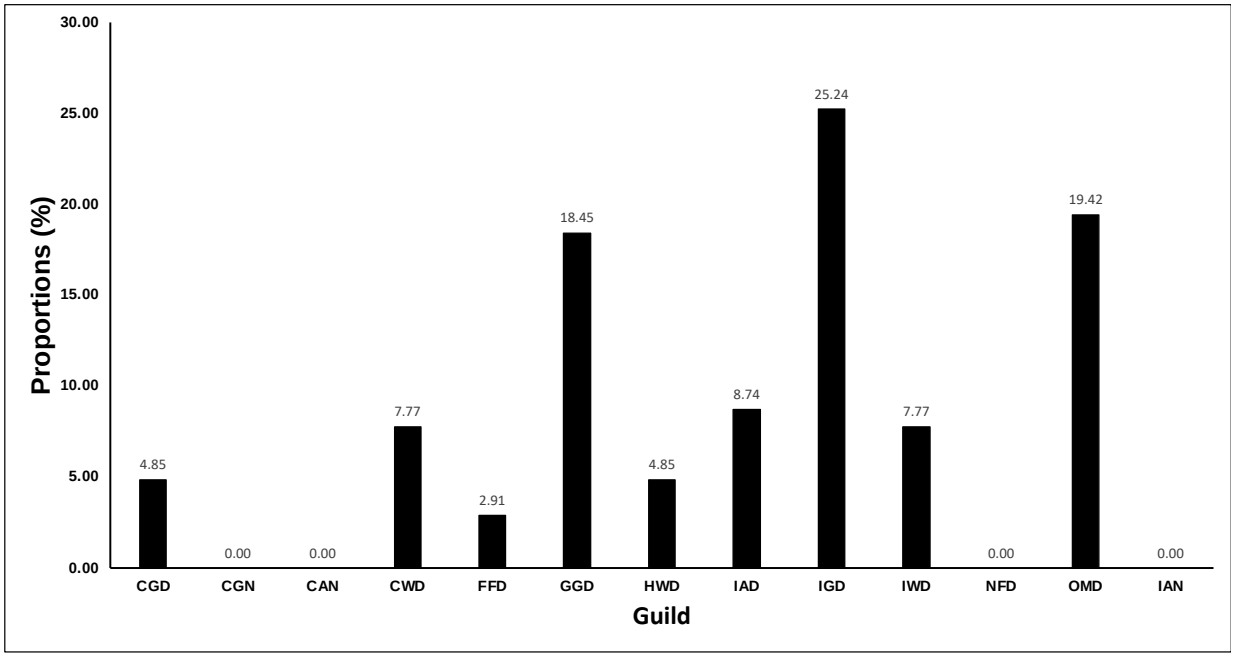

Figure 4-17 ***Column plot illustrating the proportion of each Functional Feeding Guild to the total abundance. Avifaunal trophic guilds – CGD, Carnivore Ground Diurnal; CGN, Carnivore Ground Nocturnal, CAN, Carnivore Air Nocturnal, CWD, Carnivore Water Diurnal; FFD, Frugivore Foliage Diurnal; GGD, Granivore Ground Diurnal; HWD, Herbivore Water Diurnal; IAD, Invertivore Air Diurnal; IGD, Insectivore Ground Diurnal; IWD, Invertivore Water Diurnal; NFD, Nectivore Foliage Diurnal; OMD, Omnivore Multiple Diurnal; IAN, Invertivore Air Nocturnal.***

4.5.1.4 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. This section needs to be interpreted with caution based on the limited time spend on this component.

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.

4.6 Fine-Scale Habitat Use

Fine-scale habitats within the landscape are important in supporting a diverse avifauna community as they provide differing nesting, foraging and reproductive opportunities. Two different habitat types were delineated within the PAOI, comprising of Degraded Grassland and Modified landscape.

4.7 Degraded Grassland

This habitat unit can be regarded as important, not only within the local landscape, but also regionally. The unit functions as remaining greenlands which supports viable indigenous plant species populations and is also used for foraging. The unit also serves as a movement corridor for fauna within a landscape mainly fragmented by agricultural practices. Avifauna species utilising this habitat type included, but not limited to *Sagittarius serpentarius* (Secretarybird), *Bubulcus ibis* (Western Cattel Egret), *Euplectes progne* (Long-tailed Widowbird), *Cisticola juncidis* (Zittign Cisticola), *Vanellus coronatus* (Crowned Lapwing), *Numida melaegis* (Helmeted guineafowl) and *Afrotis afraoides* (Northern Black Korhaan).

Figure 4-18 Photograph illustrating an example of the Degraded grassland habitat observed in the PAOI

4.8 Transformed Areas

The Modified Area consisted primarily of urban development and existing electricity infrastructure and roads (Figure 4-19). These areas were mostly void of avifauna species, with the species recorded here being those resilient to disturbance. Species occurring here included *Vanellus armatus* (Blacksmith Lapwing), *Lamprotornis nitens* (Cape Glossy Starling), *Passer melanurus* (Cape Sparrow), *Streptopelia capicola* (Cape Turtle Dove), *Acridotheres tristis* (Common Myna), and *Dicrurus adsimilis* (Fork-tailed Drongo).

Figure 4-19 Photograph illustrating an example of the modified habitats observed in the broader assessment area

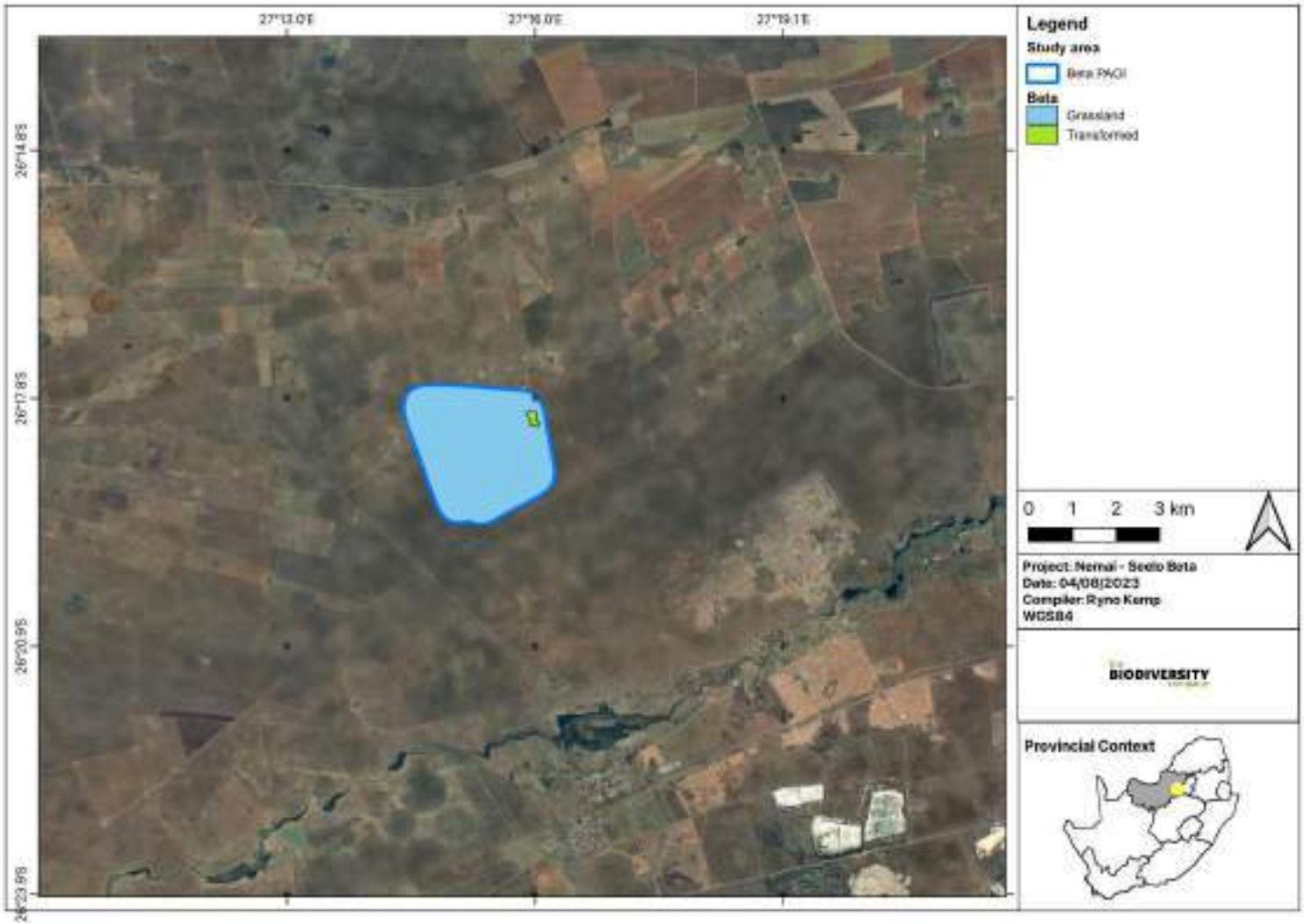

Figure 4-20 Map illustrating the habitat types delineated within the proposed Beta PV Area

5 Site Ecological Importance (SEI)

5.1 Environmental Screening Tool

The terrestrial biodiversity theme sensitivity as indicated by the screening tool report for the project area of influence, was derived to be 'Low' (Figure 5-1).

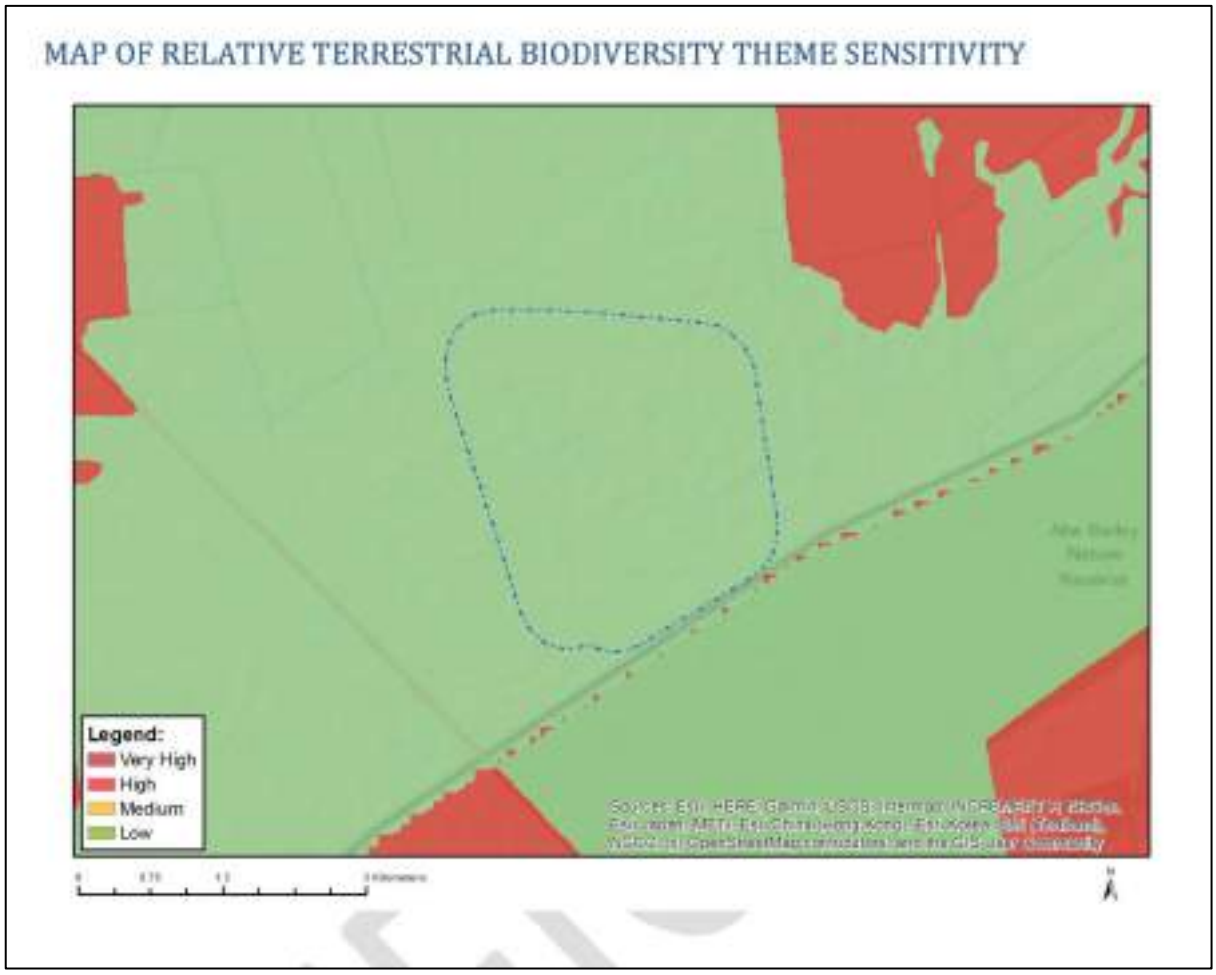

Figure 5-1 Terrestrial Biodiversity Theme Sensitivity for the PAOI, National Web based Environmental Screening Tool

As indicated in the screening report, the Animal Species Theme sensitivity was derived from being 'medium for the PAOI (Figure 5-2).]

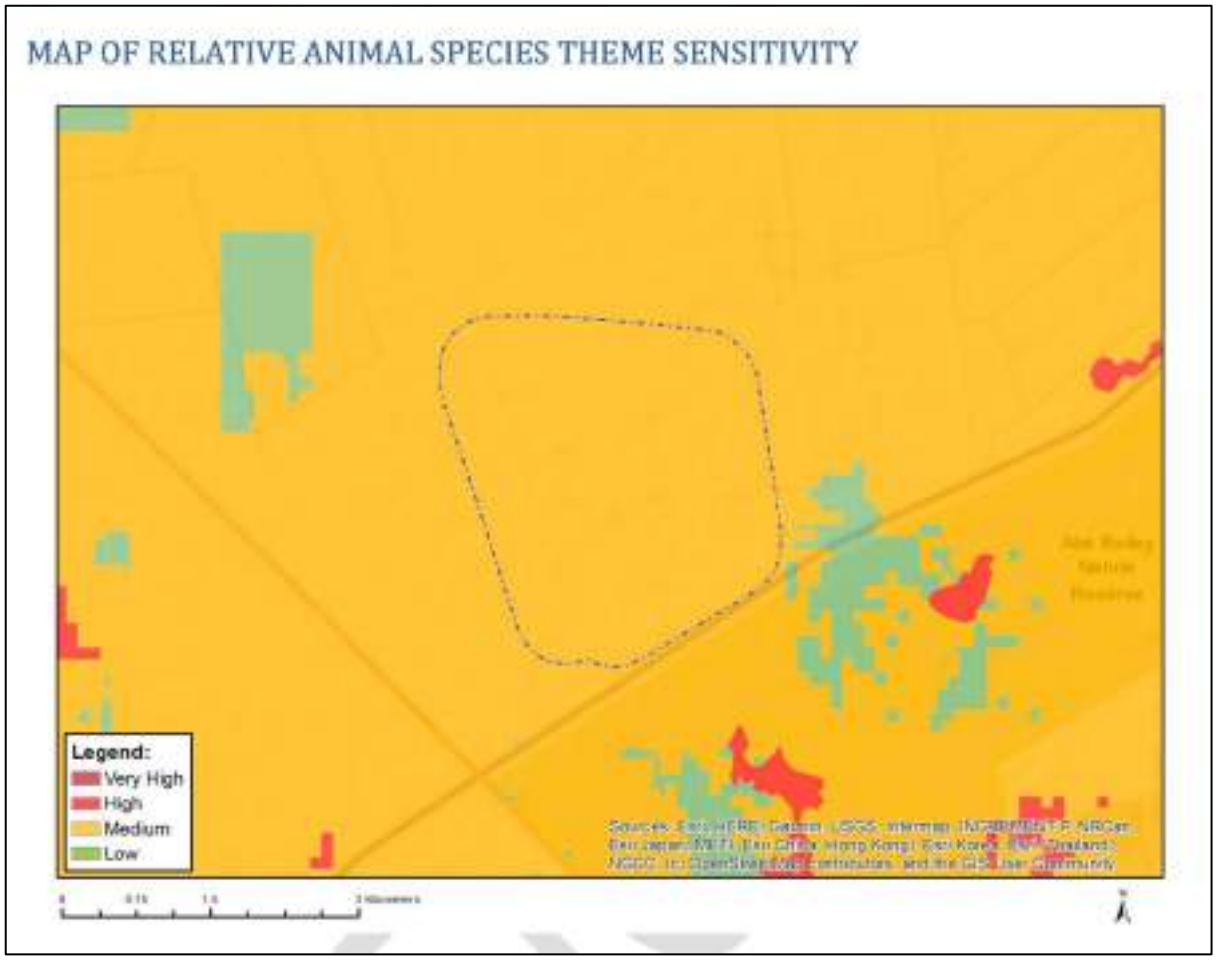

Figure 5-2 Fauna Theme Sensitivity for the PAOI, National Web based Environmental Screening Tool

5.2 Site Ecological Importance (SEI)

Based on the criteria provided in Section 3.6 of this report, all habitats within the assessment area of the proposed project were allocated a sensitivity or SEI category (Table 5-1).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 5-3. 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 Open Savannah was assigned a medium SEI and the modified area a very low SEI.

Table 5-1 SEI Summary of habitat types delineated within field assessment area of project area

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Modified Grasslands	Medium Confirmed or highly likely occurrence of populations of NT species	Medium Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity	**Medium**	Medium Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality	**Medium**
Transformed	Very Low	Very Low	**Very Low**	Very High	**Very Low**

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.	Several major current negative ecological impacts.		Habitat that can recover rapidly	

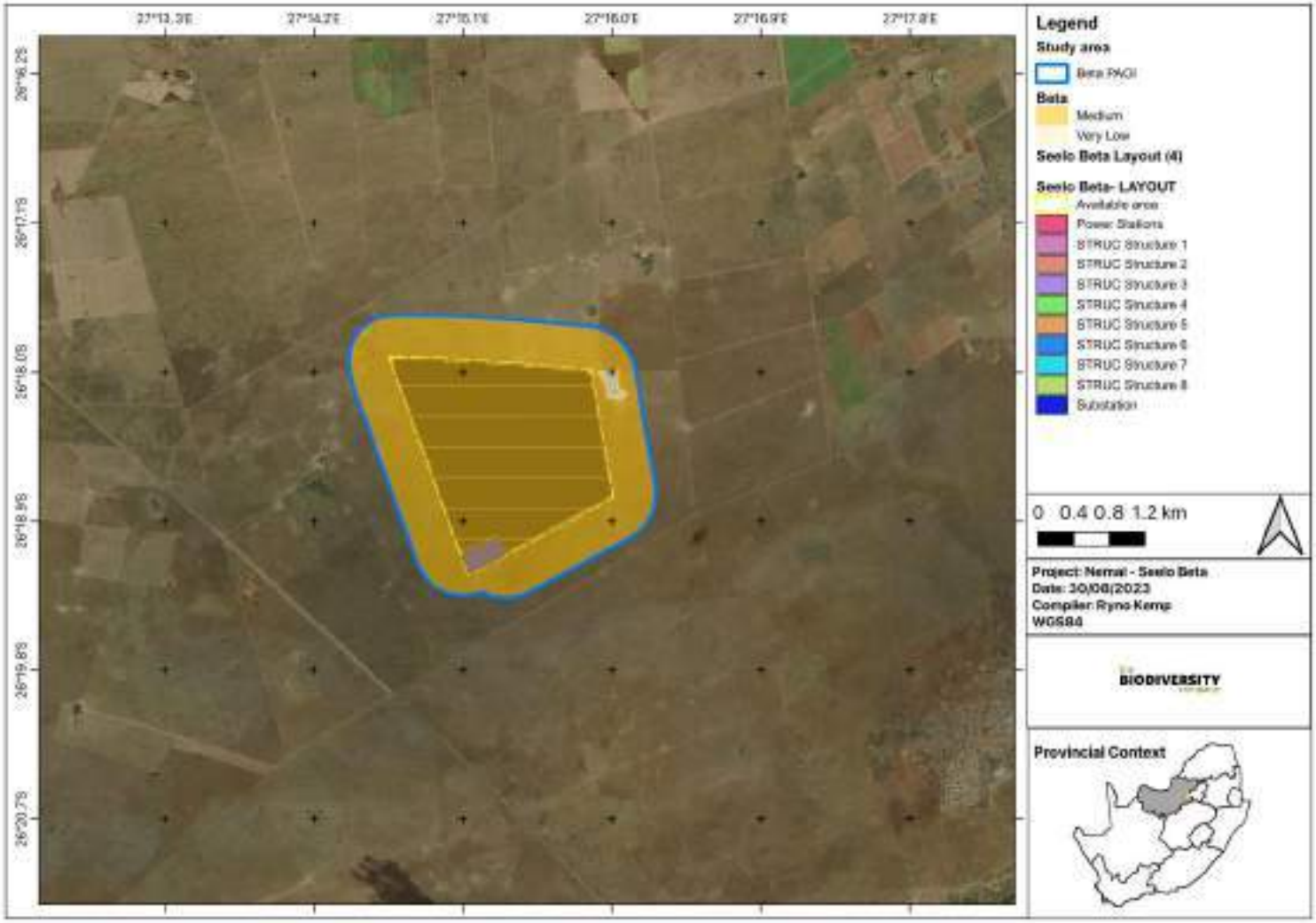

Figure 5-3 Map illustrating the Site Ecological Importance of the proposed development within an avifauna context

6 Impact Assessment

Potential impacts were evaluated against the data captured during the fieldwork and from a desktop perspective to identify relevance to the project site, specifically the proposed development footprint area. The assessment of the significance of direct, indirect and cumulative impacts was undertaken. Bennun *et al* (2021) describes three broad types of impacts associated with solar energy development:

- Direct impacts – Impacts that result from project activities or operational decisions that can be predicted based on planned activities and knowledge of local biodiversity, such as habitat loss under the project footprint, habitat fragmentation as a result of project infrastructure and species disturbance or mortality as a result of project operations.

- Indirect impacts – Impacts induced by, or 'by-products' of, project activities within a project's area of influence.

- Cumulative impacts – Impacts that result from the successive, incremental and/or combined effects of existing, planned and/or reasonably anticipated future human activities in combination with project development impacts.

The assessment of impact significance considers pre-mitigation as well as implemented post-mitigation scenarios. Three phases were considered for the impact assessment:

- Construction Phase;
- Operational Phase; and
- Closure/Rehabilitation Phase.

6.1 Present Impacts to Avifauna

In consideration that there are anthropogenic activities and influences are present within the landscape, there are several negative impacts to biodiversity, including avifauna (Figure 6-1). These include:

- Existing energy infrastructure;
- Noise pollution;
- Minor and major gravel roads and associated vehicle traffic;
- Invasive Alien Plants;
- Livestock agriculture; and
- Fences and associated infrastructure.

Figure 6-1 Photograph illustrating an example of impacts observed within the proposed development.

6.2 Anticipated Impacts

This section describes the potential impacts on avifauna associated with the construction and operational phases of the proposed development and is only relevant to the PV site and associated infrastructure.

During the construction phase vegetation clearing for the associated infrastructure will lead to direct habitat loss. Vegetation clearing will create a disturbance and will therefore potentially lead to the displacement of avifaunal species. The operation of construction machinery on site will generate noise pollution. Increased human presence can lead to poaching and the increase in vehicle traffic and heavy machinery will potentially lead to roadkill.

The principal impacts of the operational phase are electrocution, collisions, chemical pollution due to chemical cleaning of the PV panels (should environmentally friendly or biodegradable products not be used) and habitat loss. Solar panels have been implicated as a potential risk for bird collisions. Collisions are thought to arise when birds (particularly waterbirds) mistake the panels for waterbodies, known as the “lake effect” (Lovich & Ennen, 2011), or when migrating or dispersing birds become disorientated by the polarised light reflected by the panels. This “lake-effect” hypothesis has not been substantiated or refuted to date (Visser *et al,* 2019). It can however be said that the combination of powerlines, fencing and large infrastructure will influence avifauna species. Visser *et al* (2019) performed a study at a utility-scale PV SEF in the Northern Cape and found that most of the species affected by the facility were passerine species. This is due to collisions with solar panels from underneath. During a predator attack while foraging under the panels, individuals may alight and then collide with the panel. Larger species were said to be more influenced by the facilities when they were found foraging close by and were disturbed by predators which resulted in collisions with infrastructure.

Large passerines are particularly susceptible to electrocution because owing to their relatively large bodies, they are able to touch conductors and ground/earth wires or earthed devices simultaneously. The chances of electrocution are increased when feathers are wet, during periods of high humidity or during defecation. Prevailing wind direction also influences the rate of electrocution casualties.

Fencing of the PV site can influence birds in six ways (BirdLife South Africa, 2015):

- Snagging – occurs when a body part is impaled on one or more barbs or razor points of a fence;
- Snaring – when a bird’s foot/leg becomes trapped between two overlapping wires;
- Impact injuries – birds flying into a fence, the impact may kill or injure the bird;
- Snarling – when birds try and push through a mesh or wire stands, ultimately becoming trapped (uncommon);
- Electrocution – electrified fence can kill or severely injure birds; and
- Barrier effect – fences may limit flightless birds including moulting waterfowl from resources.

Chemical pollution from PV cleaning, if not environmentally friendly will result in either acute or chronic affects. Should this chemical penetrate into the surrounding environment, it would impact populations on a larger scale and not just species found in and around the PV footprint.

6.3 Alternatives considered

No alternatives were considered for this project.

6.4 Loss of Irreplaceable Resources

The proposed development will lead to the loss of the following irreplaceable resources:

- Habitat and possible nesting sites for avifauna SCC (i.e., nesting potential for Secretarybird).

6.5 Assessment of Impact Significance

The assessment of impact significance considers pre-mitigation as well as implemented of post-mitigation scenarios. Although different species and groups will react differently to the development, the risk assessment was undertaken bearing in mind the potential impacts to the priority species listed in this report.

6.5.1 Construction Phase

6.5.1.1 Habitat destruction

Habitat destruction of the proposed development is inevitable. Pre-mitigation the significance of the impact is a Negative Very High Impact but with the implementation of mitigation measures can be reduced to a Negative Medium Impact.

Pre mitigation							
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**
Post mitigation							
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**

Mitigation Actions:

- If feasible 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 fossorial and epigeic biodiversity (Bennun et al, 2021). If concrete foundations are used that would increase the impact of the project as there would be direct impacts to soil permeability and characteristics, thereby influencing inhabitant fauna. In addition, stormwater runoff and runoff from cleaning the panels would be increased, increasing erosion in the surrounding areas;
- Indigenous vegetation to be maintained under the solar panels, if possible to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018). The photographs below are sourced from these documents;


- Vegetation clearing to commence only after the necessary permits have been obtained;
- Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities;
- Vegetation clearance should remain within the approved development layout.

6.5.1.2 Destruction, degradation and fragmentation of surrounding habitats

Construction activities can lead to destruction of surrounding habitats. Pre-mitigation this impact has a Negative High significance, but with the implementation of mitigation measures the significance can be reduced to a Negative Low impact.

Pre mitigation							
Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**

2	4	3	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).	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.	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 moderate Impact**
Post mitigation							
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**

Mitigation Actions:

- Pre-construction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, remaining within demarcated construction areas etc;

- All solid waste must be managed in accordance with a Solid Waste Management Plan. Recycling is encouraged;
- All construction activities and roads to be within the clearly defined and demarcated areas;
- Temporary laydown areas must be clearly demarcated and rehabilitated with indigenous vegetation subsequent to end of use;
- Appropriate dust control measures to be implemented;
- Suitable sanitary facilities to be provided for construction staff as per the guidelines in Health and Safety Act;
- Cement must be mixed in a designated area on a liner away from water sources and buffers and that successful rehabilitation of the construction areas can take place; and
- All hazardous materials, if any, must be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner.

6.5.1.3 Displacement/emigration of avifauna community (including SCC) due to noise pollution

Noise pollution generated from construction activities will lead to the displacement/emigration of the local avifauna community including the proximal surrounding area. This will include SCC that occur or are likely to occur within the area.

Pre mitigation							
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**
Post mitigation							

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**

Mitigation Actions:

- No construction activity is to occur at night, as nocturnal species are highly dependent on sound and/or vocalisations for behavioural processes;
- All vehicles speed must be restricted to 40 km/h, to reduce the noise emitted by them; and
- If generators are to be used these must be soundproofed.

6.5.1.4 Direct mortality from persecution or poaching of avifauna species and collection of eggs

There is the possibility of construction staff poaching avifauna species and collecting eggs from the project footprint and proximal surrounding area. There is also the possibility of persecution of species that are deemed as negative in folklore. This impact was determined to have a Negative Medium Impact significance but can be reduced to a Negative Low Impact significance with the implementation of mitigation actions.

Pre mitigation							
Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
2	3	2	1	2	4	3	
	Probable: The impact will likely occur	Medium term: The impact will continue or	Completely reversible: The		High cumulative impact: The impact	High: Impact affects the continued viability of the	**Negative Medium Impact**

Local/district: Will affect the local area or district.	(Between a 50% to 75% chance of occurrence).	last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).	impact is reversible with implementation of minor mitigation measures.	Marginal loss of resource: The impact will result in marginal loss of resources.	would result in significant cumulative effects	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.	
Post mitigation							
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**

Mitigation Actions:

- All personnel must undergo environmental awareness training that includes educating on not poaching/persecuting species and collecting eggs;
- Prior to commencing work each day, two individuals should traverse the working area in order to disturb any avifauna and so they have a chance to vacate the area; and

- Any avifauna threatened by the construction activities that does not vacate the area should be removed safely by an appropriately qualified environmental officer or removal specialist.

6.5.1.5 Direct mortality from increased vehicle and heavy machinery traffic

The increased vehicle and heavy machinery traffic associated with construction activities will lead to roadkill. This impact was determined to have a Negative Medium Impact significance but can be reduced to a Negative Low Impact significance with the implementation of mitigation actions.

Pre mitigation							
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**
Post mitigation							
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	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**

		thereafter (2 – 10 years).					

Mitigation Actions:

- All personnel must undergo environmental induction with regards to awareness about speed limits and roadkill; and
- All construction vehicles must adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected.

6.6 Operational Phase

6.6.1.1 Collisions with infrastructure associated with the PV Facility

The proposed Beta project comprises of components that pose a collision risk to avifauna species. This includes collisions with PV panels, and fences. This impact was determined to have a Negative Very High significance but can be reduced to a Negative Medium significance with the implementation of appropriate mitigation measures.

Pre mitigation							
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**
Post mitigation							

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**

Mitigation Actions:

- Post-construction monitoring should follow the BirdLife South Africa best practice guidelines for solar energy facilities (BirdLife South Africa, 2017). If monitoring results indicate excessive bird fatalities, then adaptive mitigations should be implemented. Before implementation, these should be discussed with the avifaunal specialist and ECO and could include the retrofitting/incorporation of additional visual cues/diverters to existing PV panels/infrastructure.
- The air space used by the gridlines /tie in lines must be minimised by placing them underground as far as possible;
- Fencing mitigations:
    - Top 2 strands must be smooth wire;
    - Routinely retention loose wires;
    - Minimum distance between wires is 300 mm; and
    - Place markers on fences.

6.6.1.2 Electrocution due to infrastructure associated with the PV Facility

Electrocution with SEF connections poses a lower risk than that of the powerlines that are generally associate with the SEF developments. This impact was determined to have a Negative Medium significance but can be reduced to a Negative Low significance with the implementation of appropriate mitigation measures.

Pre mitigation							
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**

Mitigation Actions:

- Insulation where energised parts and/or grounded parts are covered with materials appropriate for providing incidental contact protection to birds. It is best to use suspended insulators and vertical disconnectors, if upright insulators or horizontal disconnectors are present, these should be covered; and
- Perch discouragers can be used such as perch guards or spikes. Considerable success achieved by providing artificial bird safe perches, which are placed at a safe distance from the energised parts (Prinsen et al, 2012).

6.6.1.3 Direct mortality from roadkills, persecution or poaching of avifauna species and collection of eggs

There is the possibility of operational staff poaching avifauna species and collecting eggs from the project footprint and proximal surrounding area. There is also the possibility of persecution of species that are deemed as negative in folklore. This impact was determined to have a Negative Medium Impact significance but can be reduced to a Negative Low Impact significance with the implementation of mitigation actions.

Pre mitigation							
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**
Post mitigation							
Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
2	2	2	1	2	1	1	
	Possible: The impact may occur	Medium term: The impact will	Completely reversible: The impact is		Negligible cumulative impact: The impact would	Low: Impact affects the quality, use and integrity of	**Negative Low Impact**

Local/district: Will affect the local area or district.	(Between a 25% to 50% chance of occurrence).	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).	reversible with implementation of minor mitigation measures.	Marginal loss of resource: The impact will result in marginal loss of resources.	result in negligible to no cumulative effects.	the system/component in a way that is barely perceptible.	

Mitigation Actions:

- All personnel must undergo environmental awareness training that includes educating on not poaching/persecuting avifauna species and collecting eggs.
- Signs must be put up to enforce this, should someone be caught an appropriate fine must be enforced.
- All personnel must undergo environmental induction with regards to awareness about speed limits and roadkill; and
- All vehicles must adhere to a speed limit of maximum of40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected.

6.6.1.4 Pollution of water sources and surrounding habitat due to cleaning products of the PV panels

It is likely that the panels will be cleaned with chemicals that is not environmentally friendly. This impact was determined to have a Negative High Impact significance but can be reduced to a Negative Low Impact significance with the implementation of mitigation actions.

Pre mitigation							
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	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	**Negative High Impact**

		be mitigated by direct human action or by natural processes thereafter (10 – 30 years).				impaired and may temporarily cease. High costs of rehabilitation and remediation.	
Post mitigation							
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**

Mitigation Actions:

- Only environmentally friendly chemicals are to be used for cleaning of the panels.

6.6.1.5 Heat radiation from the BESS and PV panels

Heat radiation form the infrastructure can result in an overall increase of temperature in the surrounding area, it can also lead to veld fires. This impact was determined to have a Negative Medium Impact significance but can be reduced to a Negative Low Impact significance with the implementation of mitigation actions.

Pre mitigation							
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**
Post mitigation							
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**

Mitigation Actions:

- The BESS must be enclosed in a structure with a non-reflective surface;
- A fire management plan needs to be put in place; and

- Grass must be kept under the panels to ensure that additional reflection is not taking place from the surface below the panels.

6.6.1.6 Encroachment of Invasive Alien Plants into disturbed areas

Invasive Alien Plants (IAPs) tend to encroach into disturbed areas and outcompete/displace indigenous vegetation. This will lead to a shift in the vegetation composition and structure, and consequently will cause a negative shift in the wellbeing of the avifauna community. This impact was determined to have a Negative Very High significance but can be reduced to a Negative Low Impact significance with the implementation of mitigation actions.

Pre mitigation							
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**
Post mitigation							
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	Short term: The impact will either disappear with mitigation or will	Completely reversible: The impact is reversible with implementation of	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	**Negative Low Impact**

	than a 25% chance of occurrence).	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).	minor mitigation measures.			a way that is barely perceptible.	

Mitigation Actions:

- An IAP Management Plan must be written and implemented for the development. The developer must contract a specialist to develop the plan and the developer is responsible for its implementation;
- Regular monitoring for IAP encroachment during the operation phase must be undertaken to ensure that no alien invasion problems have developed as result of the disturbance. This should be every 3 months during the first two years of the operation phase and every six months for the life of the project; and
- All IAP species must be removed/controlled using the appropriate techniques as indicated in the IAP management plan.

6.7 Decommissioning Phase

6.7.1.1 Direct mortality due to earthworks, vehicle collisions and persecution

Decommissioning activity will likely lead to direct mortality of avifauna due to earthworks, vehicle collisions and persecution. This impact was determined to have a Negative Medium significance but can be reduced to a Negative Low Impact significance with the implementation of mitigation actions.

Pre mitigation							
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**
Post mitigation							
Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
1	2	1	2	1	1	1	
Site: The impact will only affect the site.	Possible: The impact may occur (Between a 25% to 50% 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).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	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**

Mitigation Actions:

- All personnel should undergo environmental awareness training including educating about not harming or collecting species;
- Prior to commencing work each day, two individuals should traverse the working area in order to disturb any fauna and so they have a chance to vacate;
- Any fauna threatened by the construction activities must be removed safely by an appropriately qualified environmental officer or removal specialist;
- All construction vehicles must adhere to a speed limit of maximum 20 km/h to avoid collisions. Appropriate speed control measures and signs must be erected;
- All hazardous materials, if any, should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner;
- Any excavations should not be left open for extended periods of time as fauna may fall in and become trapped in them. Excavations should only be dug when they are required and should be used and filled shortly thereafter;
- All infrastructure must be removed if the facility is decommissioned; and
- The project area must be rehabilitated, and a management plan must be in place to ensure that it is done successfully.

6.7.1.2 Continued habitat degradation due to Invasive Alien Plant encroachment and erosion

Disturbance created during decommissioning will leave the development area vulnerable to erosion and alien plant invasion for several years.

Pre mitigation							
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**

Post mitigation							
Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
1	2	1	2	1	1	1	
Site: The impact will only affect the site.	Possible: The impact may occur (Between a 25% to 50% 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).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	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**

Mitigation Actions:

- Rehabilitation in accordance with the Rehabilitation Plan for the development must be undertaken in areas disturbed during the decommissioning phase;
- Rehabilitation monitoring must be undertaken at biannually for 3 years after the decommissioning phase
- All erosion problems observed must be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques; and
- There should be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous flora.

6.8 Unplanned Events

The planned activities will have anticipated impacts as discussed above; however, unplanned events may occur on any project, leading to potential impacts that will require appropriate management.

Table 6-1 is a summary of the findings of an unplanned event assessment conducted from a terrestrial ecology perspective. Note that not all potential unplanned events may be captured herein, and this process must therefore be managed throughout all phases and according to events that take place or have a high likelihood of taking place.

Table 6-1 Summary of unplanned events, potential impacts and mitigations

Unplanned Event	Potential Impact	Mitigation
Fire	Uncontrolled/unmanaged fire that spreads to the surrounding natural savannah.	An appropriate fire management plan needs to be compiled and implemented.
Erosion caused by water runoff from the surface	Erosion on the side of the roads and cleared areas.	A storm water management plan must be compiled and implemented.

6.9 Cumulative Impacts

Cumulative impacts are assessed within the context of the extent of the proposed PAOI other developments and activities in the area (existing and proposed) and general habitat loss and disturbance resulting from any other anthropogenic activities in the area. The impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation this provides a good method of assessing a project's impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts in an area or region, it is appropriate to consider the cumulative effects of development or disturbance activities. This is similar to the concept of shifting baselines, which describes how the environmental baseline at a specific point in time may actually represent a significant change from the original state of the system. This section describes the potential cumulative impacts of the project on the local and regional avifauna community.

Localised cumulative impacts include those from operations that are close enough to potentially cause additive effects on the local environment or any sensitive receivers (such as nearby large road networks, other solar PV facilities, and power infrastructure). Relevant activities and impacts include dust deposition, noise and vibration, loss of corridors or habitat, disruption of waterways, groundwater drawdown, groundwater and surface water depletion, and transport activities. Long-term cumulative impacts associated with the site development activities can lead to the loss of endemic and threatened species, including natural habitat and vegetation types, and these impacts can even lead to the degradation of conserved areas such as the adjacent game parks and reserves.

The total area within the 30 km buffer around the project area amounts to 343 787 ha, but when considering the transformation (147 236 ha) that has taken place within this radius, 196,551 ha of intact habitat remains, according to the 2018 National Biodiversity Assessment. Therefore, the area within 30 km of the project has experienced approximately 42.82% 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 (Including the others e.g., Alpha and Charlie) measuring a maximum of 2095 ha (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 1.08% (the sum of all related developments as a percentage of the total remaining habitat). Table 6-2 outlines the calculation procedure for the spatial assessment of cumulative impacts.

Table 6-2 Loss of habitat within a 30 km radius of the project

	Total Habitat (ha)	Total Loss (ha)	Tot. Remaining Habitat (ha) (Remnants)	Total Historical Loss (%)	Cumulative Projects (ha)	Tot. Remaining Habitat (ha)	Cumulative Habitat Lost (%)
Approximate Solar development cumulative effects (Spatial)	343,787	147,236	196,551	**42.82%**	2,095	**194,701**	**1.08%**

The overall cumulative impact assessment is presented in Table 6-3 and Figure 6-2 below. Approximately 40% of the habitat has already been lost, and as discussed above the proposed solar developments will result in a further cumulative loss of approximately 0.94% from only similar developments (Solar, approved and in process) in the area, as such the cumulative impact from the proposed development is rated as medium (Figure 6-2). This means that the entire region's careful spatial management and planning must be a priority, and existing large infrastructure projects must be carefully monitored over the long term.

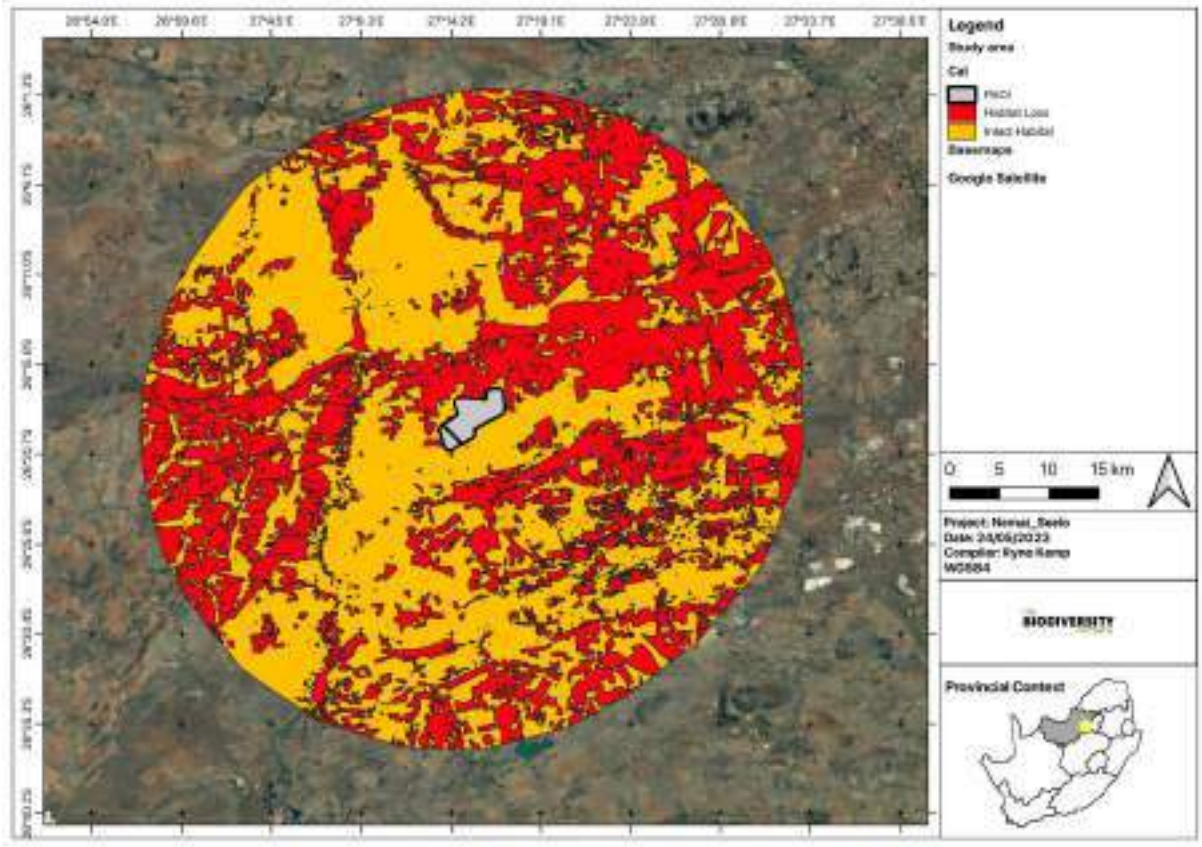

Figure 6-2 ***Map illustrating the additional renewable energy developments within the landscape overlaid onto the remnant vegetation types***

Table 6-3 Cumulative Impacts to avifauna associated with the proposed project

Impact	Project in Isolation						Cumulative Effect					
	Duration of Impact	Extent	Intensity	Frequency	Probability of Impact	Significance	Duration of Impact	Extent	Intensity	Frequency	Probability of Impact	Significance
Loss of habitat, and disruption of surrounding ecological corridors.	4	2	3	3	3	54	5	3	3	3	4	77
	Long term	Area	Medium/slightly harmful	Frequent	Probable	**Medium**	Permanent	Region	Medium/slightly harmful	Frequent	Almost certain	**Medium**

7 Avifauna Impact Management Actions

The purpose of the Biodiversity Impact Management Actions of is to present the mitigations in such a way that they can be incorporated into the Environmental Management Programme (EMPr), allowing for more successful implementation and auditing of the mitigations and monitoring guidelines.

Table 7-1 presents the recommended mitigation measures and the respective timeframes, targets, and performance indicators pertaining to the avifaunal component.

Table 7-1 Summary of management outcomes pertaining to impacts to avifauna and their habitats

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
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
If feasible 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	Decommissioning /Rehabilitation

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
			area must be re-vegetated with plant and grass species which are indigenous to this vegetation type.	
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 available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment on site unless necessary. All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them leaking and entering the environment.	Life of operation	Environmental Officer Contractor	Spill events, Vehicles dripping.	Ongoing
Cement must be mixed in a designated area on a liner away from water sources and buffers 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 avifaunaFluorescent and mercury vapor lighting	Construction/Operational Phase	Project Manager Environmental Officer Design Engineer	Light pollution and period of light.	Ongoing

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
should be avoided, and sodium vapor (red/green) lights should be used wherever possible.				
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
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
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
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	Exposed cables	During phase

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
		Environmental Officer Design Engineer		
Any exposed parts must be covered (insulated) to reduce electrocution risk	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds	During phase
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
Post-construction monitoring should follow the BirdLife South Africa best practice guidelines for solar energy facilities (BirdLife South Africa, 2017). If monitoring results indicate excessive bird fatalities, then adaptive mitigations should be implemented. Before implementation, these should be discussed with the avifaunal specialist and ECO and could include the retrofitting/incorporation of additional visual cues/diverters to existing PV panels/infrastructure.	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.
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

8 Conclusion and Impact Statement

8.1 Conclusion

This Avifauna Impact Assessment aimed to provide information to guide the risk of the proposed Solar PV project and the associated infrastructure to the Avifauna community likely affected by its development.

Two site visits were conducted for the purpose of this regime 2 assessment. The first field investigation was conducted in the summer, over 3 days from the 17th to the 19th of February 2023. The second field investigation was conducted during late summer, over 3 days from the 21st to the 23rd of April 2023.Three SCC species recorded in and around the proposed development i.e., ***Sagittarius serpentarius*** (Secretarybird), ***Antropoides paradiseus*** (Blue Crane) and ***Phoenicopterus roseus*** (Greater Flamngo). Eighteen (18) risk species were recorded during the field investigation. These are species at risk for collisions, electrocutions or sensitive to habitat loss.

The SEI of the proposed PAOI was found to be medium. However, the impacts can be assumed to being High to Medium during the Construction Phase, most of which could be reduced to Medium to Low with the application of mitigation measures. Impacts in the operational phase are expected to be Medium and can be reduced to Medium to Low with mitigation measures. Decommissioning phase impacts are expected to be Medium and can be reduced to Low with mitigation measures. Cumulative impacts are medium for the project in isolation and in consideration with Alpha and Charlie facility proposed in the area.

Management measures include ensuring the construction footprint is kept small and industry-standard mitigations are put into place for solar panels, fencing and electrical infrastructure, among other measures.

8.2 Impact Statement

The main expected impacts of the proposed PV and associated infrastructure will include the following:

- Habitat loss and fragmentation;
- Electrocutions; and
- Collisions.

Mitigation measures as described in this report can be implemented to reduce the significance of the risk to an acceptable residual risk level. Considering the above-mentioned information, it is the opinion of the specialist that the project may be favourably considered, on condition that all the mitigation and recommendations provided in this report and other specialist reports are implemented.

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10 Appendix Items

10.1 Appendix A: Expected species

Scientific Name	Common Name	Family Name	Regional	Global (IUCN)
Accipiter badius	Shikra	Accipitridae	Unlisted	Unlisted
Accipiter tachiro	African Goshawk	Accipitridae	Unlisted	Unlisted
Acridotheres tristis	Common Myna	Sturnidae	Unlisted	Unlisted
Actophilornis africanus	African Jacana	Jacanidae	Unlisted	Unlisted
Afrotis afraoides	Northern Black Korhaan	Otididae	Unlisted	Unlisted
Amadina erythrocephala	Red-headed Finch	Estriidae	Unlisted	Unlisted
Amadina fasciata	Cut-throat Finch	Estriidae	Unlisted	Unlisted
Anas sparsa	African Black Duck	Anatidae	Unlisted	Unlisted
Anas undulata	Yellow-billed Duck	Anatidae	Unlisted	Unlisted
Anhinga rufa	African Darter	Anhingidae	Unlisted	Unlisted
Apalis thoracica	Bar-throated Apalis	Cisticolidae	Unlisted	Unlisted
Aquila rapax	Tawny Eagle	Accipitridae	EN	VU
Aquila spilogaster	African Hawk Eagle	Accipitridae	Unlisted	Unlisted
Ardea alba	Great Egret	Ardeidae	Unlisted	Unlisted
Ardea cinerea	Grey Heron	Ardeidae	Unlisted	Unlisted
Ardea goliath	Goliath Heron	Ardeidae	Unlisted	Unlisted
Ardea melanocephala	Black-headed Heron	Ardeidae	Unlisted	Unlisted
Ardea purpurea	Purple Heron	Ardeidae	Unlisted	Unlisted
Ardeola ralloides	Squacco Heron	Ardeidae	Unlisted	Unlisted
Batis molitor	Chinspot Batis	Platysteiridae	Unlisted	Unlisted
Bostrychia hagedash	Hadada Ibis	Threskiornithidae	Unlisted	Unlisted
Bubo lacteus	Verreaux's Eagle-Owl	Strigidae	Unlisted	Unlisted
Bubulcus ibis	Western Cattle Egret	Ardeidae	Unlisted	Unlisted
Buphagus erythrorynchus	Red-billed Oxpecker	Buphagidae	Unlisted	Unlisted
Buteo buteo	Common Buzzard	Accipitridae	Unlisted	Unlisted
Butorides striata	Striated Heron	Ardeidae	Unlisted	Unlisted
Calendulauda africanoides	Fawn-colored Lark	Alaudidae	Unlisted	Unlisted
Calendulauda sabota	Sabota Lark	Alaudidae	Unlisted	Unlisted
Calidris pugnax	Ruff	Scolopacidae	Unlisted	Unlisted
Camaroptera brevicaudata	Grey-backed Camaroptera	Cisticolidae	Unlisted	Unlisted
Campephaga flava	Black Cuckooshrike	Campephagidae	Unlisted	Unlisted
Caprimulgus pectoralis	Fiery-necked Nightjar	Caprimulgidae	Unlisted	Unlisted
Caprimulgus rufigena	Rufous-cheeked Nightjar	Caprimulgidae	Unlisted	Unlisted
Caprimulgus tristigma	Freckled Nightjar	Caprimulgidae	Unlisted	Unlisted
Centropus burchellii	Burchell's Coucal	Cuculidae	Unlisted	Unlisted
Ceryle rudis	Pied Kingfisher	Alcedinidae	Unlisted	Unlisted
Chlorocichla flaviventris	Yellow-bellied Greenbul	Pycnonotidae	Unlisted	Unlisted
Chlorophoneus sulfureopectus	Orange-breasted Bush-Shrike	Malaconotidae	Unlisted	Unlisted
Chrysococcyx caprius	Diederik Cuckoo	Cuculidae	Unlisted	Unlisted
Chrysococcyx klaas	Klaas's Cuckoo	Cuculidae	Unlisted	Unlisted

Circaetus cinereus	Brown Snake Eagle	Accipitridae	Unlisted	Unlisted
Circaetus pectoralis	Black-chested Snake Eagle	Accipitridae	Unlisted	Unlisted
Cisticola aridulus	Desert Cisticola	Cisticolidae	Unlisted	Unlisted
Cisticola chiniana	Rattling Cisticola	Cisticolidae	Unlisted	Unlisted
Cisticola fulvicapilla	Neddicky	Cisticolidae	Unlisted	Unlisted
Cisticola juncidis	Zitting Cisticola	Cisticolidae	Unlisted	Unlisted
Cisticola rufilatus	Tinkling Cisticola	Cisticolidae	Unlisted	Unlisted
Cisticola tinniens	Levaillant's Cisticola	Cisticolidae	Unlisted	Unlisted
Clamator jacobinus	Jacobin Cuckoo	Cuculidae	Unlisted	Unlisted
Clamator levaillantii	Levaillant's Cuckoo	Cuculidae	Unlisted	Unlisted
Colius striatus	Speckled Mousebird	Coliidae	Unlisted	Unlisted
Columba livia	Rock Dove	Columbidae	Unlisted	Unlisted
Corvus albus	Pied Crow	Corvidae	Unlisted	Unlisted
Corythaixoides concolor	Grey Go-away-bird	Musophagidae	Unlisted	Unlisted
Corythornis cristatus	Malachite Kingfisher	Alcedinidae	Unlisted	Unlisted
Crithagra atrogularis	Black-throated Canary	Fringillidae	Unlisted	Unlisted
Crithagra flaviventris	Yellow Canary	Fringillidae	Unlisted	Unlisted
Crithagra mozambica	Yellow-fronted Canary	Fringillidae	Unlisted	Unlisted
Cuculus clamosus	Black Cuckoo	Cuculidae	Unlisted	Unlisted
Cuculus gularis	African Cuckoo	Cuculidae	Unlisted	Unlisted
Cuculus solitarius	Red-chested Cuckoo	Cuculidae	Unlisted	Unlisted
Cursorius temminckii	Temminck's Courser	Glareolidae	Unlisted	Unlisted
Delichon urbicum	Common House Martin	Hirundinidae	Unlisted	Unlisted
Dendrocygna bicolor	Fulvous Whistling Duck	Anatidae	Unlisted	Unlisted
Dendrocygna viduata	White-faced Whistling Duck	Anatidae	Unlisted	Unlisted
Dendroperdix sephaena	Crested Francolin	Phasianidae	Unlisted	Unlisted
Dicrurus adsimilis	Fork-tailed Drongo	Dicruridae	Unlisted	Unlisted
Egretta ardesiaca	Black Heron	Ardeidae	Unlisted	Unlisted
Egretta garzetta	Little Egret	Ardeidae	Unlisted	Unlisted
Elanus caeruleus	Black-winged Kite	Accipitridae	Unlisted	Unlisted
Emberiza flaviventris	Golden-breasted Bunting	Emberizidae	Unlisted	Unlisted
Emberiza impetuani	Lark-like Bunting	Emberizidae	Unlisted	Unlisted
Emberiza tahapisi	Cinnamon-breasted Bunting	Emberizidae	Unlisted	Unlisted
Eremomela icteropygialis	Yellow-bellied Eremomela	Cisticolidae	Unlisted	Unlisted
Eremomela usticollis	Burnt-necked Eremomela	Cisticolidae	Unlisted	Unlisted
Euplectes afer	Yellow-crowned Bishop	Ploceidae	Unlisted	Unlisted
Euplectes orix	Southern Red Bishop	Ploceidae	Unlisted	Unlisted
Falco amurensis	Amur Falcon	Falconidae	Unlisted	Unlisted
Fulica cristata	Red-knobbed Coot	Rallidae	Unlisted	Unlisted
Gallinula chloropus	Common Moorhen	Rallidae	Unlisted	Unlisted
Glaucidium perlatum	Pearl-spotted Owlet	Strigidae	Unlisted	Unlisted
Halcyon albiventris	Brown-hooded Kingfisher	Alcedinidae	Unlisted	Unlisted
Halcyon chelicuti	Striped Kingfisher	Alcedinidae	Unlisted	Unlisted
Halcyon leucocephala	Grey-headed Kingfisher	Alcedinidae	Unlisted	Unlisted

Halcyon senegalensis	Woodland Kingfisher	Alcedinidae	Unlisted	Unlisted
Haliaeetus vocifer	African Fish Eagle	Accipitridae	Unlisted	Unlisted
Hieraaetus wahlbergi	Wahlberg's Eagle	Accipitridae	Unlisted	Unlisted
Indicator indicator	Greater Honeyguide	Indicatoridae	Unlisted	Unlisted
Indicator minor	Lesser Honeyguide	Indicatoridae	Unlisted	Unlisted
Ispidina picta	African Pygmy Kingfisher	Alcedinidae	Unlisted	Unlisted
Ixobrychus minutus	Little Bittern	Ardeidae	Unlisted	Unlisted
Kaupifalco monogrammicus	Lizard Buzzard	Accipitridae	Unlisted	Unlisted
Lagonosticta rhodopareia	Jameson's Firefinch	Estriididae	Unlisted	Unlisted
Lagonosticta senegala	Red-billed Firefinch	Estriididae	Unlisted	Unlisted
Laniarius ferrugineus	Southern Boubou	Malaconotidae	Unlisted	Unlisted
Lanius collaris	Southern Fiscal	Laniidae	Unlisted	Unlisted
Lophoceros nasutus	African Grey Hornbill	Bucerotidae	Unlisted	Unlisted
Lophotis ruficrista	Red-crested Korhaan	Otididae	Unlisted	Unlisted
Lybius torquatus	Black-collared Barbet	Lybiidae	Unlisted	Unlisted
Malaconotus blanchoti	Grey-headed Bush-Shrike	Malaconotidae	Unlisted	Unlisted
Megaceryle maxima	Giant Kingfisher	Alcedinidae	Unlisted	Unlisted
Melaenornis mariquensis	Marico Flycatcher	Muscicapidae	Unlisted	Unlisted
Melaenornis pallidus	Pale Flycatcher	Muscicapidae	Unlisted	Unlisted
Melaenornis pammelaina	Southern Black Flycatcher	Muscicapidae	Unlisted	Unlisted
Melaenornis silens	Fiscal Flycatcher	Muscicapidae	Unlisted	Unlisted
Melierax canorus	Pale Chanting Goshawk	Accipitridae	Unlisted	Unlisted
Merops apiaster	European Bee-eater	Meropidae	Unlisted	Unlisted
Merops bullockoides	White-fronted Bee-eater	Meropidae	Unlisted	Unlisted
Merops hirundineus	Swallow-tailed Bee-eater	Meropidae	Unlisted	Unlisted
Merops nubicoides	Southern Carmine Bee-eater	Meropidae	Unlisted	Unlisted
Merops persicus	Blue-cheeked Bee-eater	Meropidae	Unlisted	Unlisted
Merops pusillus	Little Bee-eater	Meropidae	Unlisted	Unlisted
Microcarbo africanus	Reed Cormorant	Phalacrocoracidae	Unlisted	Unlisted
Micronisus gabar	Gabar Goshawk	Accipitridae	Unlisted	Unlisted
Milvus aegyptius	Yellow-billed Kite	Accipitridae	Unlisted	Unlisted
Mirafra africana	Rufous-naped Lark	Alaudidae	Unlisted	Unlisted
Muscicapa striata	Spotted Flycatcher	Muscicapidae	Unlisted	Unlisted
Myrmecocichla formicivora	Ant-eating Chat	Muscicapidae	Unlisted	Unlisted
Nettapus auritus	African Pygmy Goose	Anatidae	VU	LC
Nilaus afer	Brubru	Malaconotidae	Unlisted	Unlisted
Numida meleagris	Helmeted Guineafowl	Numididae	Unlisted	Unlisted
Nycticorax nycticorax	Black-crowned Night Heron	Ardeidae	Unlisted	Unlisted
Oena capensis	Namaqua Dove	Columbidae	Unlisted	Unlisted
Oenanthe familiaris	Familiar Chat	Muscicapidae	Unlisted	Unlisted
Oriolus larvatus	Black-headed Oriole	Oriolidae	Unlisted	Unlisted
Oriolus oriolus	Eurasian Golden Oriole	Oriolidae	Unlisted	Unlisted
Ortygospiza atricollis	Quailfinch	Estrildidae	Unlisted	Unlisted
Otus senegalensis	African Scops Owl	Strigidae	Unlisted	Unlisted

Pandion haliaetus	Western Osprey	Pandionidae	Unlisted	Unlisted
Peliperdix coqui	Coqui Francolin	Phasianidae	Unlisted	Unlisted
Phalacrocorax lucidus	White-breasted Cormorant	Phalacrocoracidae	Unlisted	Unlisted
Phyllastrephus terrestris	Terrestrial Brownbul	Pycnonotidae	Unlisted	Unlisted
Pinarocorys nigricans	Dusky Lark	Alaudidae	Unlisted	Unlisted
Plectropterus gambensis	Spur-winged Goose	Anatidae	Unlisted	Unlisted
Polemaetus bellicosus	Martial Eagle	Accipitridae	EN	EN
Polyboroides typus	African Harrier-Hawk	Accipitridae	Unlisted	Unlisted
Prionops plumatus	White-crested Helmet-Shrike	Vangidae	Unlisted	Unlisted
Ptilopsis granti	Southern White-faced Owl	Strigidae	Unlisted	Unlisted
Ptyonoprogne fuligula	Rock Martin	Hirundinidae	Unlisted	Unlisted
Pycnonotus nigricans	African Red-eyed Bulbul	Pycnonotidae	Unlisted	Unlisted
Pycnonotus tricolor	Dark-capped Bulbul	Pycnonotidae	Unlisted	Unlisted
Rhinoptilus chalcopterus	Bronze-winged Courser	Glareolidae	Unlisted	Unlisted
Riparia paludicola	Brown-throated Martin	Hirundinidae	Unlisted	Unlisted
Riparia riparia	Sand Martin	Hirundinidae	Unlisted	Unlisted
Sagittarius serpentarius	Secretarybird	Sagittariidae	VU	EN
Sarkidiornis melanotos	Knob-billed Duck	Anatidae	Unlisted	Unlisted
Scopus umbretta	Hamerkop	Scopidae	Unlisted	Unlisted
Spermestes cucullata	Bronze Mannikin	Estrildidae	Unlisted	Unlisted
Spilopelia senegalensis	Laughing Dove	Columbidae	Unlisted	Unlisted
Stenostira scita	Fairy Flycatcher	Muscicapidae	Unlisted	Unlisted
Streptopelia capicola	Ring-necked Dove	Columbidae	Unlisted	Unlisted
Streptopelia semitorquata	Red-eyed Dove	Columbidae	Unlisted	Unlisted
Struthio camelus	Common Ostrich	Struthionidae	Unlisted	Unlisted
Sylvietta rufescens	Long-billed Crombec	Macrosphenidae	Unlisted	Unlisted
Tachybaptus ruficollis	Little Grebe	Podicipedidae	Unlisted	Unlisted
Terpsiphone viridis	African Paradise Flycatcher	Monarchidae	Unlisted	Unlisted
Threskiornis aethiopicus	African Sacred Ibis	Threskiornithidae	Unlisted	Unlisted
Tockus leucomelas	Southern Yellow-billed Hornbill	Bucerotidae	Unlisted	Unlisted
Tockus rufirostris	Southern Red-billed Hornbill	Bucerotidae	Unlisted	Unlisted
Trachyphonus vaillantii	Crested Barbet	Lybiidae	Unlisted	Unlisted
Tricholaema leucomelas	Acacia Pied Barbet	Lybiidae	Unlisted	Unlisted
Tringa nebularia	Common Greenshank	Pycnonotidae	Unlisted	Unlisted
Turdoides bicolor	Southern Pied Babbler	Leiothrichidae	Unlisted	Unlisted
Turdoides jardineii	Arrow-marked Babbler	Leiothrichidae	Unlisted	Unlisted
Turnix sylvaticus	Kurrichane Buttonquail	Turnicidae	Unlisted	Unlisted
Turtur chalcospilos	Emerald-spotted Wood Dove	Columbidae	Unlisted	Unlisted
Tyto alba	Western Barn Owl	Strigidae	Unlisted	Unlisted
Upupa africana	African Hoopoe	Upupidae	Unlisted	Unlisted
Urocolius indicus	Red-faced Mousebird	Coliidae	Unlisted	Unlisted
Vanellus armatus	Blacksmith Lapwing	Charadriidae	Unlisted	Unlisted
Vanellus coronatus	Crowned Lapwing	Charadriidae	Unlisted	Unlisted
Vanellus senegallus	African Wattled Lapwing	Charadriidae	Unlisted	Unlisted

Vidua chalybeata	Village Indigobird	Viduidae	Unlisted	Unlisted
Vidua funerea	Dusky Indigobird	Viduidae	Unlisted	Unlisted
Zapornia flavirostra	Black Crake	Rallidae	Unlisted	Unlisted

*(Taylor *et al*. 2015), + (IUCN 2021)

10.2 Appendix B

10.3 Point count data

Scientific Name	**Common Name**	Family Name	**RD (Regional, Global)**
Acridotheres tristis	Common Myna	Sturnidae	0
Acrocephalus gracilirostris	Lesser Swamp Warbler	Acrocephalidae	0
Afrotis afraoides	Northern Black Korhaan	Otididae	0
Alopochen aegyptiaca	Egyptian Goose	Anatidae	0
Amblyospiza albifrons	Thick-billed Weaver	Ploceidae	0
Anas erythrorhyncha	Red-billed Teal	Anatidae	0
Anas undulata	Yellow-billed Duck	Anatidae	0
Anthropoides paradiseus	Blue Crane	Gruidae	NT, VU
Anthus cinnamomeus	African Pipit	Motacillidae	0
Anthus leucophrys	Plain-backed Pipit	Motacillidae	0
Ardea purpurea	Purple Heron	Ardeidae	0
Bostrychia hagedash	Hadada Ibis	Threskiornithidae	0
Bradypterus baboecala	Little Rush Warbler	Locustellidae	0
Bubulcus ibis	Western Cattle Egret	Ardeidae	0
Calandrella cinerea	Red-capped Lark	Alaudidae	0
Cecropis cucullata	Greater Striped Swallow	Hirundinidae	0
Ceryle rudis	Pied Kingfisher	Alcedinidae	0
Charadrius tricollaris	Three-banded Plover	Charadriidae	0
Chersomanes albofasciata	Spike-heeled Lark	Alaudidae	0
Chlidonias leucopterus	White-winged Tern	Laridae	0
Chrysococcyx caprius	Diederik Cuckoo	Cuculidae	0
Cisticola aridulus	Desert Cisticola	Cisticolidae	0
Cisticola ayresii	Wing-snapping Cisticola	Cisticolidae	0
Cisticola fulvicapilla	Neddicky	Cisticolidae	0
Cisticola juncidis	Zitting Cisticola	Cisticolidae	0
Cisticola textrix	Cloud Cisticola	Cisticolidae	0
Cisticola tinniens	Levaillant's Cisticola	Cisticolidae	0
Columba guinea	Speckled Pigeon	Columbidae	0
Corvus albus	Pied Crow	Corvidae	0
Corythornis cristatus	Malachite Kingfisher	Alcedinidae	0
Cossypha caffra	Cape Robin-Chat	Muscicapidae	0
Coturnix coturnix	Common Quail	Phasianidae	0
Creatophora cinerea	Wattled Starling	Sturnidae	0
Curruca subcoerulea	Chestnut-vented Warbler	Sylviidae	0
Dendrocygna viduata	White-faced Whistling Duck	Anatidae	0
Egretta ardesiaca	Black Heron	Ardeidae	0
Elanus caeruleus	Black-winged Kite	Accipitridae	0
Emberiza impetuani	Lark-like Bunting	Emberizidae	0
Eremopterix leucotis	Chestnut-backed Sparrow-Lark	Alaudidae	0
Eremopterix verticalis	Grey-backed Sparrow-Lark	Alaudidae	0

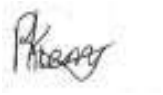
Euplectes afer	Yellow-crowned Bishop	Ploceidae	0
Euplectes orix	Southern Red Bishop	Ploceidae	0
Euplectes progne	Long-tailed Widowbird	Ploceidae	0
Falco naumanni	Lesser Kestrel	Falconidae	0
Fulica cristata	Red-knobbed Coot	Rallidae	0
Gallinula chloropus	Common Moorhen	Rallidae	0
Haliaeetus vocifer	African Fish Eagle	Accipitridae	0
Himantopus himantopus	Black-winged Stilt	Recurvirostridae	0
Hirundo albigularis	White-throated Swallow	Hirundinidae	0
Hirundo rustica	Barn Swallow	Hirundinidae	0
Lamprotornis nitens	Cape Starling	Sturnidae	0
Lanius collaris	Southern Fiscal	Laniidae	0
Lanius minor	Lesser Grey Shrike	Laniidae	0
Macronyx capensis	Cape Longclaw	Motacillidae	0
Merops apiaster	European Bee-eater	Meropidae	0
Merops pusillus	Little Bee-eater	Meropidae	0
Microcarbo africanus	Reed Cormorant	Phalacrocoracidae	0
Mirafra africana	Rufous-naped Lark	Alaudidae	0
Mirafra fasciolata	Eastern Clapper Lark	Alaudidae	0
Motacilla capensis	Cape Wagtail	Motacillidae	0
Myrmecocichla formicivora	Ant-eating Chat	Muscicapidae	0
Numida meleagris	Helmeted Guineafowl	Numididae	0
Oena capensis	Namaqua Dove	Columbidae	0
Oenanthe pileata	Capped Wheatear	Muscicapidae	0
Ortygospiza atricollis	Quailfinch	Estrildidae	0
Passer diffusus	Southern Grey-headed Sparrow	Passeridae	0
Passer melanurus	Cape Sparrow	Passeridae	0
Petrochelidon spilodera	South African Cliff Swallow	Hirundinidae	0
Phalacrocorax lucidus	White-breasted Cormorant	Phalacrocoracidae	0
Phoenicopterus roseus	Greater Flamingo	Phoenicopteridae	NT, LC
Plectropterus gambensis	Spur-winged Goose	Anatidae	0
Plegadis falcinellus	Glossy Ibis	Threskiornithidae	0
Plocepasser mahali	White-browed Sparrow-Weaver	Ploceidae	0
Ploceus velatus	Southern Masked Weaver	Ploceidae	0
Porphyrio madagascariensis	African Swamphen	Rallidae	0
Prinia flavicans	Black-chested Prinia	Cisticolidae	0
Prinia subflava	Tawny-flanked Prinia	Cisticolidae	0
Pternistis swainsonii	Swainson's Spurfowl	Phasianidae	0
Pycnonotus nigricans	African Red-eyed Bulbul	Pycnonotidae	0
Pycnonotus tricolor	Dark-capped Bulbul	Pycnonotidae	0
Quelea quelea	Red-billed Quelea	Ploceidae	0
Rallus caerulescens	African Rail	Rallidae	0
Recurvirostra avosetta	Pied Avocet	Recurvirostridae	0
Riparia cincta	Banded Martin	Hirundinidae	0

Riparia paludicola	Brown-throated Martin	Hirundinidae	0
Sagittarius serpentarius	Secretarybird	Sagittariidae	VU, EN
Saxicola torquatus	African Stonechat	Muscicapidae	0
Scleroptila gutturalis	Orange River Francolin	Phasianidae	0
Spatula hottentota	Blue-billed Teal	Anatidae	0
Spatula smithii	Cape Shoveler	Anatidae	0
Spilopelia senegalensis	Laughing Dove	Columbidae	0
Sporopipes squamifrons	Scaly-feathered Weaver	Ploceidae	0
Streptopelia capicola	Ring-necked Dove	Columbidae	0
Streptopelia semitorquata	Red-eyed Dove	Columbidae	0
Tachybaptus ruficollis	Little Grebe	Podicipedidae	0
Tadorna cana	South African Shelduck	Anatidae	0
Telophorus zeylonus	Bokmakierie	Malaconotidae	0
Threskiornis aethiopicus	African Sacred Ibis	Threskiornithidae	0
Trachyphonus vaillantii	Crested Barbet	Lybiidae	0
Tricholaema leucomelas	Acacia Pied Barbet	Lybiidae	0
Urocolius indicus	Red-faced Mousebird	Coliidae	0
Vanellus armatus	Blacksmith Lapwing	Charadriidae	0
Vanellus coronatus	Crowned Lapwing	Charadriidae	0

10.5 Appendix C: Specialist Declaration of Independence

I, Ryno Kemp, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations, and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan, or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.



Ryno Kemp

Biodiversity Specialist

The Biodiversity Company

May 2023

Avifauna Site Sensitivity Verification report for the proposed Seelo Beta Solar Energy Facilities

North West, South Africa

March 2023

CLIENT

Prepared by:

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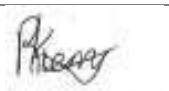
Report Name	**Avifauna Site Sensitivity Verification report for the Proposed Seelo Beta Solar Energy Facilities**
Submitted to	NEMAI CONSULTING
Report Writer	**Ryno Kemp** 
	Ryno Kemp is Pr Sci Nat registered (117462/17) in Zoological Science and is finalising his PhD in Zoology from the University of Pretoria. Ryno is a qualified Avifauna specialist with just over a year's experience, three years of experience in conservation and more than eight years of scientific research experience across South Africa.
Report Reviewer	**Andrew Husted** 
	Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 13 years' experience in the environmental consulting field.
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

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1 Introduction

1.1 Background

The Biodiversity Company was appointed to undertake an Avifauna Site Sensitivity Verification for the proposed development of the Seelo Beta 240MW Solar PV and Battery Energy Storage Systems (BESS) Project near the town of Carletonville, in the North West Province (the "Project"). The electricity generated by the Project will be injected into the existing Eskom 132 kV distribution system. The Applicant intends to bid for the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows.

The Project is located in the most eastern part of the North West Province (at the boundary between North West and Gauteng) and falls within the Dr Kenneth Kaunda District Municipality (DKKDM) and the JB Marks Local Municipality (JBMLM). The site is located approximately 13km to the north-west of the town of Carletonville.

The property earmarked for the Project covers a combined area of approximately 1130 ha, of which the buildable area determined by the engineering team is approximately 355 ha.

Table 1-1 Details of the affected properties

Farm Details	21-digit Surveyor General No.
Portion 1 of Farm 96 (Rooipan)	T0IQ00000000009600001

Components of the Proposed Solar PV Plant

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

- PV panel arrays, which are the subsystems which convert incoming sunlight into electrical energy;
- Mounting structures to support the PV panels;
- On-site inverters to convert DC to facilitate AC connection between the solar energy facility and electricity grid;
- BESS);
- IPP substation;
- Eskom switching substation1;
- Cabling between the Project's components, to be laid underground (where practical);
- Administration Buildings (Offices);
- Workshop areas for maintenance and storage;
- Temporary and permanent laydown areas;
- Internal access roads and perimeter fencing of the footprint;
- High Voltage (HV) Transformers; and
- Security Infrastructure.

The approach was informed by the Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The approach has taken cognisance of the recently published Government Notices 320 (20 March 2020) in terms of NEMA, dated 20 March and 30 October 2020: "*Procedures for the Assessment and Minimum*

Criteria for Reporting on 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" (Reporting Criteria).

After considering the findings and recommendations provided by the specialist herein, this report should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making regarding the proposed project's ecological viability.

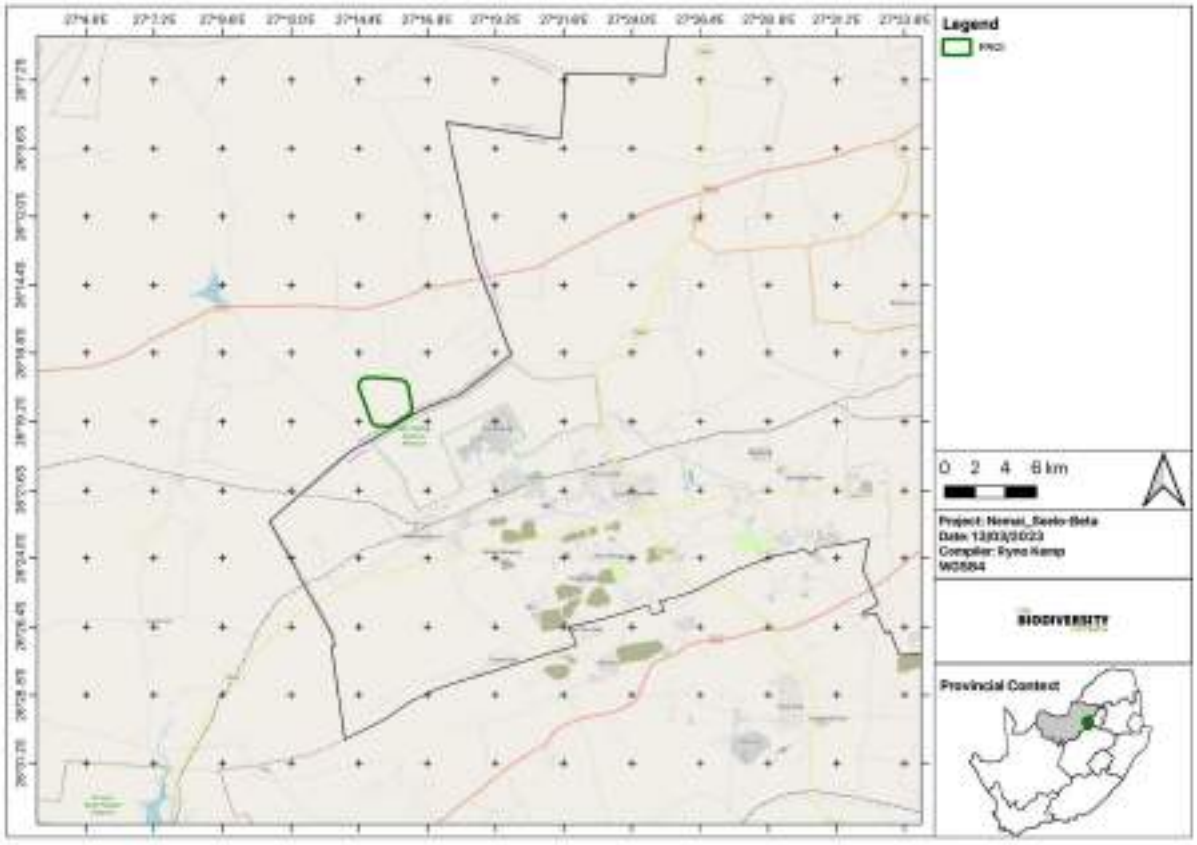


Figure 1-1 Proposed location of the project area in relation to the nearby towns

1.2 Scope of Work

The principal aim of the assessment was to provide information to guide the risk of the proposed activity to the ecological communities of the associated ecosystems and the potential impact of the proposed infrastructure within the project area. This was achieved through the following:

- Desktop assessment to identify the relevant ecologically important geographical features within the project area;
- Desktop assessment to compile an expected species list and identify possible threatened avifauna species that occur within the project area;
- Identify how the proposed project impacts based on the site assessment and desktop information and evaluate the level of risk of these potential impacts;
- Identify specific regions and avian habitats in and outside the study area that could be regarded as sensitive or which may harbour Species of Conservation Concern (SCC); and
- Identify significant bird breeding, roosting or feeding sites and possible avian flight paths or migratory routes.

1.3 Assumptions and Limitations

The following assumptions and limitations are applicable to this assessment:

- The assessment area was based on the area provided by the client. Any alterations to the footprint and/or missing GIS information pertaining to the assessment area would have affected the area surveyed;
- The PAOI was based on the project footprint area as provided by the client, as well as a 500 m assessment area around the proposed SEF;
- The findings expressed in this report are based on a three-day field survey during February 2023. The site visit was conducted during summer; all seasonal and nomadic movements or altitudinal migrations would likely be present during the field study;
- Bird behaviour and ecology are unpredictable, like any other organisms;
- The impact assessment included is for a site verification report alone and is based on desktop information as well as the information from the screening assessment and a 3-day site visit;
- The SEI included in the field summary section is preliminary; and
- Whilst every effort is made to cover as much of the site as possible, representative sampling is completed. By its nature, it is possible that some bird species present on site were not recorded during the field investigations.

1.4 Key Legislative Requirements

The legislation, policies and guidelines listed below in Table 1-2Table 1-2 A list of key legislative requirements relevant to biodiversity and conservation in the North West Province apply to the current project regarding biodiversity and ecological support systems. The list below, although extensive, may not be complete, and other legislation, policies and guidelines may apply in addition to those listed below.

Table 1-2 A list of key legislative requirements relevant to biodiversity and conservation in the North West Province

Region	Legislation
International	Convention on Biological Diversity (CBD, 1993)
	The Convention on Wetlands (RAMSAR Convention, 1971)
	The United Nations Framework Convention on Climate Change (UNFCC,1994)
	The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973)
	The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979)
National	Constitution of the Republic of South Africa (Act No. 108 of 2006)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24, No 42946 (January 2020)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24, No 43110 (March 2020)
	The National Environmental Management Protected Areas Act (Act No. 57 of 2003)
	The National Environmental Management Biodiversity Act (Act No. 10 of 2004)
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);
	The Environment Conservation Act (Act No. 73 of 1989) and associated EIA Regulations
	National Environmental Management Air Quality Act (No. 39 of 2004)
	National Protected Areas Expansion Strategy (NPAES)

	Environmental Conservation Act (Act No. 73 of 1983)
	Natural Scientific Professions Act (Act No. 27 of 2003)
	National Biodiversity Framework (NBF, 2009)
	National Forest Act (Act No. 84 of 1998)
	National Veld and Forest Fire Act (101 of 1998)
	National Spatial Biodiversity Assessment (NSBA)
	World Heritage Convention Act (Act No. 49 of 1999)
	National Heritage Resources Act, 1999 (Act 25 of 1999)
	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations, 2014
	South Africa's National Biodiversity Strategy and Action Plan (NBSAP)
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)
	Sustainable Utilisation of Agricultural Resources (Draft Legislation).
	White Paper on Biodiversity
	National Water Act (NWA, 1998)
Provincial	North-West Biodiversity Sector Plan of 2015 (READ, 2015)

2 Methods

2.1 Desktop Assessment

The desktop assessment was principally undertaken using a Geographic Information System (GIS) to access the latest available spatial datasets in order to develop digital cartographs and species lists. These datasets and their date of publishing are provided below.

2.1.1 Ecologically Important Landscape Features

Existing ecologically relevant data layers were incorporated into a GIS to establish how the proposed project might interact with any ecologically important entities. Emphasis was placed around the following spatial datasets:

- National Biodiversity Assessment 2018 (Skowno et al, 2019) (NBA) – The purpose of the NBA is to assess the state of South Africa's biodiversity based on the best available science, to understand trends over time and inform policy and decision-making across a range of sectors. The NBA deals with all three components of biodiversity: genes, species and ecosystems, and assesses biodiversity and ecosystems across terrestrial, freshwater, estuarine and marine environments. The two headline indicators assessed in the NBA are:
    - Ecosystem Threat Status – an indicator of an ecosystem's wellbeing based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition.
    - Ecosystem Protection Level – an indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP) based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. NP, PP or MP ecosystem types are collectively called under-protected ecosystems.
- Protected areas:

- South Africa Protected Areas Database (SAPAD) (DFFE, 2022) – The (SAPAD) Database contains spatial data for the conservation of South Africa. It includes spatial and attribute information for formally protected areas and areas with less formal protection. SAPAD is updated continuously and forms the basis for the Register of Protected Areas, a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.
- National Protected Areas Expansion Strategy (NPAES) (DFFE, 2021) – The NPAES provides spatial information on areas suitable for terrestrial ecosystem protection. These focus areas are large, intact and unfragmented and therefore highly important for biodiversity, climate resilience and freshwater protection.

- North West Biodiversity Sector Plan - The spatial component of the Biodiversity Sector Plan is based on systematic biodiversity planning undertaken by READ. The purpose of a Biodiversity Sector Plan is to inform land use planning, environmental assessments, land and water use authorisations, and natural resource management, undertaken by a range of sectors whose policies and decisions impact 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 (READ, 2015).

- 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 (WCDEAP, 2017).

- Important Bird and Biodiversity Areas (IBAs) (BirdLife South Africa, 2015) – IBAs constitute a global network of over 13 500 sites, of which 112 are found in South Africa. IBAs are sites of global significance for bird conservation, identified through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria; and

- Hydrological Setting:

  - South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer *et al,* 2018) – A South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was established during the National Biodiversity Impact Assessment of 2018. It is a collection of data layers that represent the extent of the river and inland wetland ecosystem types and pressures on these systems.

  - Strategic Water Source Areas (SWSAs) (Lotter *et al*, 2021) – SWSAs are defined as areas of land that supply a quantity of mean annual surface water runoff in relation to their size and, therefore, contribute considerably to the overall water supply of the country. These are key ecological infrastructure assets, and the adequate protection of surface water SWSAs areas is vital for national security because a lack of water security will compromise national security and human wellbeing.

  - National Freshwater Ecosystem Priority Area (NFEPA) (Nel *et al.,* 2011) – The NFEPA database provides strategic spatial priorities for conserving the country's freshwater ecosystems and associated biodiversity and supporting sustainable use of water resources.

2.1.2 Expected Avifauna Species

The following resources were considered during the desktop assessment and for the compilation of the expected species list:

- South African Bird Atlas Project 2 (SABAP2). Full protocol data from 9 relevant pentads (2610_2710, 2610_2715, 2610_2720, 2615_2710, 2615_2715, 2615_2720, 2620_2710, 2620_2715, 2620_2720) were used to compile the expected species list.
- Coordinated Water Bird Counts (CWAC) – The Animal Demography Unit (ADU) launched the Coordinated Waterbird Counts (CWAC) project in 1992 as part of South Africa's commitment to international waterbird conservation. The primary aim of CWAC is to act as an effective long-term waterbird monitoring tool. This is done through a programme of regular mid-summer and mid-winter censuses at several wetlands. The database is located at https://cwac.birdmap.africa/index.php.
- Coordinated Avifaunal Roadcounts (CAR) – The Coordinated Avifaunal Roadcounts (CAR) were pioneered in July 1993 in a joint Cape Bird Club/ADU project to monitor the populations of two threatened species: *Anthropoides paradiseus* (Blue Crane) and *Neotis denhamii* (Denham's Bustard). It monitors 36 species of large terrestrial birds along 350 fixed routes covering over 19 000 km using a standardised method.
- Important Bird and Biodiversity Areas (BirdLife South Africa, 2015) – Important Bird and Biodiversity Areas (IBAs) constitute a global network of over 13 500 sites, of which 112 are found in South Africa. IBAs are sites of global significance for bird conservation, identified through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria.
- Hockey *et al*. (2005), Roberts Birds of Southern Africa (7th edition). The primary source for species identification, geographic range, and life history information.
- Sinclair and Ryan (2010), Birds of Africa. Secondary source for identification.
- Taylor *et al*. (2015), Eskom Red Data Book of Birds of South Africa, Lesotho, and Swaziland. They are used for conservation status, nomenclature, and taxonomical ordering.

2.1.3 Field Survey

The fieldwork component comprised a single summer (wet season) survey conducted between the 17th and 19th of February, 2023. Sampling consisted of standardised point counts within the PAOI around the property boundary and random diurnal incidental surveys. Standardised point counts (Buckland *et al*, 1993) were conducted to gather data on the species composition and relative abundance of species within the broad habitat types identified. The standardised point count technique was utilised (Cumming & Henry, 2019). Each point count was run over a 10 min period. The horizontal detection limit was set at 100 m. At each point, the observer would document the date, start time, and end time, habitat, numbers of each species, detection method (seen or heard), behaviour (perched or flying) and general notes on habitat and nesting suitability for important conservation species (**Error! Reference source not found.**). Diurnal incidental searches were conducted to supplement the species inventory with cryptic and elusive species that may not be detected during the rigid point count protocol. This involved opportunistic species sampling between point count periods, random meandering, and road cruising.

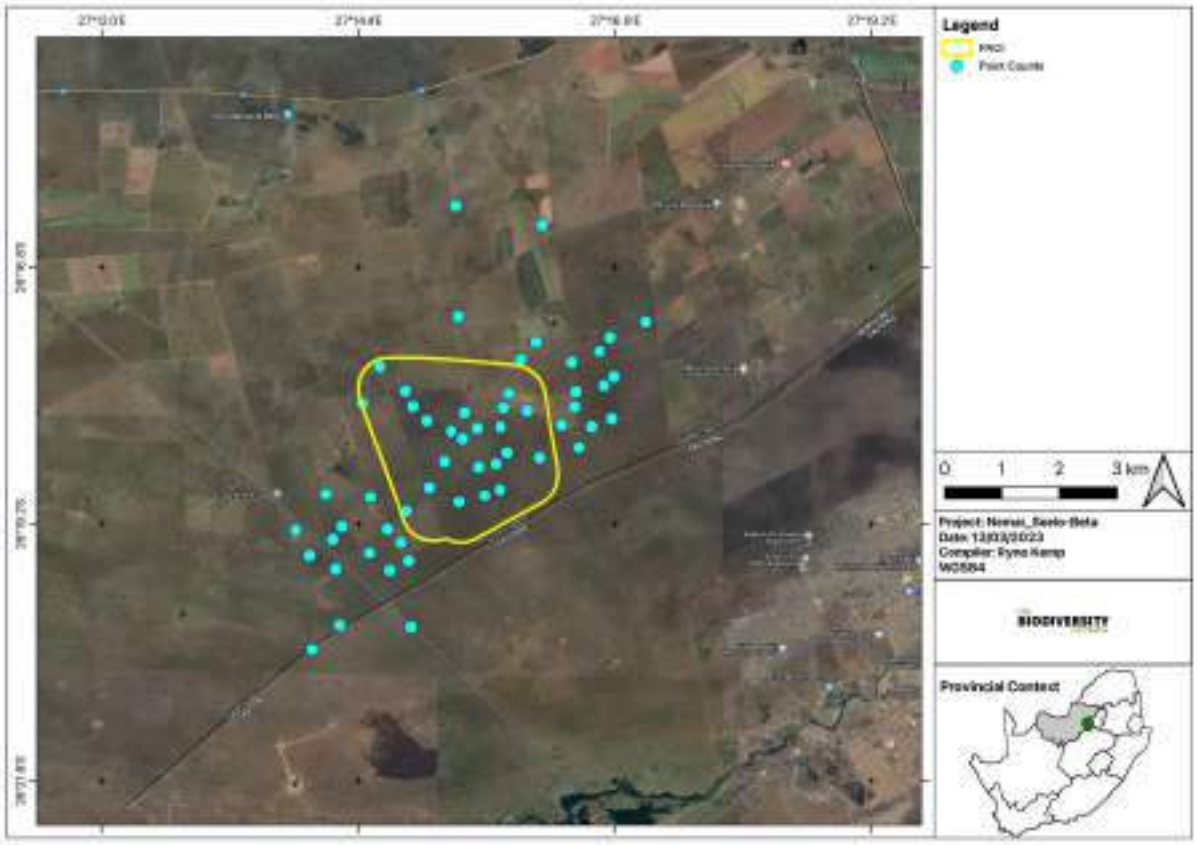


Figure 2-1 Map illustrating the points visited during the field surveys

2.2 Avifauna Site Ecological Importance (SEI)

The different habitat types within the assessment area were delineated and identified based on observations during the field assessment and available satellite imagery. These habitat types were assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of species of conservation concern and their ecosystem processes.

Site Ecological Importance (SEI) is a function of the Biodiversity Importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present on the site) and Receptor Resilience (RR) (its resilience to impacts) as follows.

BI is a function of Conservation Importance (CI) and the receptor's Functional Integrity (FI). The CI and FI ratings criteria are provided in Table 2-1 and Table 2-2, respectively.

Table 2-1 Summary of Conservation Importance criteria

Conservation Importance	Fulfilling Criteria
Very High	Confirmed or highly likely occurrence of Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Extremely Rare or CR species that have a global extent of occurrence (EOO) of < 10 km^2. Any area of natural habitat of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent) of natural habitat of an EN ecosystem type. Globally significant populations of congregatory species (> 10% of global population).
High	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km^2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining.

Conservation Importance	Fulfilling Criteria
	Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type. Presence of Rare species. Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	Confirmed or highly likely occurrence of populations of Near Threatened (NT) species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. Any area of natural habitat of threatened ecosystem type with status of VU. Presence of range-restricted species. > 50% of receptor contains natural habitat with potential to support SCC.
Low	No confirmed or highly likely populations of SCC. No confirmed or highly likely populations of range-restricted species. < 50% of receptor contains natural habitat with limited potential to support SCC.
Very Low	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

Table 2-2 Summary of Functional Integrity criteria

Functional Integrity	Fulfilling Criteria
Very High	Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. No or minimal current negative ecological impacts, with no signs of major past disturbance.
High	Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types. Good habitat connectivity, with potentially functional ecological corridors and a regularly used road network between intact habitat patches. Only minor current negative ecological impacts, with no signs of major past disturbance and good rehabilitation potential.
Medium	Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts, with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	Small (> 1 ha but < 5 ha) area. Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.
Very Low	Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.

BI can be derived from a simple matrix of CI and FI as provided in Table 2-3.

Table 2-3 Matrix used to derive Biodiversity Importance from Functional Integrity and Conservation Importance

Biodiversity Importance (BI)		Conservation Importance (CI)				
		Very high	High	Medium	Low	Very low
Functional Integrity (FI)	Very high	Very high	Very high	High	Medium	Low
	High	Very high	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very low
	Low	Medium	Medium	Low	Low	Very low
	Very low	Medium	Low	Very low	Very low	Very low

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor, as summarised in Table 2-4.

Table 2-4 Summary of Receptor Resilience criteria

Resilience	Fulfilling Criteria
Very High	Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
Medium	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
Very Low	Habitat that is unable to recover from major impacts, or species that are unlikely to: (i) remain at a site even when a disturbance or impact is occurring, or (ii) return to a site once the disturbance or impact has been removed.

After the BI and RR determination, the SEI can be ascertained using the matrix provided in Table 2-5.

Table 2-5 Matrix used to derive Site Ecological Importance from Receptor Resilience and Biodiversity Importance

Site Ecological Importance		Biodiversity Importance				
		Very high	High	Medium	Low	Very low
Receptor Resilience (RR)	Very Low	Very high	Very high	High	Medium	Low
	Low	Very high	Very high	High	Medium	Very low
	Medium	Very high	High	Medium	Low	Very low
	High	High	Medium	Low	Very low	Very low
	Very High	Medium	Low	Very low	Very low	Very low

Interpretation of the SEI in the context of the proposed development activities is provided in Table 2-6.

Table 2-6 Guidelines for interpreting Site Ecological Importance in the context of the proposed development activities

Site Ecological Importance	Interpretation in relation to proposed development activities
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.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

3 Results

3.1 Desktop Baseline

3.1.1 Ecologically Important Landscape Features

The following features describe the general area and habitat. This assessment is based on spatial data from various sources, such as the provincial environmental authority and SANBI. The desktop analysis and its relevance to this project are listed in **Error! Reference source not found.**.

Table 3-1 Summary of the relevance of the Project Area of Influence (PAOI) to ecologically important landscape features

Desktop Information Considered	Relevant/Irrelevant
North West Biodiversity Sector Plan	Irrelevant – The PAOI does not overlap with the North West Biodiversity Sector Plan
Ecosystem Threat Status	Relevant – Overlaps with Least Concern Ecosystems
Ecosystem Protection Level	Relevant – The PAOI overlaps with Poorly Protected Ecosystem
Protected Areas	Relevant – The PAOI are next to Abe Bailey Provincial Nature Reserve
National Protected Areas Expansion Strategy	Irrelevant – Does not overlap with any Protected Areas Expansion Strategy
Important Bird and Biodiversity Areas	Irrelevant – The PAOI is located approximately 30km from the IBA
Coordinated Avifaunal Road Count	Relevant - The PAOI is located next to a Coordinated Avifaunal Road Count
Coordinated Waterbird Count	Relevant – The PAOI is in close proximity to 3 Coordinated Water Count Sites
Strategic Water Source Areas	Irrelevant - The PAOI does not overlap any SWSA
South African Inventory of Inland Aquatic Ecosystems	Irrelevant - The PAOI does not overlap any CR Inland Aquatic Ecosystem, only a non-perennial river
National Freshwater Priority Area	Irrelevant – The PAOI does not overlap with FEPA wetlands and FEPA rivers
Powerline Corridor	Relevant – The PAOI overlaps with the Strategic Transmission Corridors
Renewable Energy Development Zone (REDZ)	Irrelevant – The PAOI is not situated within any of the Renewable Energy Development Zone
Renewable Energy EIA Application Database (REEA)	Relevant – Only a few approved projects occur within 30 km of the boundary of the PAOI.

3.2 Avifauna Species of Conservation Concern

Based on the South African Bird Atlas Project 2 (SABAP2) database, 320 bird species have the potential to occur in the vicinity of the assessment area, with 20 species listed as SCC on a regional or global scale (Table 3-2). Only one SCC was observed during the field investigation; however, three other species have a high likelihood of occurring, and five have a medium likelihood of occurring at the proposed development.

Table 3-2 Avifauna species of conservation concern that are expected to occur within the proposed project area and vicinity. EN = Endangered, NT = Near Threatened, LC = Least Concern, and VU = Vulnerable.

Common Name	Scientific Name	Conservation Status		Likelihood of Occurrence
		Regional	Global (IUCN)	
Secretarybird	*Sagittarius serpentarius*	VU	EN	High
Blue Crane	*Anthropoides paradiseus*	NT	VU	Confirmed
Maccoa Duck	*Oxyura maccoa*	NT	EN	Low
Verreaux's Eagle	*Aquila verreauxii*	NA	LC	Low

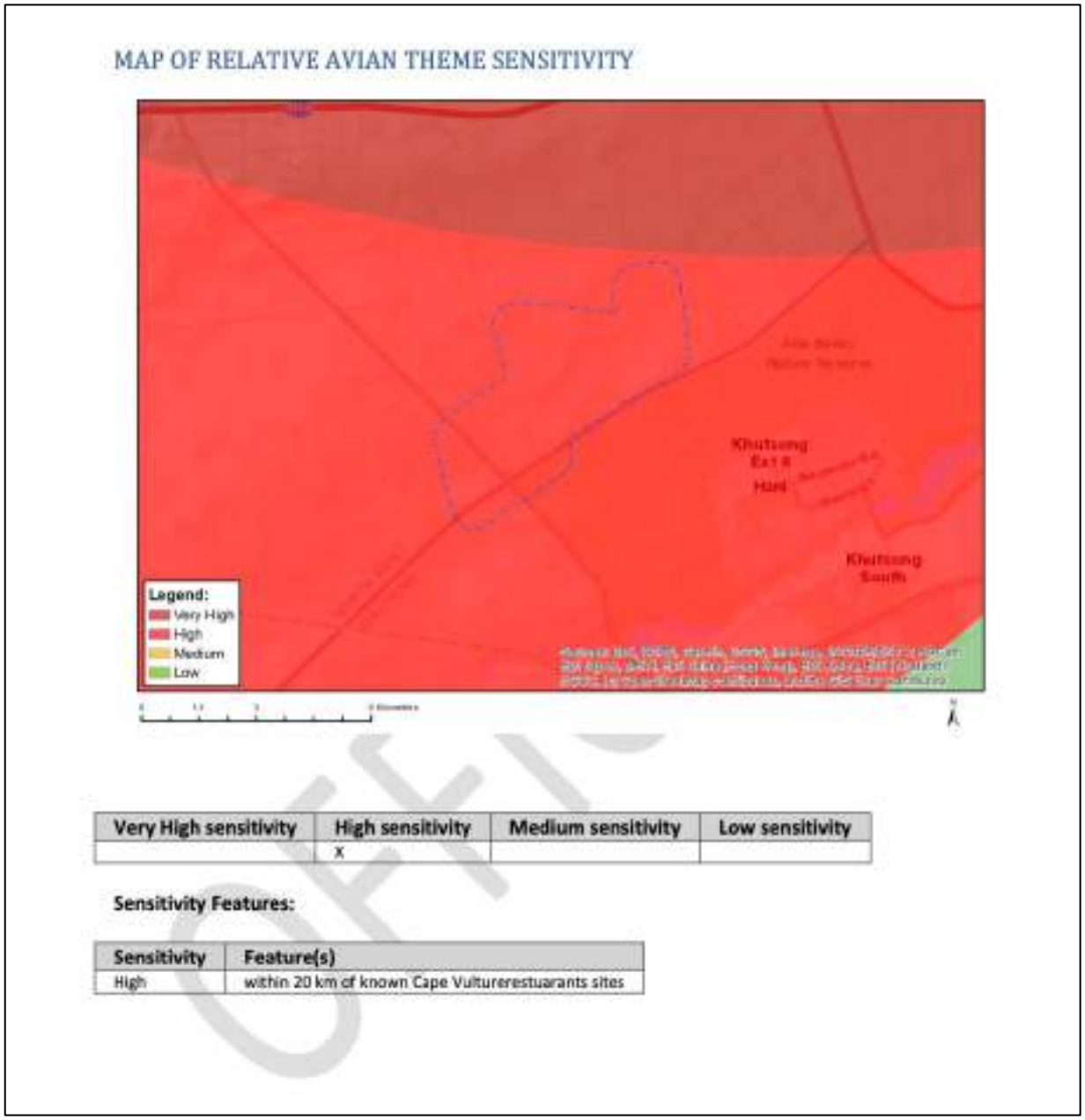
Lanner Falcon	*Falco biarmicus*	VU	LC	Medium
Red-footed Falcon	*Falco vespertinus*	NT	VU	Low
Greater Flamingo	*Phoenicopterus roseus*	NT	LC	Medium
Lesser Flamingo	*Phoeniconaias minor*	NT	NT	Medium
African Marsh Harrier	*Circus ranivorus*	EN	LC	High
Pallid Harrier	*Circus macrourus*	NT	NT	Low
Half-collared Kingfisher	*Alcedo semitorquata*	NT	LC	Low
African Grass Owl	*Tyto capensis*	VU	LC	Medium
Black-winged Pratincole	*Glareola nordmanni*	NT	NT	Low
Curlew Sandpiper	*Calidris ferruginea*	LC	NT	Low
Abdim's Stork	*Ciconia abdimii*	NT	LC	Low
Yellow-billed Stork	*Mycteria ibis*	EN	LC	Medium
Caspian Tern	*Hydropogne caspia*	VU	LC	Low
Cape Vulture	*Gyps coprotheres*	EN	VU	High
Lappet-faced Vulture	*Torgos tracheliotos*	EN	EN	Low
White-backed Vulture	*Gyps africanus*	CR	CR	Low

3.3 Site Sensitivity

This section provides the sensitivity of the PAOI within an avifauna community context. The section is divided into the National Web-based Environmental Screening Tool Report outputs and the Site Ecological Importance, as determined using the Species Environmental Assessment guidelines (SANBI, 2020).

3.3.1 Environmental Screening Tool

As indicated by the screening tool report for the project area, the avian theme was derived to be “High” sensitivity due to the proximity of a Vulture restaurant. However, the avian theme is mainly used for wind farm developments (Figure 3-1). Therefore, the animal species and terrestrial biodiversity themes should be used for PV projects (Figure 3-2 and Figure 3-3). As indicated in the screening report, the Animal Species Theme sensitivity was derived to be ‘medium’ sensitivity due to the likely presence of the African Marsh Harrier (Circus ranivorous) and African Grass Owl (*Tyto capensis*). The screening tool also highlights White-bellied Bustard (*Eupodotis senegalensis*) as a potential species to occur at the site, but it is unlikely for the species to be observed in the wider area of the project area. As indicated by the screening tool report for the project area, the terrestrial biodiversity theme sensitivity was derived to be ‘Low’ with a small portion as “Very High” sensitivity.



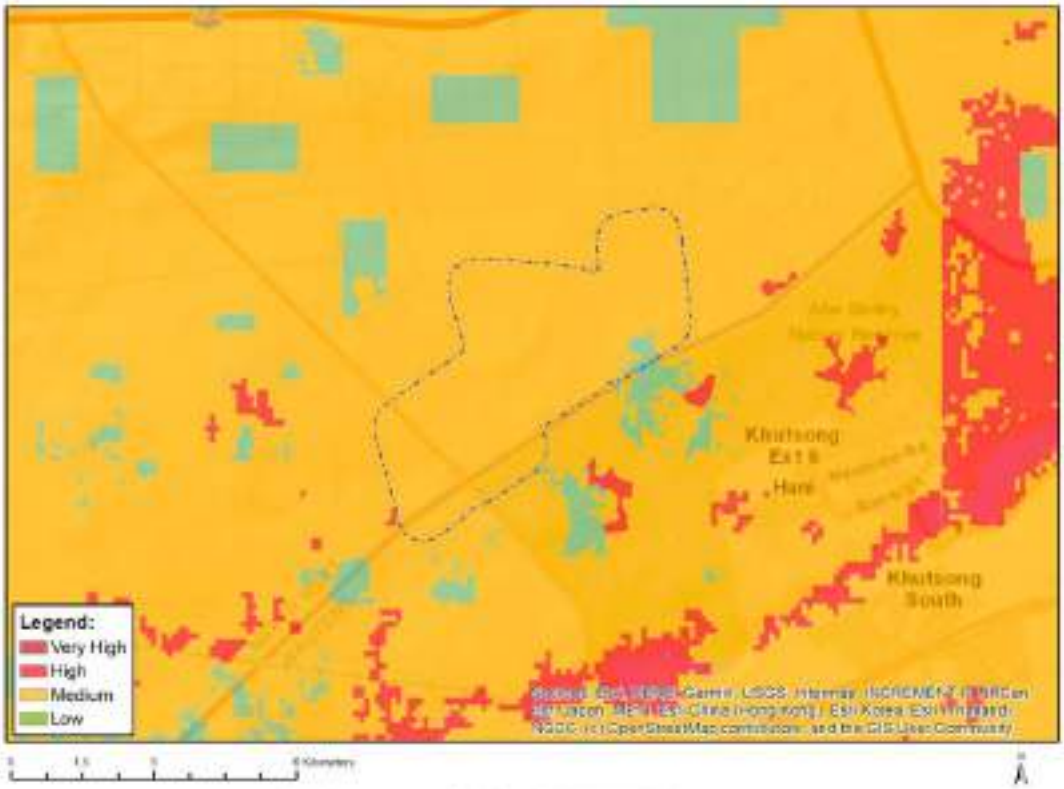
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	within 20 km of known Cape Vulturerestuarants sites

Figure 3-1 Avian Theme Sensitivity for the Proposed Development, National Web based Environmental Screening Tool.

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at ciadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Circus ranivorus
Low	Subject to confirmation
Medium	Aves-Tyto capensis
Medium	Aves-Circus ranivorus
Medium	Aves-Eupodotis senegalensis
Medium	Mammalia-Crocidura maquassiensis
Medium	Mammalia-Hydrictis maculicollis

Figure 3-2 Animal Theme Sensitivity for the Proposed Development, National Web based Environmental Screening Tool.

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Very High	Critical biodiverisity area 2
Very High	Protected Areas Expansion Strategy

Figure 3-3 Terrestrial Biodiversity Theme Sensitivity for the Proposed Development, National Web based Environmental Screening Tool.

3.3.2 Avifauna Site Ecological Importance (SEI)

Based on the criteria provided in Section **Error! Reference source not found.** of this report, all habitats within the assessment area of the proposed project were allocated a sensitivity or SEI category (Table 3-3). The SEI of the PAOI within an avifauna context was based on the field results and desktop information. The SEI of the habitat types delineated is illustrated in Figure 3-4. The non-perennial river was given a 50m buffer with a "High" sensitivity rating. Blue Cranes (Antropoides paradiseus) were observed during the survey with the POAI. The grasslands are well managed but are mainly used for grazing by livestock, and without any confirmed nest sites, the grasslands were rated as medium sensitivity. The transformed habitat, like secondary agricultural fields, human settlements, etc., were given a very low sensitivity.

Table 3-3 SEI Summary of habitat types delineated within field assessment area of project area

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Non-perennial river and water sources	High	Medium	**Medium**	Low	**High**
	Confirmed or highly likely occurrence of CR, EN, VU species. Presence of Rare species.	Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity		Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality	
Modified Grasslands	Medium	Medium	**Medium**	Medium	**Medium**
	Confirmed or highly likely occurrence of populations of NT species	Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity		Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality	
Transformed	Very Low	Very Low	**Very Low**	Very High	**Very Low**
	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.	Several major current negative ecological impacts.		Habitat that can recover rapidly	

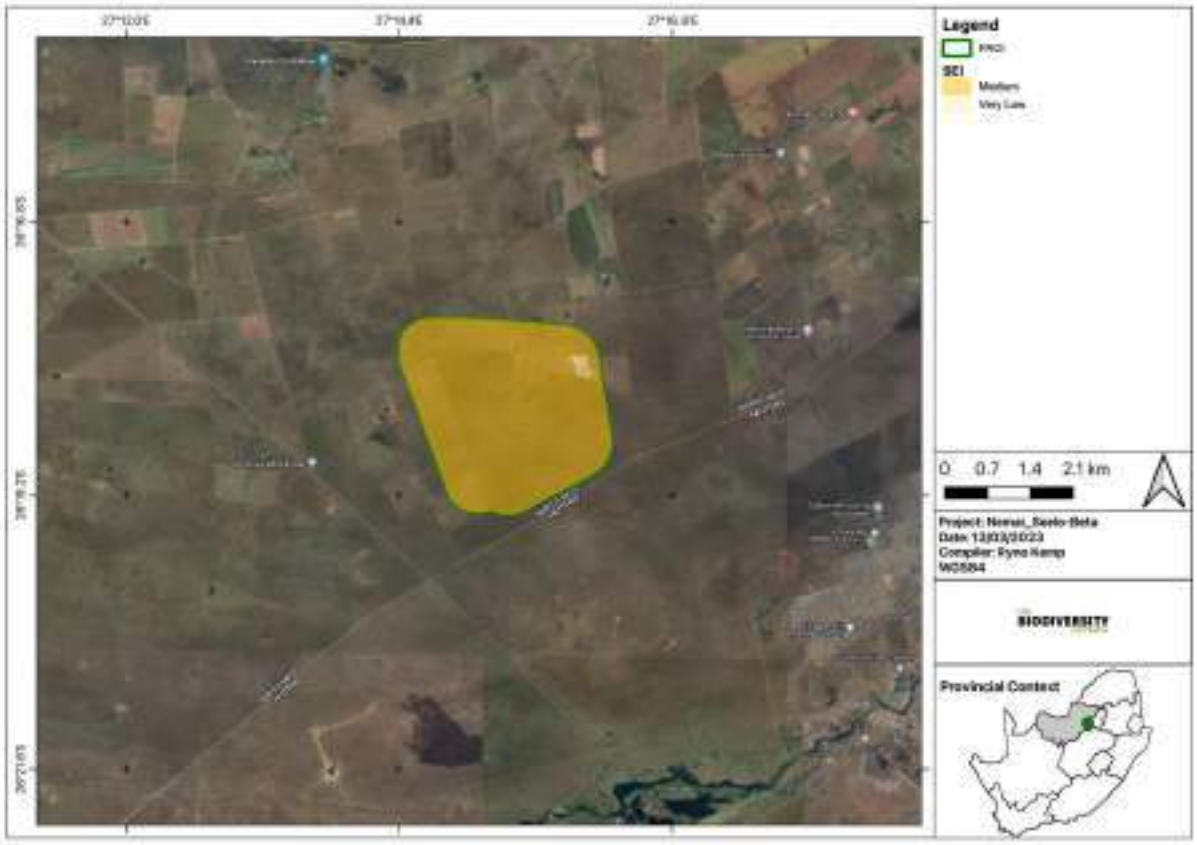


Figure 3-4 Map illustrating the Site Ecological Importance of the proposed development within the PAOI

4 Conclusion

Based on a desktop analysis and a three-day field investigation, the proposed Solar Park development is associated with medium sensitivity as the area is dominated by modified grassland. In the sensitivity verification report prepared by the Avifaunal specialist, it has been recommended that an Avifauna Impact Assessment should be conducted during the impact assessment phase of the proposed project.

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6 Appendix Item – Specialist Declaration of Independence

I, Ryno Kemp, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Ryno Kemp

Ecologist/Avifauna Specialist

The Biodiversity Company

March 2023

APPENDIX E4: Agricultural Compliance Statement

AGRICULTURAL ASSESSMENT:

COMPLIANCE STATEMENT

PROPOSED SEELO BETA PV PROJECT

LOCATED ON THE BOUNDARY BETWEEN NORTH-WEST AND GAUTENG PROVINCE

Compiled for:
Nemai Consulting (Pty) Ltd

Compiled by
Dr Andries Gouws Index

April 2023

DECLARATION

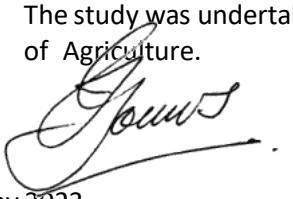
The observations, conclusions and recommendations made in this report are based on the best available data and on best scientific and professional knowledge of the directors of INDEX (Pty) Ltd. The report is based on GIS programming and utilises satellite tracking to map survey points. Survey points are normally accurate to within 3 metres; which must be considered in the use of the information.

The directors of INDEX (Pty) Ltd exercises due care and diligence in rendering services and preparing documents. However, the company accepts no liability, and the client, by receiving this document, indemnifies INDEX (Pty) Ltd and its directors and employees, by the use of the information contained in this document, against any action, claim, demand, loss, liability, cost, damage and expense arising from or in connection with services rendered.

The property and copyright of this report shall remain vested in INDEX (Pty) Ltd. The client that commissioned the report may use the information as it may think fit; but only for the land for which it was commissioned.

General declaration:

- INDEX acted as the independent specialist in this application;
- Performed the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- There were no circumstances that may compromise INDEX's objectivity in performing such work;
- INDEX have expertise in conducting the specialist report relevant to this application, including knowledge of NEMA and its regulations and any guidelines that have relevance to the proposed activity;
- Have no and will not engage in conflicting interests in the undertaking of the activity.
- The study was undertaken by Dr Andries Gouws. He is a registered member of SACNASP in the category of Agriculture.



May 2023

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SUMMARY

FINDINGS AND ANALYSES

- There is no land that can be regarded as high potential cropping land that be protected because it is *highly sensitive* for farming purposes.

IMPACT ASSESSMENT

- There will be no loss of high potential soil and only a small impact on cattle production.

IMPACT AND MITIGATION DURING CONSTRUCTION

- Security during construction: Mend fences when they are breached in order to protect livestock and game. This applies especially for farmers with rare and endangered game.
- Make the contact details of the main contractors available to surrounding landowners and attend to any problems expeditiously.
- Hazardous substances should be safely disposed of or stored to minimise any impact on animals and water resources.

IMPACT AND MITIGATION DURING OPERATIONAL PHASE

- Road reserves require normal maintenance. Mitigation is normally not required. However, alien vegetation should be controlled.
- Implement the Environmental Management Programme (EMPr) for the duration of the operations to eliminate potential impacts.

GENERAL CONCLUSIONS

- No key issues or triggers were identified.
- There is no high potential sensitive land on the PV Site.

RECOMMENDATION

The land on which the development is proposed is low potential cropping land that has a low sensitivity in in terms of Notice 320 of the National Environmental Management Act in May 2020 of the Department of Environmental Affairs.

It is recommended that construction be approved.

1 SPECIALIST DECLARATION

COMPLIANCE STATEMENT

Main findings of the study are as follows:

No high potential land was found on the site. According to the criteria of DALRRD the land is Class 7 or poorer and has a low or medium low sensitivity to agricultural development. There will be no impact regarding to loss of sensitive land.

THE AUTHOR OF THE REPORT CONFIRMS THE FOLLOWING:

3.3.1. Details and relevant experience as well as the SACNASP registration number of the soil scientist/agricultural specialist/s preparing the assessment including a curriculum vita;	Dr Andries Gouws is a soil scientist and is registered with SACNASP. Refer to Sections 11.2 and 11.3.
3.3.2. A signed statement of independence by the specialist;	Refer to the preamble of the report.
3.3.3. A map showing the proposed development footprint (including supporting infrastructure) with a 50 m buffered development envelope, overlaid on the agricultural sensitivity map generated by the national environmental screening tool;	The entire PV site will be developed. See Figure 2.
3.3.4. Calculations of the physical development footprint area for each land parcel as well as the total physical development footprint area of the proposed development including supporting infrastructure;	Total survey area is Betha 875 ha and the PV 352ha
3.3.5. Confirmation that the development footprint is in line with the allowable development limits contained in Table 1 above;	The size of the generation unit 240MW, this is within the allowable limit.
3.3.6. confirmation from the specialist that all reasonable measures have been taken through micro-siting to avoid or minimise fragmentation and disturbance of agricultural activities;	Micro siting is possible and led to the present design. The development will not disturb any adjacent farming activities. The site will not be subdivided in terms of Act 70 of 1970. The developed it will, therefore not lead to fragmentation of farm land.
3.3.7. A substantiated statement from the soil scientist or agricultural specialist on the acceptability of the proposed development and a recommendation on the approval of the proposed development;	The PV site development takes place on low potential land that has a low sensitivity related to agriculture. It consists of shallow and rocky soils with few patches of deeper soils. It is the author's opinion that the no reason could be found to prevent the project from being implemented.

3.3.8. Any conditions to which this statement is subjected	There are no conditions imposed on the approval of the project.
3.3.9. in the case of a linear activity, confirmation from the agricultural specialist or soil scientist, that in their opinion, based on the mitigation and remedial measures proposed, the land can be returned to the current state within two years of completion of the construction phase.	N/A
3.3.10. Where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr; and	No particular management requirements are proposed. Temporary measures should be put in place to contain livestock and game animals where fences are removed. Some of the fences are of game standard and should be repaired or replaced to the same standard.
3.3.11. A description of the assumptions made and any uncertainties or gaps in knowledge or data.	The observations are accepted as representative of the soil conditions. The author feels confident that this is the case. There were sufficient observations made that no gaps in knowledge or data is expected.
The duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Assessment date: April 2023. The duration, date and season of the site inspection and the significance of the season to the outcome of the assessment is not relevant. The main criteria for farming potential are soils, climate and water availability. These are not bound to seasons.
A description of the methodology used to undertake the on-site assessment	Refer to Section 5.

2 BACKGROUND

Nemai Consulting (Pty) Ltd was appointed to undertake the required Environmental Authorisation (EA) application process for the proposed Seelo Beta 240MW Solar PV and BESS project located on the boundary between North-West and Gauteng Province, approximately 13km north-west of the town of Carletonville.

INDEX was appointed to do the agricultural impact compliance statement in terms of Notice 320 of the National Environmental Management Act in May 2020 of the Department of Environmental Affairs.

SITE VERIFICATION

The current use of the land and the environmental sensitivity of the site as identified by the screening tool was be confirmed by a site visit.

The site sensitivity verification is normally done by desk top analysis, using satellite imagery, a preliminary on-site inspection and any other available and relevant information.

The outcome of the site sensitivity verification found the following:

- It disputes the current use of the land and the environmental sensitivity as identified by the screening tool.
- The crop land boundary is incorrect – no land is cultivated on the PV Site. The land indicated as cropping land is actually grazing. The environmental sensitivity according to the tool is indicated as high and moderately sensitive. This is not the case; the soil is shallow and rocky with many outcrops that renders the site as not arable and only suitable for grazing. There are no irrigation rights nor is there any land under irrigation.
- In line with the provisions of the Protocol, a compliance statement is required for the Environmental Impact Assessment (EIA) report.

The findings of the Sensitivity Verification are incorporated into this report as an addendum.

The location of the Seelo Beta Solar Projects is indicated in Figure 1.

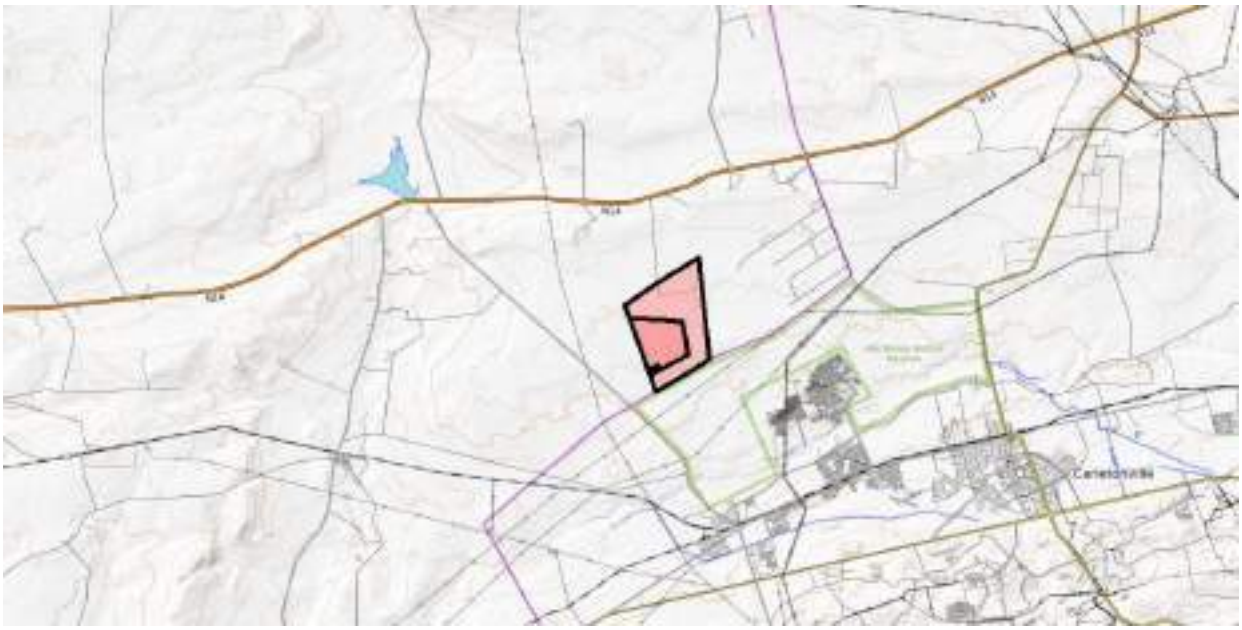


Figure 1. Locality of the project

3 TERMS OF REFERENCE

Index was appointed as agricultural specialist for the proposed Seelo Beta 240MW Solar PV and BESS project located on the boundary between North-West and Gauteng Province, approximately 13km north-west of the town of Carletonville.

The TOR is as follows:

APPROACH

- Determine agricultural potential in the Project's footprint.
- Determine impacts of the Project from an agricultural perspective.
- Suggest suitable mitigation measures to address the identified impacts.

The following were indicated by the client as particular outputs:

- Indicate Key Issues & Triggers Identified During Scoping
- Indicate loss of agricultural land with high capability due to direct occupation by the development footprint.
- Indicate loss of fertile soil.
- Soil erosion due to inadequate stormwater management.

4 PROPOSED DEVELOPMENT

The project consists of a PV site and associated infrastructure. The detail of this project is as follows:

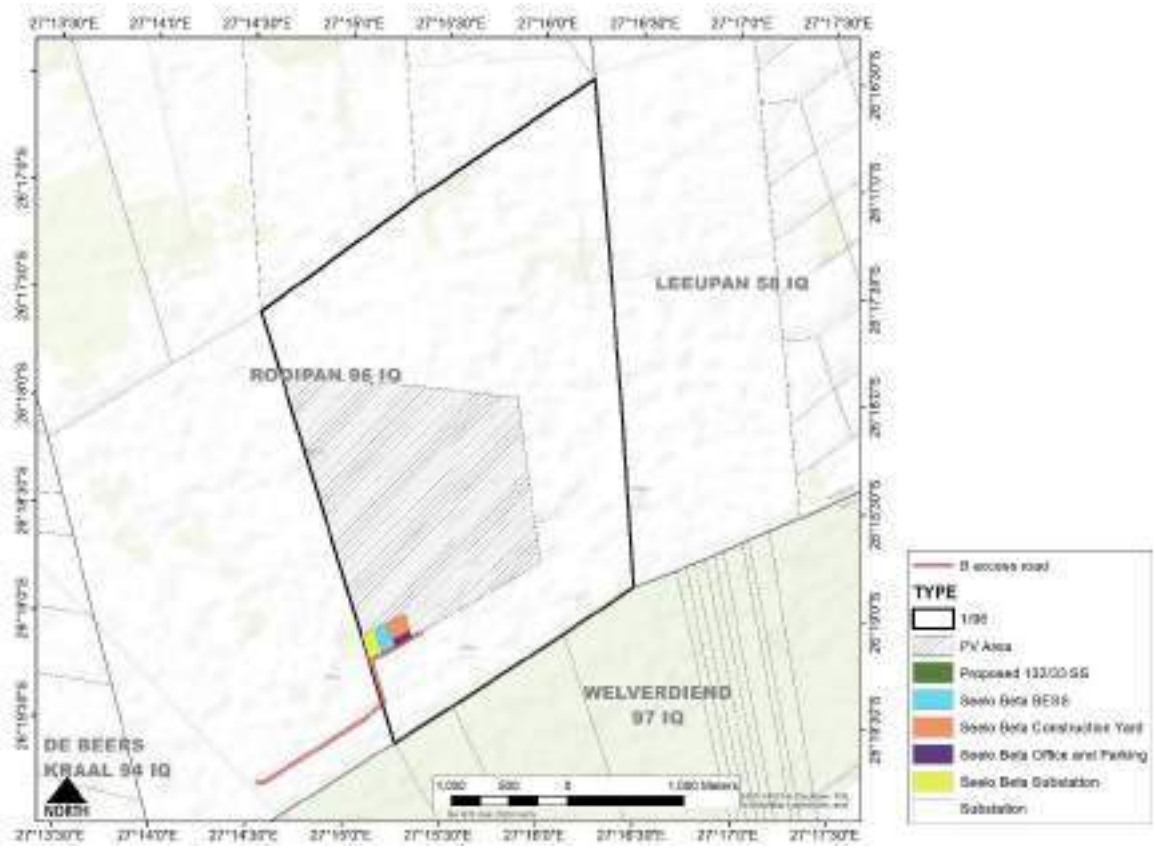


Figure 2. Main components of the development

High potential land on the site was excluded from the development. Per implication, micro placement reduced and minimised the impact of the development. Recent Google images indicate the arable land that occurs on the farming land parcels.

Figure 3. Google image indicating no cultivated land on the site

The design and placement of the infrastructure may change as other specialist assessments are taken into consideration

5 METHODS AND PROCEDURES

SITE SENSITIVITY VERIFICATION

The verification is a review of existing information on soils and topography on a desktop level to determine areas with high sensitivity in terms of Notice 320 of the National Environmental Management Act in May 2020 of the Department of Environmental Affairs.

The current use of the land and the environmental sensitivity of the site are available in the screening tool, and were used in assessing the site.

- The desktop verification was done through use of satellite imagery and a site visit.
- The aim was to verify the findings of the interpretation done on the satellite images and of the data obtained from the Screening Tool.
- The outcome of the site verification is included in this report.

The report compared the current crop land and the environmental sensitivity as identified by the screening tool with the present situation.

The findings of the Sensitivity Verification are incorporated into this report as an addendum.

The results of the site verification are provided in the following chapters.

SITE EVALUATION PROCESS

Satellite images were used as backdrop and the present land uses digitised.

Soil profiles were augured to determine soil depth, clay content is land conditions.

Capability classification is according to the guidelines published on the AGIS website of the National Department of Agriculture (NDA) was used to determine the capability of soils and their agricultural potential (DALRRD, 2019).

Site observations were made on all much of the Seelo Beta PV site. The positions are indicated below:

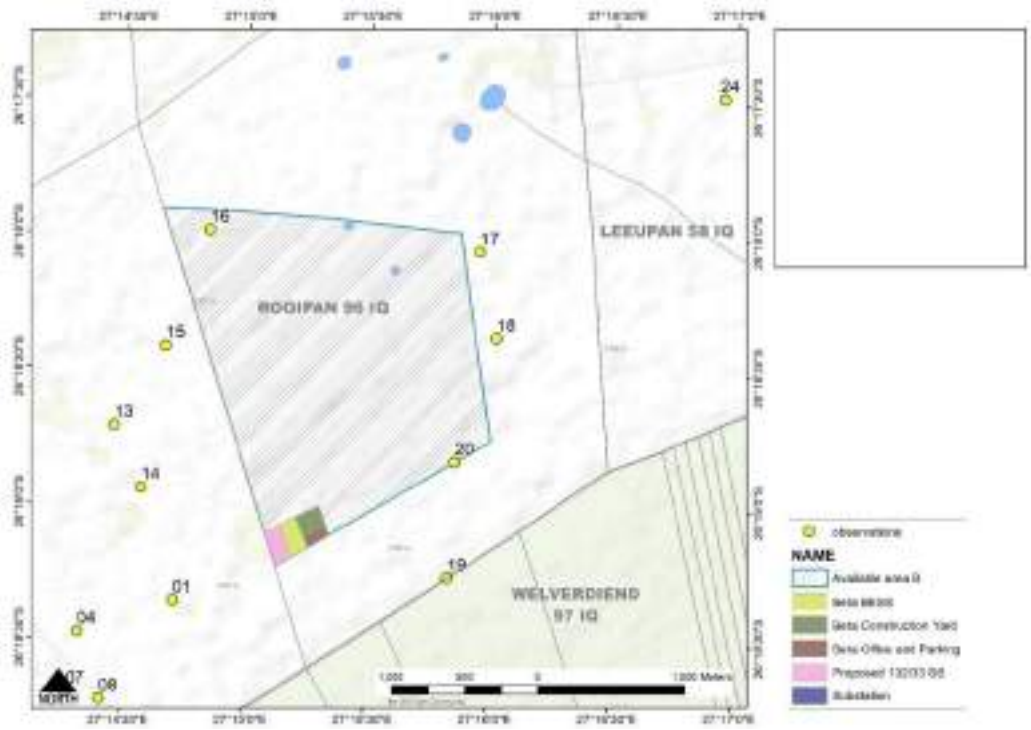


Figure 4. Positions of observations

6 SITE EVALUATION

6.1 PRESENT LAND USES

The entire site proposed for the PV project is used for grazing. Cultivated land was excluded from all infrastructure development.

Photo 1. Rocks removed in an attempt to make lands

Photo 2. Grazing land on rocky soils

Photo 3. Grazing on rock outcrops

6.2 CLIMATE

The climate is suitable for adapted crop production practices provided that the soil is suitable for cultivation. In this case, the soils on the PV site are shallow and rocky and not arable. This was also the reason that the farmers abandoned crop production and planted pastures.

6.3 SOIL PROPERTIES

SOIL TYPES

Twenty-four observations were photographed on which no deep and arable soils were found. 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 (refer to photos below).

Soil types identified are Mispah, Glenrosa and Hutton. The Hutton's vary in depth between 300mm and to more than 500mm over very short distances. This is very common on soil that developed on dolomite.

A description of the soil types indicated on Figure 5 are as follows:

Hu/R	Shallow and rocky soils derived from weathered dolomite. It consists of dark brown sandy loam topsoil with moderately developed blocky structure. The clay content is between 18 and 28%. Rock outcrops of dolomite and chert are common. Dominant soil types are Hutton and Mispah.
Hu/VD	Shallow and rocky soils with depths that varies in between 300 and 500mm. It consists of dark brown sandy loam topsoil with moderately developed blocky structure. The clay content is between 18 and 28%. Rock outcrops of dolomite and chert are common. Dominant soil types are Hutton and Mispah.
Ms/R	Shallow and rocky soils. Rock outcrops of dolomite and chert are common.

The soils are not arable and only suitable for grazing.

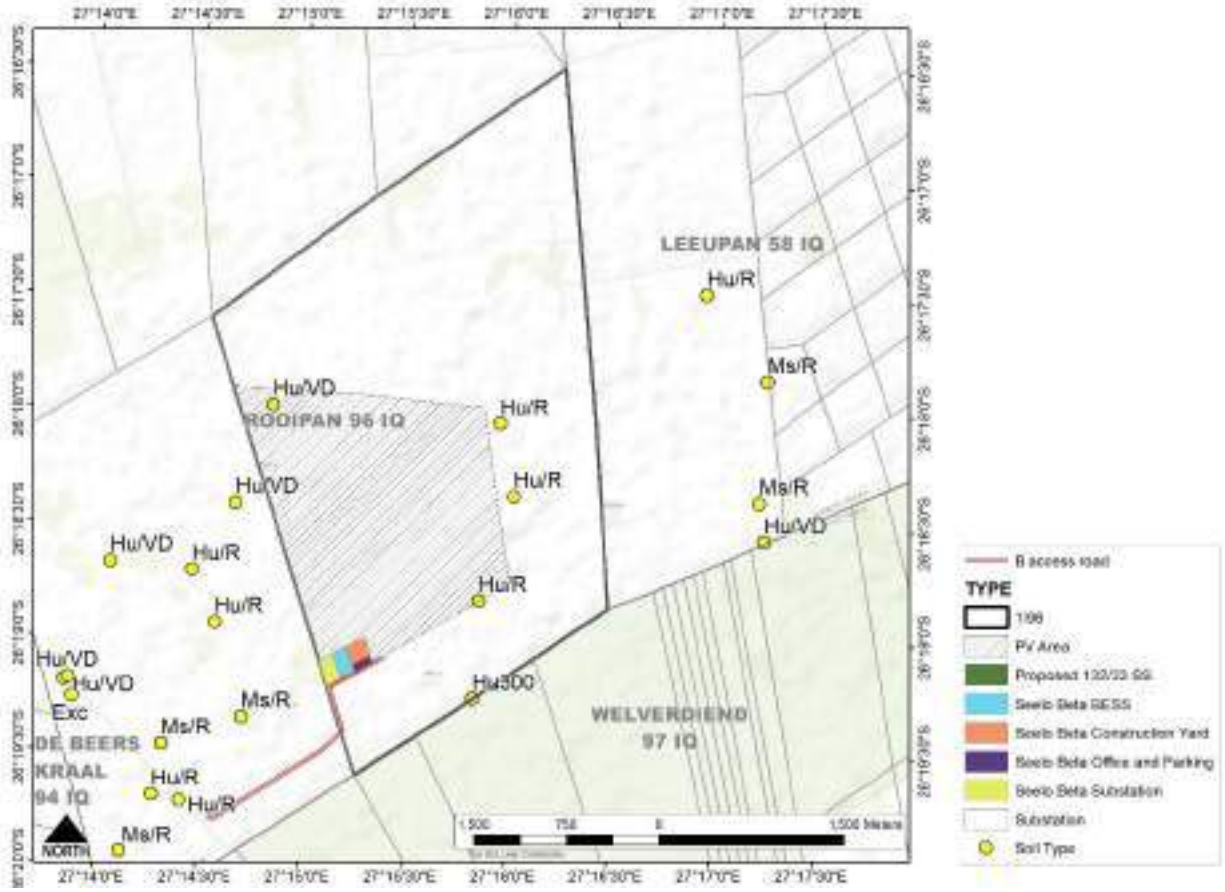


Figure 5. Soils types per observation

SOIL 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. The classic eight-class land capability system was adapted for use by the South African Department of Agriculture in their Agriculture Geographic Information System (AGIS).

This dataset is used within the screening tool.

Land capability classes are interpretive groupings of land with similar potential and limitations or similar hazards. Land capability involves consideration of difficulties in land use owing to physical land characteristics, climate and the risks of land damage from erosion and other causes.

According to the criteria in AGIS, the arable portions are Class 7 or poorer with only small isolated portions that has low capability (or sensitivity).

The small portions of land that the Sensitivity tool indicate as high sensitivity is, therefore, incorrect.

6.4 VEGETATION

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 70 LSU.

6.5 WATER

There are boreholes on the property that is used for livestock watering. No water licence is in place for abstracting water for irrigation.

Construction will have no impact on the availability of water for farming purposes.

7 SENSITIVITY ANALYSES

7.1 ECOLOGICAL SENSITIVITY – SCREENING TOOL

The Department of Forestry, Fisheries and Environment published Notice 320 in 2020 that describes the minimum criteria when applying for environmental authorisation.

This protocol provides the criteria for the assessment and reporting of impacts on agricultural resources for activities requiring environmental authorisation. The assessments requirements of this protocol are according to the level of environmental sensitivity as indicated by the national web-based environmental screening tool for agricultural resources. It is based on the most recent land capability evaluation as provided by the DALRRD.

According to the protocol, an applicant intending to undertake an activity where it occurs on land with '*very high*' or '*high'* sensitivity for agricultural resources must submit an Agricultural Agro-Ecosystem Specialist Assessment. Alternatively, a Compliance statement will suffice.

The dataset downloaded from the screening tool includes cultivated land and environmental sensitivity.

CULTIVATED LAND

The Screening tool indicates a small portion of cultivated land on Seelo Beta PV site. This is incorrect. The portion indicated was cultivated last in 2004, after which it was withdrawn and left to recover as grazing (see Google images below):

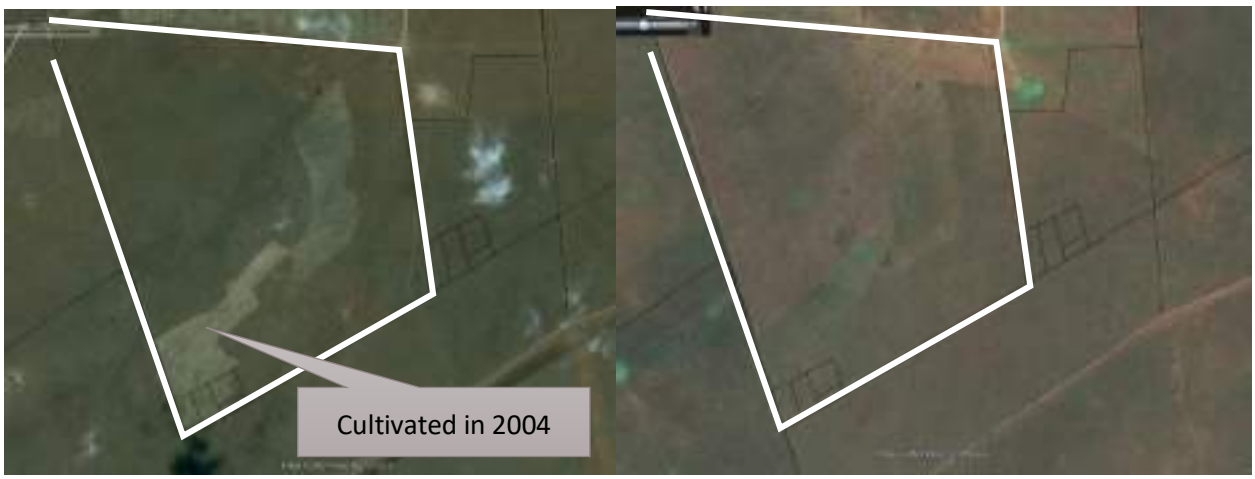


Figure 6. Land last cultivated in 2004 and present situation

ENVIRONMENTAL SENSITIVITY

In the case of this project, the Screening Tool indicates that the site sensitivity is *moderate* in general and *high* on small portions in the west (see Figure 7).

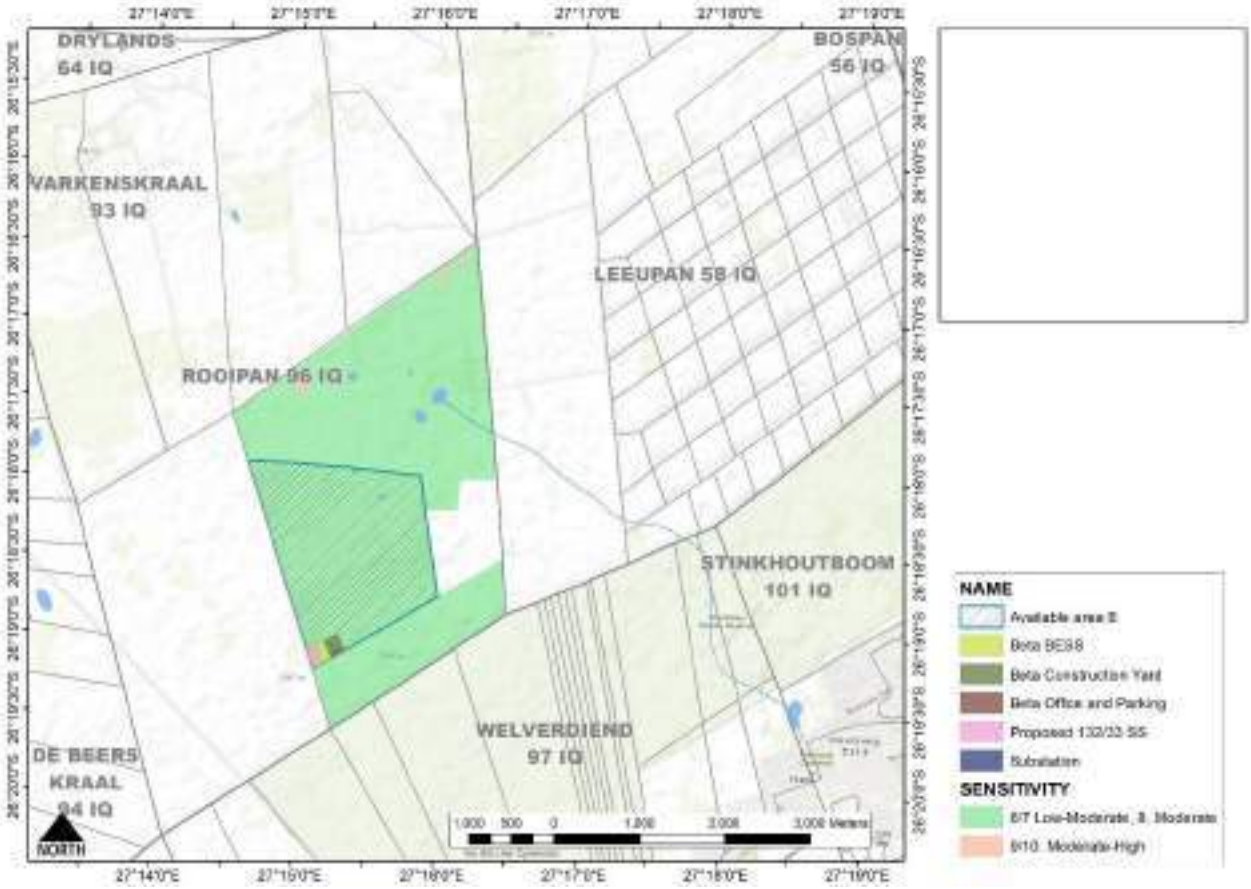


Figure 7. Sensitivity (tool)

7.2 SPECIALIST SITE ANALYSES

Sensitivity verification was done by desk top analysis using satellite imagery and a site visit that took place on 4 April 2023.

The outcome of the site sensitivity verification found that:

- The sensitivity tool incorrectly found moderate/high sensitivity land on the 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 (refer to Section 6.3). 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.
- No land can be regarded as high potential for cropping and which should be protected because it is *highly sensitive* for farming purposes.

Figure 8. Sensitivity (Specialist analyses)

8 IMPACT ASSESSMENT

8.1 LOSS OF HIGH POTENTIAL LAND

No high potential land was found on the site.

- No impact.

8.2 LOSS OF AGRICULTURAL PRODUCTION

There is no land cultivated on the property.

The site is used for animal grazing and can carry approximately 100 LSU. At a gross farm income (enterprise margin) of around R8 500 per LSU the financial impact is approximately R595 000. This is before overhead costs.

- The impact of the development is low but permanent.

8.3 LOSS OF AGRICULTURAL INFRASTRUCTURE

There is no farming infrastructure that will be lost.

- There is no impact.

8.4 LOSS OF SOIL DUE TO EROSION

The soil is well-drained with moderately developed structure. It is also on evenly sloped land where erosion is not expected.

Nevertheless, the PV projects creates areas that are cleared of vegetation, and that could be subject to erosion. Runoff from hard surfaces should be dealt with by a Stormwater Management Plan (SMP). This is an engineering function and is normally addressed as part of the project design.

Mitigation is achieved by allowing grass to re-establish after construction and by guidelines in the SMP.

- No impact is expected

9 CONCLUSIONS

FINDINGS AND ANALYSES

- There is no land that can be regarded as high potential cropping land that be protected because it is *highly sensitive* for farming purposes.

IMPACT ASSESSMENT

- There will be no loss of high potential soil and only a small impact on cattle production.

IMPACT AND MITIGATION DURING CONSTRUCTION

- Security during construction: Mend fences when they are breached in order to protect livestock and game. This applies especially for farmers with rare and endangered game.
- Make the contact details of the main contractors available to surrounding landowners and attend to any problems expeditiously.
- Hazardous substances should be safely disposed of or stored to minimise any impact on animals and water resources.

IMPACT AND MITIGATION DURING OPERATIONAL PHASE

- Road reserves require normal maintenance. Mitigation is normally not required. However, alien vegetation should be controlled.
- Implement the Environmental Management Programme (EMPr) for the duration of the operations to eliminate potential impacts.

GENERAL CONCLUSIONS

- No key issues or triggers were identified.
- There is no high potential sensitive land on the PV Site.

RECOMMENDATION

The land on which the development is proposed is low potential cropping land that has a low sensitivity in in terms of Notice 320 of the National Environmental Management Act in May 2020 of the Department of Environmental Affairs.

It is recommended that construction be approved.

10 ADDENDA

10.1 SOURCES OF INFORMATION

a) Criteria for high potential agricultural land in South Africa, Department of Agriculture, Directorate Land Use and Soil Management, 2002.

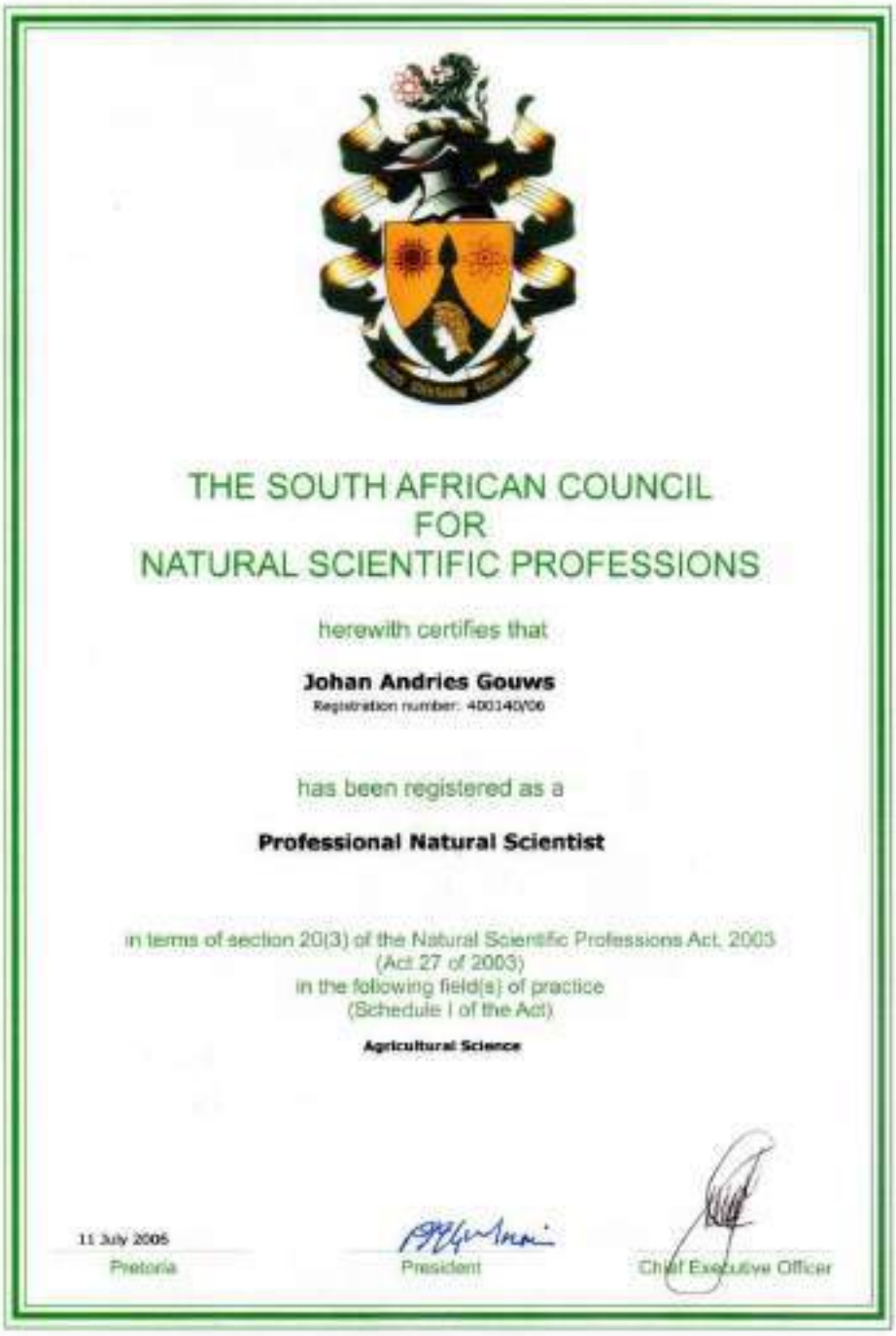
b) Grondklassifikasie Werkgroep, 1991. Grondklassifikasie, 'n Taksonomiese sisteem vir Suid Afrika, Departement van Landbou-ontwikkeling, Pretoria.

c) Department of Agriculture. Grazing capacity. Development of Agricultural Land Framework Bill , 2016

d) WRC, 2003 South African Atlas of Agrohydrology and Climatology, Water Research Commission

e) CROPWAT 8.0 has been developed by Joss Swennenhuis for the Water Resources Development and Management Service of FAO.

10.2 SACNASP CERTIFICATE



THE SOUTH AFRICAN COUNCIL
FOR
NATURAL SCIENTIFIC PROFESSIONS

herewith certifies that

Johan Andries Gouws
Registration number: 400140/06

has been registered as a

Professional Natural Scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice
(Schedule 1 of the Act)

Agricultural Science

11 July 2006
Pretoria

President

Chief Executive Officer

10.3 CURRICULUM VITAE (CV)

Position Title and No.	Agriculture, Land use planning and wetland specialist. INDEX
Name of Expert:	Andries Gouws
Date of Birth	12/04/1955
Country of Citizenship /Residence	South Africa

Education

Name of institution: College/University or other	Degree/diploma/certificate or other specialized education	Date completed
University of Pretoria, South Africa	BSc. Agriculture	1979
University of Bloemfontein	BSc. Honours, Agriculture	1987
Potchefstroom Collage for Agriculture	Diploma: Stereoscopic aerial photo interpretation of natural resources for farm planning	1981
University of South Africa	Diploma: Financial management	1992
University of Trinity	PhD: Integrated agricultural development	2007

Employment record relevant to the assignment:

Period	Employing organization and your title/position. Contact info for references	Country	Summary of activities performed relevant to the Assignment
1993 - current	INDEX - Director and co-owner: Responsibility: Agriculture and land use planning. Contact: Eugene Gouws - Director +27 82 55 33 787	RSA	Provided specialist assessment services in agriculture and land use planning for various development projects.

Membership in Professional Associations and Publications:

Soil Science society of South Africa.

South African Council for Natural Scientific Professions – Registered Professional Scientist (Reg no: 400140/06)

Adequacy for the Assignment:

Detailed Tasks Assigned on Consultant's Team of Experts:	Reference to Prior Work/Assignments that Best Illustrates Capability to Handle the Assigned Tasks
Position: Agricultural Specialist	Agricultural Impact Assessment for the Proposed Mookodi-Mahikeng 400kv Line. 2018. Client: Nemai Consulting
	Agricultural Impact Assessment for the Proposed Foxwood Dam 2015 – 2016 Compiled the specialist report on Agricultural impact

	Client: Nemai Consulting, DWS
	Agricultural Impact Assessment for the Proposed Mokolo and Crocodile River (West) Water Augmentation Project (MCWAP) (2017 – 2019) Compiled the specialist report on Agricultural impact Client: Nemai Consulting, DWS
	MSOBO COAL – HARWAR; economic study for the farming enterprises Discussion of the natural resources that influences agricultural potential; Farming and the potential for different enterprises; Indicate the potential income from main enterprises and Indicate the financial impact of the development on the farmers. (2013/4) Client: Demacon
	Agricultural potential study of Portion 21 (Portion 1) of the farm Koppieskraal 1157-IR 2019. Client: Adv Johan du Plessis
	Agricultural Potential Assessment: Albany Wind Energy Facility & Grid Infrastructure Near Makhanda, Eastern Cape Province 2020 Client: CES Environmental and Social advisory Services
	Agricultural potential and impact assessment of Available Land At Mopeia, Mozambique 2016 Client: Barari Forest Management. Department: Research & Development Abu Dhabi

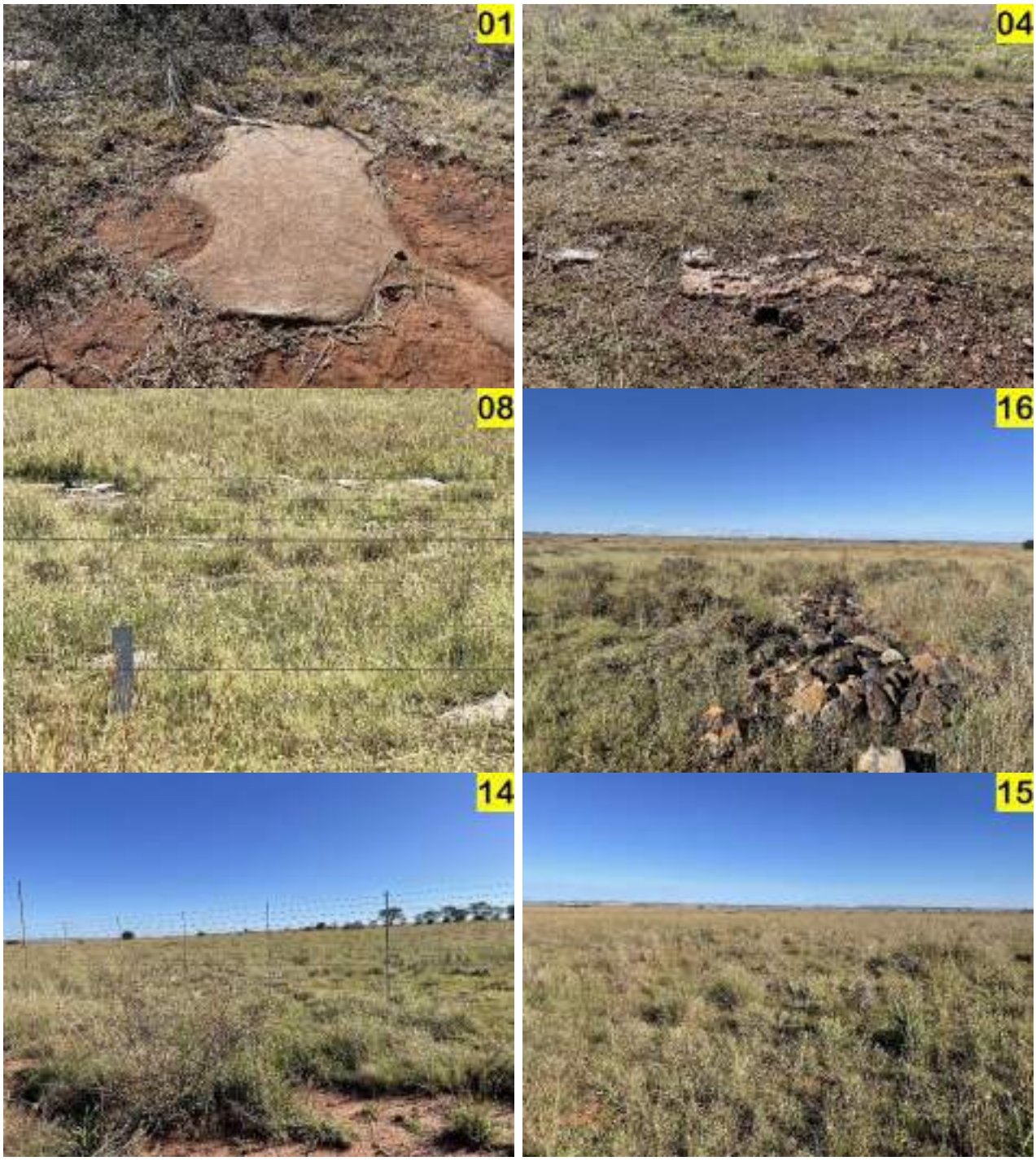
Expert's contact information: E-mail: index@iafrica.com
Phone: +27 (0) 82 807 6717

Certification:

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes my qualifications, my experience and myself.

Andries Gouws		March 2023
Name of Expert	Signature	Date

10.4 OBSERVATIONS

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SITE VERIFICATION REPORT

SEELO BETA SOLAR PV

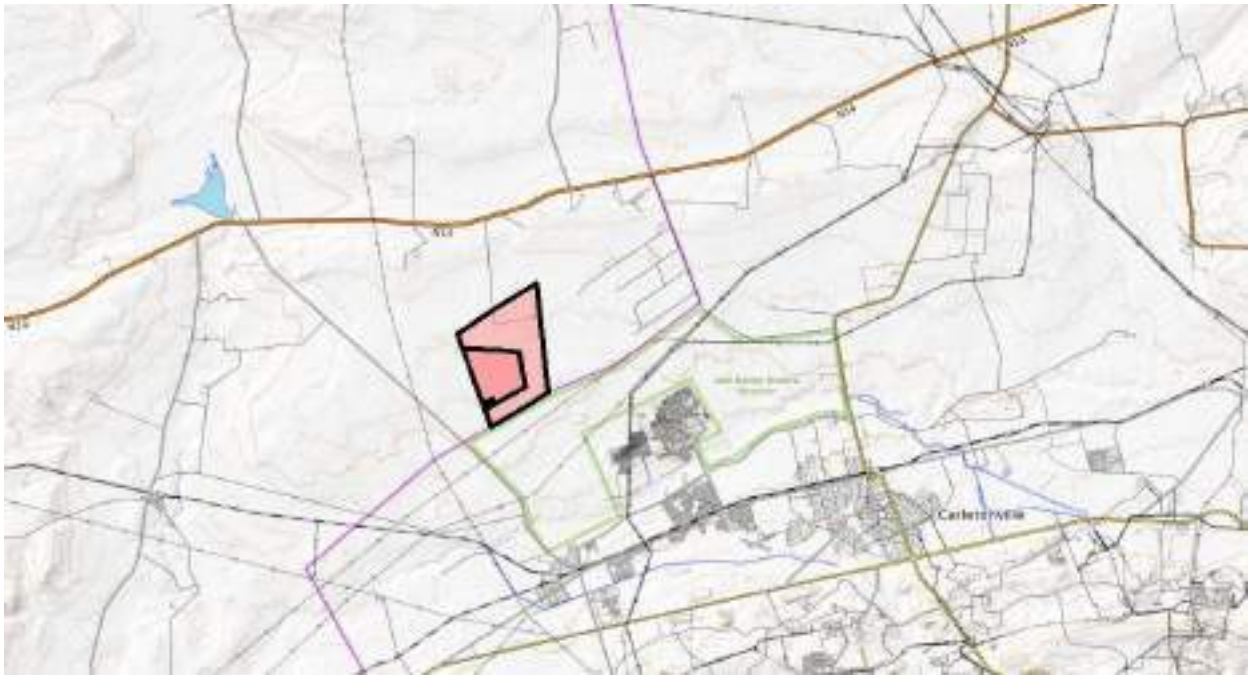
Compiled by Dr A Gouws

INDEX

March 2023

1 Background

Nemai Consulting (Pty) Ltd was appointed as Environmental Assessment Practitioner (EAP) to facilitate the application process for Environmental Authorisation (EA) for the proposed Seelo Beta 240MW Solar PV and BESS project located on the boundary between North-West and Gauteng Province, approximately 13km north-west of the town of Carletonville.



This site verification deals with Portion 2 of Farm 59.

2 Site verification

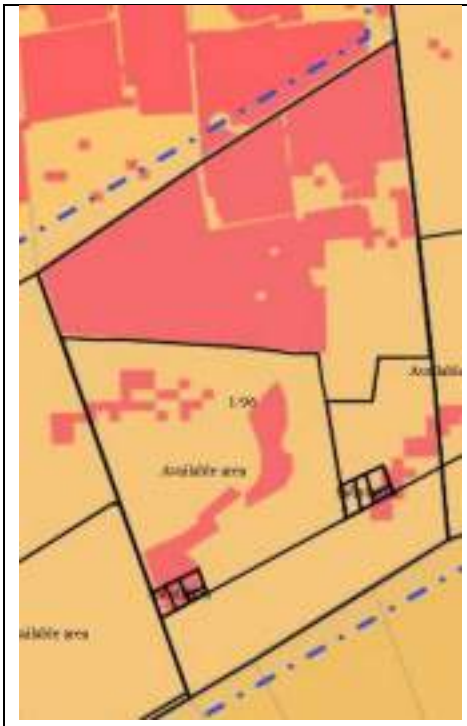


Figure 9. Results of the Sensitivity tool

Government Notice No. 320, Government Gazette 43110 of 20 March 2020. Protocol for specialist assessment and minimum report content requirements for environmental impacts on agricultural resources indicates that the site is moderately sensitive.

Sensitivity verification was undertaken by desk top analysis using satellite imagery.

The outcome of the site sensitivity verification record that:

- It agrees with the current use of the land;
- The survey of the adjoining farms found that the soils are shallow and rocky and not suitable for cropping;
- There are small areas indicated as highly sensitive which has to be verified.

Figure 10. Development area

Bing satellite images indicate that the land is used for animal grazing.

The area that will be developed is approximately 219 ha. At a grazing capacity of 5 ha/large livestock unit (LSU), the carrying capacity of the proposed development is 44 LSU.

The remaining land is 586, which is still a viable farming unit.

According to guidelines of CARA and HUAL (DALRRD), the land has low arable potential and is only suitable as grazing.

3 Finding and Recommendations

The land on which the development is proposed in low potential cropping land that is suitable as grazing. A small portion was last cultivated more than a decade ago.

It has moderate/low sensitivity.

According to the minimum standards of the protocol, a site visit and compliance statement is required to be approved.

APPENDIX E5: Geohydrology Assessment

63 Wessel Road, Rivonia, 2128 PO Box 2597, Rivonia, 2128 South Africa
Tel: +27 (0) 11 803 5726 **Fax:** +27 (0) 11 803 5745 **Web:** www.gcs-sa.biz

Geohydrological Assessment for the proposed Seelo Beta PV and BESS project

Report

Version – Final 2

31 August 2023

Nemai Consulting (Pty) Ltd

GCS Project Number: 23-0433

Client Reference: PO 10767/0655

GEOHYDROLOGICAL ASSESSMENT FOR THE PROPOSED SEELO BETA PV AND BESS PROJECT

Report

Version - Final 2

31 August 2023

Nemai Consulting (Pty) Ltd

23-0433

DOCUMENT ISSUE STATUS

Report Issue	Final 2		
GCS Reference Number	GCS Ref - 23-0433		
Client Reference	PO 10767/0655		
Title	Geohydrological Assessment for the proposed Seelo Beta PV and BESS project		
	Name	**Signature**	**Date**
Author	Chané de Bruyn (BSc, Hons) *Geohydrologist*		31 August 2023
Reviewer (Technical Director)	Henri Botha (MSc, PriSciNat) *Geohydrologist*		31 August 2023

LEGAL NOTICE

DECLARATION OF INDEPENDENCE

GCS (Pty) Ltd (GCS) was appointed to conduct this specialist groundwater study and to act as the independent hydrogeological specialist. GCS objectively performed the work, even if this results in views and findings that are not favourable. GCS has the expertise in conducting the specialist investigation and does not have a conflict of interest in the undertaking of this study. This report presents the findings of the investigations which include the activities set out in the scope of work.

APPENDIX 6 OF THE EIA REGULATION – CHECKLIST AND REFERENCE FOR THIS REPORT

Table 1 - Requirements from Appendix 6 of GN 326 EIA Regulation 2017

Requirements from Appendix 6 of GN 326 EIA Regulation 2017	Chapter
(a) Details of: (i) The specialist who prepare the reports; and (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae	Document Issue (Page ii) Appendix B.
(b) Declaration that the specialist is independent in a form as may be specialities by the competent authority	Appendix B.
(c) Indication of the scope of, and purpose for which, the report was prepared	Section 1 and 3
(cA) Indication of the quality and age of base data used for the specialist report	Section 1, 2, 5 and 6.
(cB) A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Section 6.4
(d) Duration, Date and seasons of the site investigation and the relevance of the season to the outcome of the assessment	Section 1.2
(e) Description of the methodology adopted in preparing the report or carrying out the specialised process include of equipment and modelling used	Section 4
(f) Details of an assessment of the specifically identified sensitivity of the site related to the proposed activity or activities and its associate's structures and infrastructure, inclusive of a site plan identifying alternative	Section 4 and 6
(g) Identification of any areas to be avoided, including buffers	Section 8.1
(h) Map superimposing the activity and associated structures and infrastructure on environmental sensitivities of the site including areas to be avoided, including buffers	Section 1, 5 and 7
(i) Description of any assumptions made and uncertainties or gaps in knowledge	Section 1.5, 5 and 6
(j) A description of the findings and potential implications of such findings on the impact of the proposed activity including identified alternatives on the environment or activities	Section 6 and 8
(k) Mitigation measures for inclusion in the EMPr	Section 6.7
(l) Conditions for inclusion in the environmental authorisation	Refer to recommendations in Section 6
(m) Monitoring requirements for inclusion in the EMPr or environmental authorisation	Refer to recommendations in Section 7
(n) Reasoned opinion – (i) as to whether the proposed activity, activities or portions thereof should be authorised. (iA) regarding the acceptability of the proposed activity or activities; and (ii) if the opinion is that the proposed activity, activities, or portions thereof should be authorised, and avoidance, management, and mitigation measures should be included in the EMPr, and where applicable, the closure plan	Section 8.3
(o) Description of any consultation process that was undertaken during preparing the specialist report	*None required.*
(p) A summary and copies of any comments received during any consultation process and where applicable all responses thereto	*None required.*
(q) Any other information requested by the competent authority	*None required.*

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LIST OF ACRONYMS

Acronym	Description
%	Percent
°C	Degrees Celsius
ALOS	Advanced Land Observing Satellite
BF	Baseflow
BH	Borehole
BHN	Basic Human Needs
BOD	Biological Oxygen Demand
CC	Close Corporation
DEA	Department of Environmental Affairs
DMEA	Department of Mineral and Environmental Affairs
DTM	Digital Terrain Model
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme
EU	Existing groundwater use
G3	Best Practice Guidelines: Monitoring
G4	Best Practice Guidelines: Impact Prediction
GCS	GCS Water and Environment (Pty) Ltd
GN	Government Notice
GRAII	Groundwater Resource Assessment Ver. 2
GRDM	Groundwater Resource Directed Measures
GRIP	Groundwater Resource Information Project
GW	Groundwater
HRU	Hydrological Response Unit
HSG	Hydrological Soil Group
IGRD	Intermediate Groundwater Reserve Determination
km	Kilometre
km2	Square kilometres
K-value	Hydraulic conductivity
l/s	Litres per second
m2/d	Square metres per day
MAE	Mean Annual Evaporation
mamsl	Metres above mean sea level
MAP	Mean Annual Precipitation
mbgl	Metres below ground level
mg/l	Milligrams per litre
mm/a	Millimetres per annum
Mm3/a	Million cubic metres per annum
mS/m	Milli Siemens/metre
NFEPA	National Freshwater Ecosystem Priority Areas
NGA	National Groundwater Archive
n-value	Porosity
NWA	National Water Act
PES	Present Ecological State
PU	Proposed Use
PV	Photovoltaic
Re	Recharge
RMO	Resource Management Objectives
SADC	Southern African Development Community
SADC GIP	Southern African Development Community Groundwater Information Portal
SANLC	South African National Land Cover
SCM	Site Conceptual Model
SPR	Source-Pathway-Receptor Model/Principle
SWSA	Strategic Water Source Area
TALK	Total Alkalinity
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
TWQR	Target Water Quality Range
USDA	United States Department of Agriculture
WARMS	Water Allocation Registration Management System

WL	Water level
WMA	Water Management Area
WR2012	Water Resources of South Africa 2012
WRC	Water Research Commission

1 INTRODUCTION

GCS (Pty) Ltd (GCS) was appointed by Nemai Consulting (Pty) Ltd to undertake a geohydrological assessment for the proposed Seelo Beta Solar Photovoltaic (PV) and Battery Energy Storage Systems (BESS) project, situated approximately 16.7 km northwest of Carletonville, on the North-West side of the Gauteng Province border (refer to Figure 1-1). The project falls on the border of quaternary catchments C23E and C23G of the Vaal Water Management Area (WMA 5) (DWS, 2016).

1.1 Project background

The proposed Seelo Beta PV and BESS project is situated approximately 16.7 km northwest of Carletonville, within the JB Marks Local Municipality, and the Dr Kenneth Kaunda District. The project will be situated on Portion 1 of the Farm Rooipan 96 IQand will include the following systems, sub-systems or components:

- PV panel arrays, which are the subsystems which convert incoming sunlight into electrical energy;
- Mounting structures to support the PV panels;
- On-site inverters to convert direct current (DC) to facilitate alternating current (AC) connection between the solar energy facility and electricity grid;
- BESS to store electrical energy and discharge electrical energy when required;
- IPP substation;
- Eskom switching substation[1];
- Cabling between the Project's components, to be laid underground (where practical);
- Administration Buildings (Offices);
- Workshop areas for maintenance and storage;
- Temporary and permanent laydown areas;
- Internal access roads and perimeter fencing of the footprint;
- High Voltage (HV) Transformers; and
- Security Infrastructure.

Currently, the farm is only used for grazing livestock, and boreholes located on the portion is used for domestic use and livestock drinking water.

The National Web based Environmental Screening Tool classified the area as having a very high sensitivity for the Aquatic Biodiversity Theme due to the project located within a Strategic Water Source Area (SWSA) (groundwater SWSA - Westrand Karst Belt). This geohydrology study was subsequently requested to evaluate the potential impact related to the development which will supplement the Environmental Impact Assessment (EIA) report for the site.

[1] The dedicated grid connection for the proposed Project which include a 132 kV switching substation does not form part of the current application for EA.

1.2 Study relevance to the season in which it was undertaken

This study was undertaken as a once-off study and relies on historical geohydrological and climate data for the site, as well as recognized geological and water resource databases for South Africa. Data generated during the time of this study is not seasonally bound as average yearly data was applied where required and as scientifically acceptable.

1.3 Study objectives

The main objectives of the study were as follows:

- Understand baseline groundwater quantity and quality that can be used as a benchmark for future comparison purposes.
    - This includes a field hydrocensus within a 5 km radius of the site.
    - Groundwater hydrochemistry will be confirmed with an in-situ pH/EC/TDS meter.
- Assess the current status of groundwater resources in general and any fatal flaws and /or sensitive areas.
- Understand all groundwater risks associated with the proposed activities on the groundwater environment.
- Present findings in an understandable and presentable format so that they can be used for decision-making purposes.

1.4 The layout of this report

The report has been structured, as far as possible, as per *Annexure D of the Government Gazette (GN267 of 24 March 2017)* applicable to geohydrological studies for environmental impacts assessment/water use license applications. The report further considers *Appendix 6 of EIA regulations*.

1.5 Gaps and study limitations

The following gaps and study limitations are recognized and not reported on:

- Although data in this assessment is extracted from reliable data sources, the risk assessment is considered preliminary as no exploratory drilling was conducted as part of this study.
- No numerical groundwater flow and transport model was construed for the development. GCS believes that groundwater impacts associated with the proposed activities were sufficiently evaluated via conceptual and analytical models. A numerical model will not add value to the investigation.

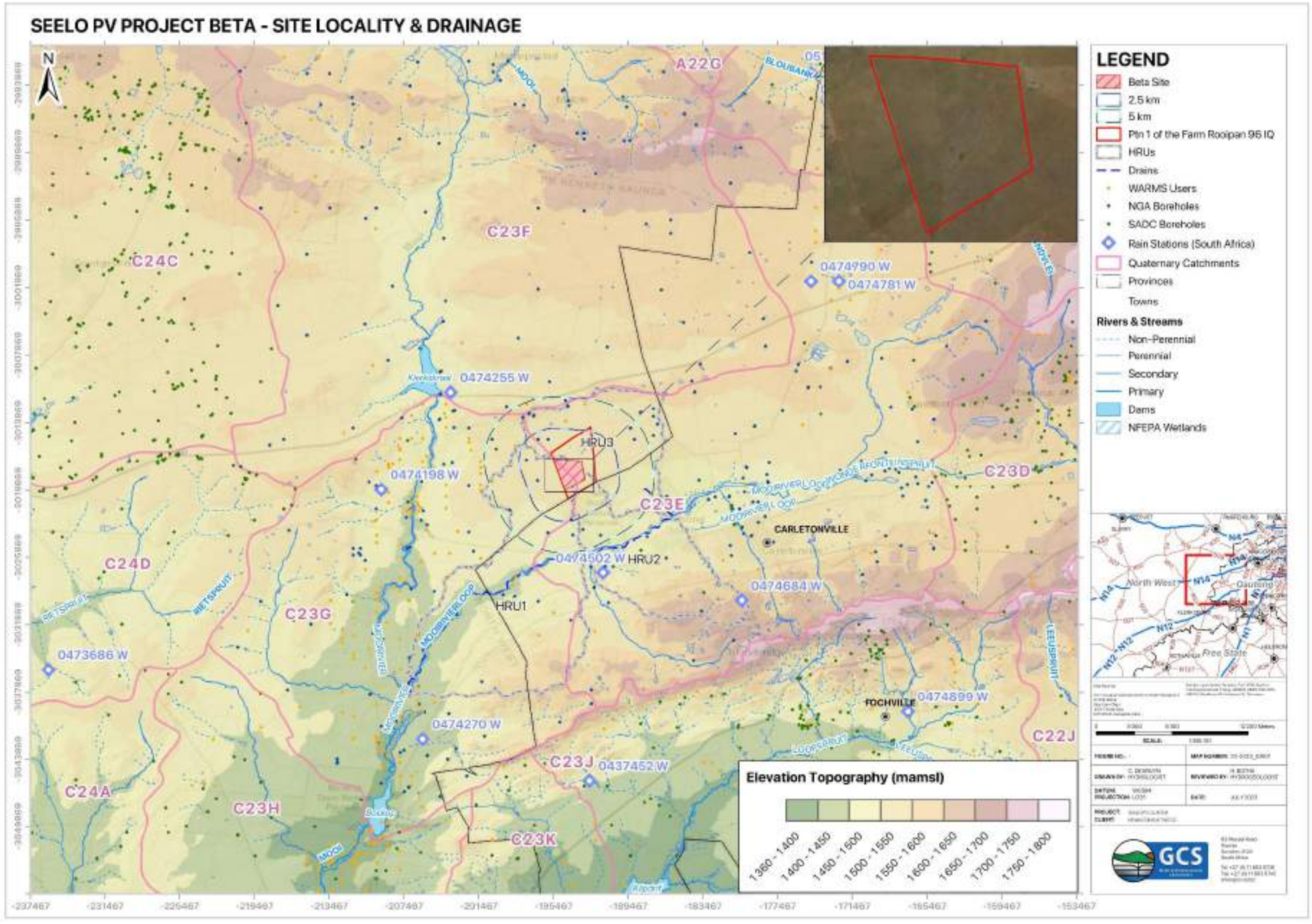


Figure 1-1: Site locality and drainage

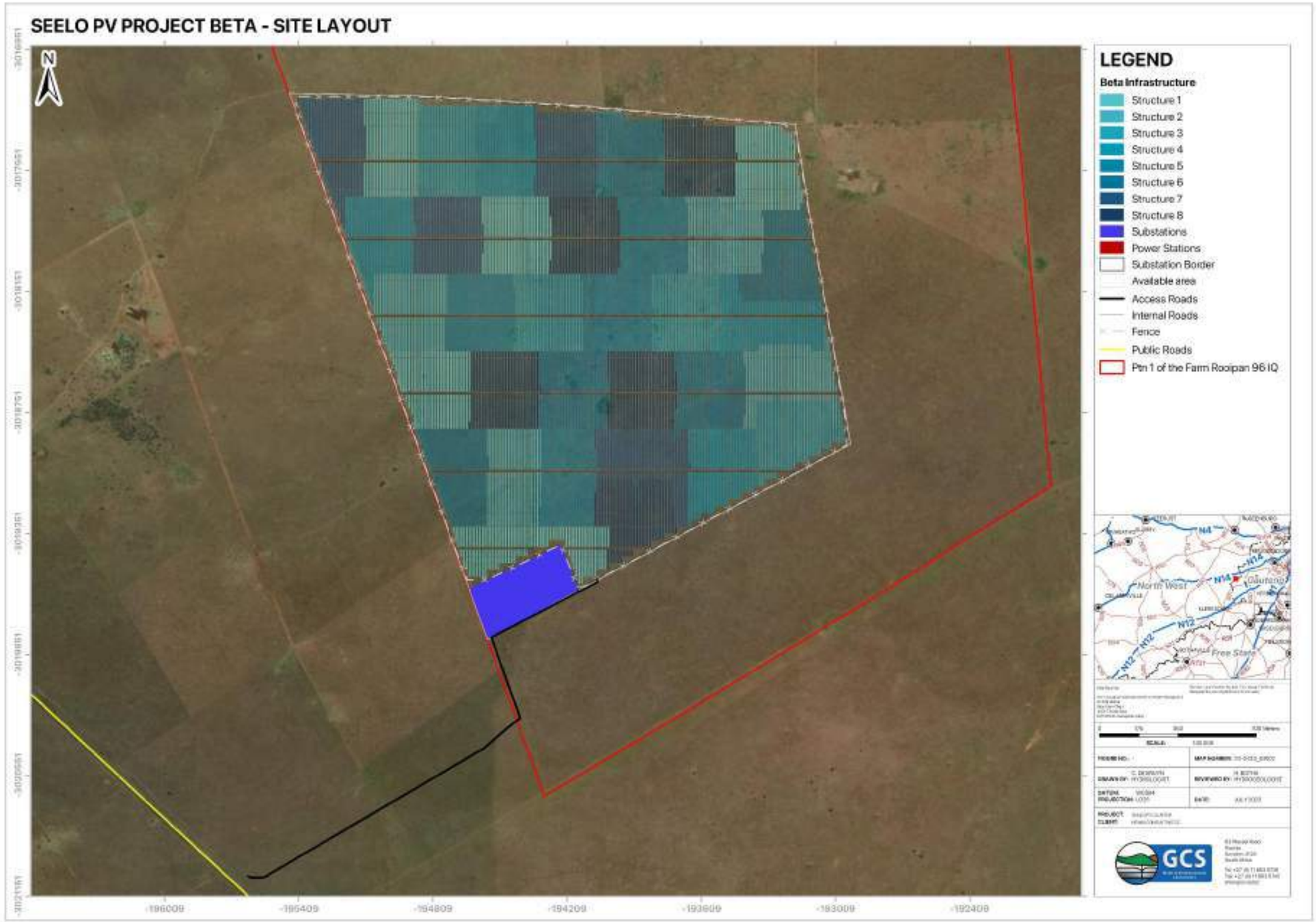


Figure 1-2: Beta PV plant infrastructure and layout

2 AREA OF INVESTIGATION

As mentioned previously, the Beta site is situated on the border of quaternary catchments C23E and C23G of the Vaal Water Management Area (DWS, 2016) Water Management Area (WMA 4). Elevations on the site typically range from 1 513 to 1 535 meters above mean sea level (mamsl).

In terms of the greater hydrological area, the site is situated to the north of the perennial Mooirivierloop (the closest distance to the perennial river is ±5.45 km). Drainage from the proposed development area is via free overland flow toward the Mooirivierloop in a southern direction as presented in Figure 1-1 (runoff from the site).

Three (3) hydrological response units (HRUs) describe the natural surface drainage of the Beta site (using a 1:50 000 stream count and 30 m DTM fill) – refer to Figure 1-1. The sub-catchment relates well to desktop-delineated drainage lines for the project area. Drainage from the Beta site is via overland flow towards the Mooirivierloop.

2.1 Climate

Climate, amongst other factors, influences soil-water processes and peak flows. The most influential climatic parameter is rainfall. Rainfall intensity, duration, evaporative demand, and runoff were considered in this study to indicate rainfall partitioning within the project area.

2.1.1 Temperature

The average yearly temperature (refer to Figure 2-1) for the project area ranges from 19 to 34 C (high) and -4 to 16°C (Low). The study area is situated in a sub-tropical highland climate area (Cwb), as per the Köppen Climate Classification (Kottek, et al., 2006). Hence, the area receives summer rainfall with dry winters.

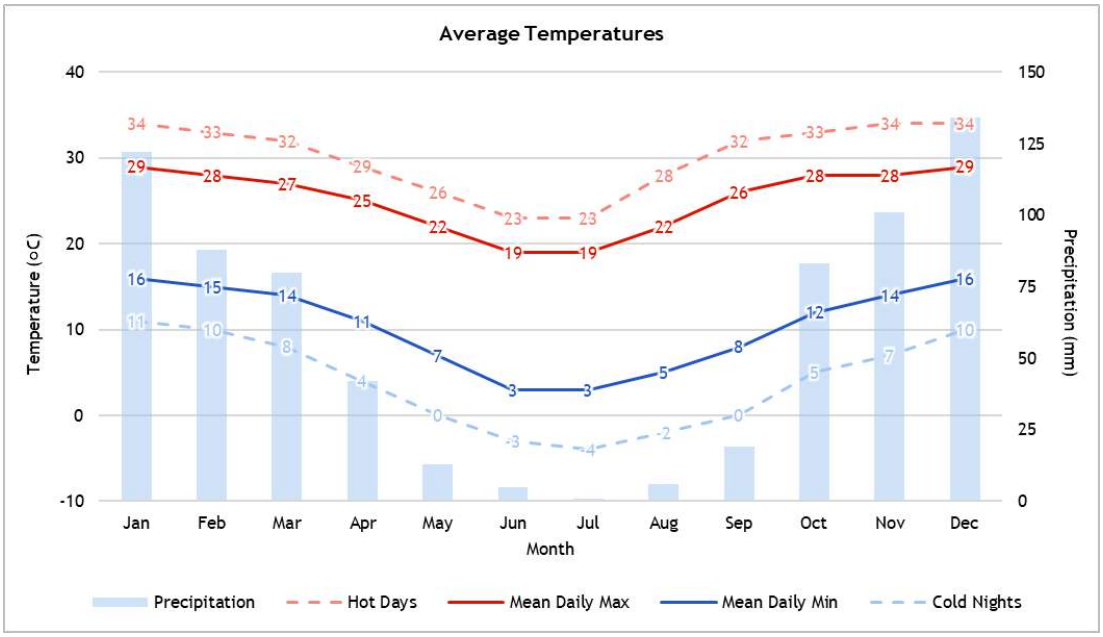


Figure 2-1: Average yearly temperatures (Meteoblue, 2022)

2.1.2 Rainfall and evaporation

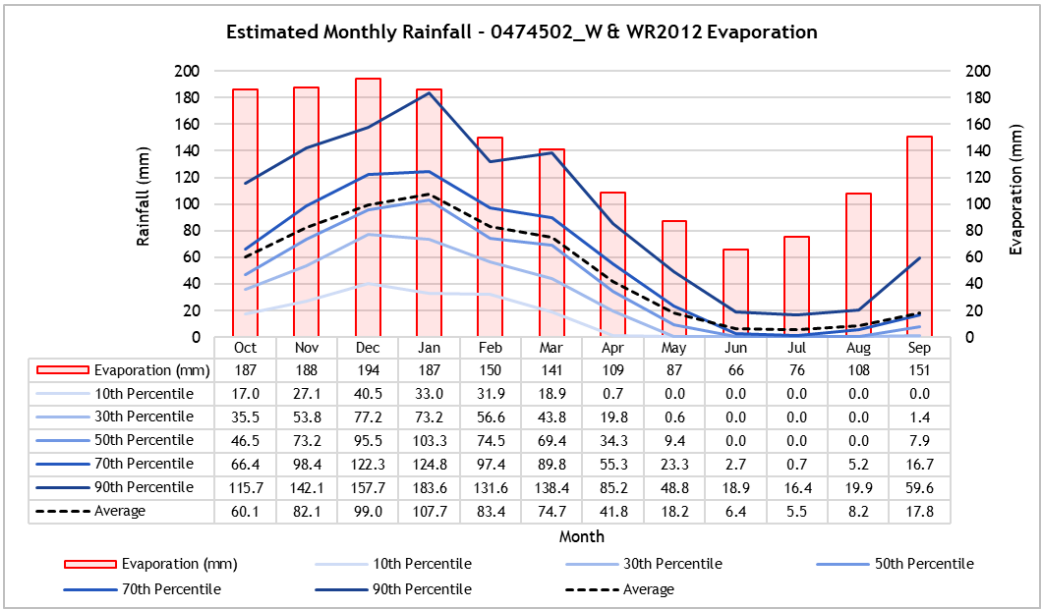
The project area is situated in rainfall zone C2E. The average Mean Annual Precipitation (MAP) for several rainfall stations situated near the site is tabulated in Table 2-1.

Table 2-1: Summary of MAP of closest rainfall stations (Smithers & Schulze, 2002)

Name	Station ID	MAP (mm/a)
Welverdiend (Pol)	0474502_W	620
Klerkskraal (Pol)	0474255_W	589
Klerkskraal	0474286_W	589
Witkoppie	0474169_W	683
Rysmierbult (TNK)	0474230_W	683
Wonderfontein	0474680_W	660
Average		**637**

The monthly rainfall data used for the area was obtained from rainfall station 0474502_W (Welverdiend Pol) situated 8.71 km from the site. The rainfall record spans from 1913 to 2004, which is a record length of 92 years. Available rainfall data suggest a MAP ranging from 361.8 (30th percentile) to 1 117.8 (90th percentile) mm/a. The average rainfall is in the order of 604.9 mm/a. Design rainfall data (Station Welverdiend) suggest a MAP in the order of 620 mm/a, which relates well to the average rainfall determined for the area. Monthly rainfall for the site is likely to be distributed as shown in Figure 2-2, below.

The site falls within evaporation zone 10A, of which Mean Annual Evaporation (MAE) ranges from 1 600 to 1 700 mm/a. The MAE far exceeds the MAP for the site, which implies greater evaporative losses when compared to incident rainfall. Monthly evapotranspiration for the site is likely to be distributed as shown in Figure 2-2, below.

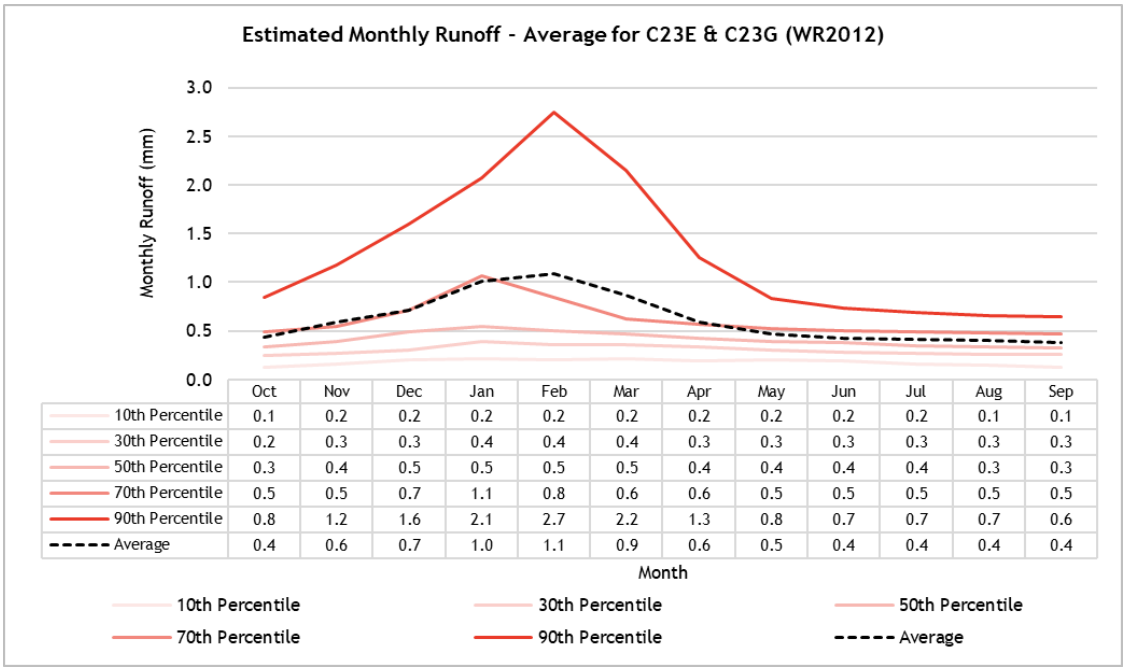


	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Evaporation (mm)	187	188	194	187	150	141	109	87	66	76	108	151
10th Percentile	17.0	27.1	40.5	33.0	31.9	18.9	0.7	0.0	0.0	0.0	0.0	0.0
30th Percentile	35.5	53.8	77.2	73.2	56.6	43.8	19.8	0.6	0.0	0.0	0.0	1.4
50th Percentile	46.5	73.2	95.5	103.3	74.5	69.4	34.3	9.4	0.0	0.0	0.0	7.9
70th Percentile	66.4	98.4	122.3	124.8	97.4	89.8	55.3	23.3	2.7	0.7	5.2	16.7
90th Percentile	115.7	142.1	157.7	183.6	131.6	138.4	85.2	48.8	18.9	16.4	19.9	59.6
Average	60.1	82.1	99.0	107.7	83.4	74.7	41.8	18.2	6.4	5.5	8.2	17.8

Figure 2-2: Average rainfall for Station 0474502_W and WR2012 evaporation

2.1.3 Runoff

The average runoff from natural (unmodified) catchments for both quaternary catchments C23E and C23G is simulated in WR2012 as being equivalent to 7.4 mm/a over the surface area (WRC, 2015). This is equal to approximately 1% of the MAP, or 5.4 Mm^3/a. Monthly runoff is distributed as shown in Figure 2-3, below.



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
10th Percentile	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1
30th Percentile	0.2	0.3	0.3	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3
50th Percentile	0.3	0.4	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3
70th Percentile	0.5	0.5	0.7	1.1	0.8	0.6	0.6	0.5	0.5	0.5	0.5	0.5
90th Percentile	0.8	1.2	1.6	2.1	2.7	2.2	1.3	0.8	0.7	0.7	0.7	0.6
Average	0.4	0.6	0.7	1.0	1.1	0.9	0.6	0.5	0.4	0.4	0.4	0.4

Figure 2-3: Simulated runoff for quaternary catchments C23E & C23G (WRC, 2015)

2.2 Desktop wetland assessment

Based on available National Wetland Freshwater Ecosystem Priority Areas (NFEPA) (Van Deventer, 2018) mostly channelled and unchanneled valley-bottom, depression and flat wetlands exist around the project area.

In terms of wetland geo-hydrology, baseflow is considered the most important contributor to stream and wetland health. Baseflow (refer to Figure 2-4) is a non-process-related term to signify low amplitude high-frequency flow in a river during dry or fair-weather periods. Baseflow is not a measure of the volume of groundwater discharged into a river or wetland, but it is recognised that groundwater contributes to the baseflow component of a river or wetland flow.

Available literature (WRC, 2015; DWA, 2006) suggests average groundwater contribution to baseflow ranges from 9.14 mm/a (PITMAN MODEL) to 18.56 mm/a (HUGHES MODEL) for quaternary catchments C23E and C23G. This relates to approximately 2% to 3% of rainfall.

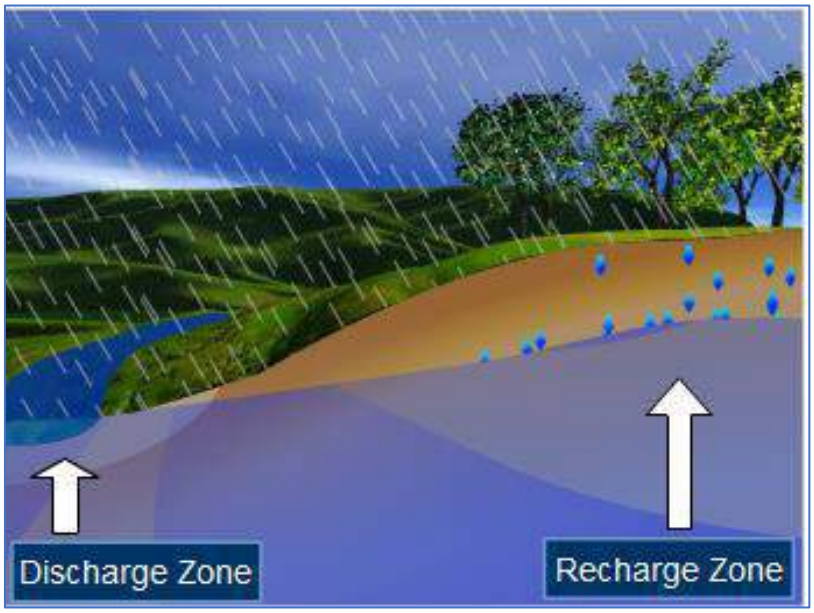


Figure 2-4: Groundwater baseflow concept (DWS, 2011)

2.3 Present ecological state (PES) and environmental sensitivity and ecological importance (EIS) – quaternary catchment scale

Table 2-2 provides a summary of the PES and EIS for the quaternary catchments, in which the project area falls. The resource management objectives (RMO) for these wetlands need to maintain the current PES and EIS post-development.

Table 2-2: Summary of PES and EIS for the quaternary catchments

Quat	PES	EIS
C23E	Class D: Largely modified	High
C23G	Class C: Moderately modified	Moderate

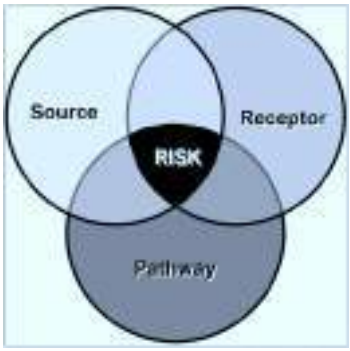
3 SCOPE OF WORK

The scope of work completed was as follows:

1. **Desktop Assessment:**
    a. All available reports relating to the site were assessed, including a review of all geohydrology, hydrology, hydrochemistry, and geology literature data.
    b. A desktop-level hydrocensus was conducted. The National Groundwater Archive (DWS, 2023) database was assessed to identify existing groundwater users in the area.
2. **Field investigation:**
    a. A site walk-over and field borehole census was undertaken on the 12th and 13th of July 2023 to identify groundwater users and sensitive groundwater areas.
        i. Field water quality was measured, and water levels were taken, where possible.
3. **Geohydrological and geological conceptual model:**
    a. A geohydrological and geological site conceptual model was developed with data obtained for the study area.
4. **Hydrogeological Risk and Impact Assessment:**
    a. A hydrogeological and geological site conceptual model was developed with data obtained for the study area.
    b. A groundwater balance was undertaken to classify the groundwater-safe yield. This safe yield has been used to assess the development impact on the aquifer on a sub-catchment scale.
    c. A preliminary risk assessment was conducted based on the Source-Pathway-Receptor (SPR) model.
5. **Monitoring Plan:**
    a. A groundwater monitoring plan, with mitigation measures, was developed for the site based on the baseline assessment of the site conditions.
6. **Reporting:**
    a. A hydrogeological report encompassing all work done as well as a preliminary groundwater risk assessment and monitoring plan were compiled.

4 METHODOLOGY

A logical and holistic approach was adopted to assess the study area. The Best Practice Guidelines for Impact Prediction (G4) (Department of Water Affairs and Forestry [DWAF], 2008), were considered to define and understand the three basic components of the geohydrological risk associated with the site activities:



- **Source term** - The source of the risk;
- **Pathway** - The pathway along which the risk propagates; and
- **Receptor** - The target that experiences the risk.

The approach was used to assess:

1. How the existing/proposed site activities could impact groundwater *Quality*; and
2. How the existing/proposed site activities could affect the groundwater *Quantity*.

4.1 Literature review and desktop study

The following sources supply an overview of the geohydrological conditions of the project area, as per the desktop information reviewed for this assessment:

- Groundwater Resource Information Project (GRIP, 2016)) and National Groundwater Database Archives (NGA, 2019) borehole data, SADC GIP borehole data (SADC, 2010) and the Water Allocation Registration Management System (DWS, 2019).
- 2526 Johannesburg - 1:500 000 Hydrogeological map series (Barnard & Baran, 1999)
- 2626 West Rand – 1:250 000 Geological map series (DMEA, 1986)
- Literature on similar geology and hydrogeology:
    - A South African Aquifer System Management Classification (Parsons, 1995);
    - Aquifer Classification of South Africa (DWA, 2012);
    - Artificial recharge and contamination aspects of the dolomite aquifers of the Turffontein Area (Fleisher, 1979);
    - The geohydrology of the dolomite aquifers of the Malmani Subgroup in the South-Western Transvaal (Fleisher, 1981); and
    - Determining hydraulic parameters of a karst aquifer using unique historical data from large-scale dewatering by deep-level mining –a case study from South Africa (Schrader, et al., 2014).
- Site-specific field-gathered data.

4.2 Desktop hydrocensus

According to SADC GIP, NGA and WARMS data for the area, there are approximately fifty-nine (59) boreholes stated within a 5 km radius of the Beta PV project. The spatial distribution of the boreholes identified is shown in Figure 4-1.

Table 4-1: Groundwater users within a 5 km radius of the site

ID	Source	Latitude (WGS84) Decimal Degrees	Longitude (WGS84) Decimal Degrees	Elevation (mamsl)	Water Level (mbgl)
2.5 km					
10560	NGA	-26.28393	27.233	1533.559	18.29
10561	NGA	-26.28387	27.2405	1529.17	9.14
15-10070	NGA	-26.29875	27.22467	1535	19.76
15-10087	NGA	-26.28765	27.27061	1521	-
2627AC00039	NGA	-26.28387	27.233	1533.473	-
2627AC00040	NGA	-26.28388	27.233	1533.487	13.72
2627AC00041	NGA	-26.28387	27.23301	1533.478	23.47
2627AC00042	NGA	-26.28389	27.233	1533.502	9.14
2627AC00043	NGA	-26.28387	27.23302	1533.483	-
2627AC00044	NGA	-26.2839	27.233	1533.516	97.54
2627AC00045	NGA	-26.28387	27.23303	1533.488	-
2627AC00046	NGA	-26.28391	27.233	1533.53	-
2627AC00047	NGA	-26.28387	27.23304	1533.492	36.5
2627AC00048	NGA	-26.28392	27.233	1533.545	96
2627AC00196	NGA	-26.31331	27.23263	1529.416	-
2627AD00052	NGA	-26.3417	27.25704	1502.224	-
5 km					
5729	NGA	-26.28387	27.30245	1520.614	-
15-10065	NGA	-26.33479	27.21256	1501	-
15-10079	NGA	-26.26559	27.22657	1562.471	25.26
15-10080	NGA	-26.267	27.22984	1554.624	-
15-10085	NGA	-26.25582	27.25264	1536.014	19.94
15-10086	NGA	-26.26013	27.25414	1543.423	33.33
2627AC00179	NGA	-26.35097	27.24022	1480.292	-
2627AD00038	NGA	-26.27554	27.29977	1526.672	106.07
2627AC00082	NGA	-26.28387	27.19967	1518	96
2627AC00197	NGA	-26.26812	27.22212	1562.633	36.45
2627AD00016	NGA	-26.25998	27.25411	1543.699	21.3
2627AD00017	NGA	-26.25998	27.25411	1543.699	24.3
2627AD00018	NGA	-26.27554	27.29967	1526.312	80
2627AD00019	NGA	-26.27555	27.29967	1526.312	88
2627AD00020	NGA	-26.27554	27.29968	1526.348	-
2627AD00021	NGA	-26.27556	27.29967	1526.312	106
2627AD00022	NGA	-26.27554	27.29969	1526.384	100
2627AD00023	NGA	-26.27557	27.29967	1526.312	96
2627AD00024	NGA	-26.27554	27.2997	1526.42	-
2627AD00025	NGA	-26.27558	27.29967	1526.312	109
2627AD00026	NGA	-26.27554	27.29971	1526.456	-
2627AD00027	NGA	-26.27559	27.29967	1526.312	-
2627AD00028	NGA	-26.27554	27.29972	1526.492	-
2627AD00029	NGA	-26.2756	27.29967	1526.312	98
2627AD00030	NGA	-26.27554	27.29973	1526.528	-
2627AD00031	NGA	-26.27561	27.29967	1526.312	102
2627AD00032	NGA	-26.27554	27.29974	1526.564	-

2627AD00033	NGA	-26.27562	27.29967	1526.312	-
2627AD00034	NGA	-26.27554	27.29975	1526.6	99.97
2627AD00035	NGA	-26.27563	27.29967	1526.312	99.97
2627AD00036	NGA	-26.27554	27.29976	1526.636	-
2627AD00037	NGA	-26.27564	27.29967	1526.312	-
2627AD00039	NGA	-26.27565	27.29967	1526.312	104.85
2627AD00040	NGA	-26.27554	27.29978	1526.708	70.1
2627AD00041	NGA	-26.27566	27.29967	1526.312	97.54
2627AD00042	NGA	-26.27554	27.29979	1526.744	-
2627AD00043	NGA	-26.27567	27.29967	1526.312	-
2627AD00044	NGA	-26.27554	27.2998	1526.78	85.04
2627AD00045	NGA	-26.27568	27.29967	1526.312	-
2627AD00053	NGA	-26.35272	27.25821	1478.668	-
2627AD00054	NGA	-26.34871	27.26545	1481.12	-
2627AD00088	NGA	-26.35276	27.27828	1475.262	-
2627AC00171	SADC	-26.29071	27.20302	1520.056	-7.1

4.3 Field investigation

The field investigation took place on the 12th and 13th of July 2023. A photographic log is available in **Appendix A**. The following summarises the findings and work completed:

- A site walkover was completed in the vicinity of the proposed development.
- A field hydrocensus was conducted within a 5 km radius of the proposed development.
- Water quality was measured in the field with a portable pH/EC meter.

4.3.1 Field hydrocensus / groundwater users in the area

A field hydrocensus was conducted within 5 km of the Beta PV project and twenty-nine (29) boreholes were located of which nineteen (19) have been confirmed. An additional ten (10) possible borehole sites were identified via visual inspection of the landscape, but these boreholes could not be confirmed as access could not be gained. Twenty-one (21) are located in the Beta PV project study area. Table 4-2 lists the boreholes identified with water level and field measurements taken where possible. The location of the boreholes identified during the hydrocensus is shown in Figure 4-1.

Table 4-2: Boreholes identified in the study area

ID	Type	Latitude (WGS84) Decimal Degrees	Longitude (WGS84) Decimal Degrees	Elevation (mamsl)	Water Level (mbgl)	Comments
BH1	Confirmed	-26.29242084	27.27748699	1540		Blocked and overgrown. Not in use.
BH2	Confirmed	-26.27931695	27.28410794	1553		Open. WL is very deep. Not in use.
BH3	Confirmed	-26.28768163	27.27069279	1528	Noted as approx. 120	Closed BH, pumped 24hrs, pumps to dam+house+agri
BH4	Confirmed	-26.30556697	27.23812767	1551	Noted as approx. 100	Closed. Domestic use
BH5	Confirmed	-26.31012929	27.23782802	1551	Noted as approx. 100	Open. WL very deep. Not in use.
BH6	Confirmed	-26.3261199	27.23694373	1528		Sealed. Not in use.
BH7	Confirmed	-26.29280867	27.30499422	1535		Open. WL very deep. Not in use.
BH8	Confirmed	-26.28984814	27.30593476	1540		Closed. Domestic and Agri
BH9	Confirmed	-26.26374928	27.30713069	1553		Closed. Domestic and Agri
BH10	Confirmed	-26.2671976	27.29665783	1572	Noted as approx. 180	Submersible Pump
BH11	Confirmed	-26.27018893	27.29603279	1555		Not in use
BH12	Confirmed	-26.27010465	27.29629314	1544		Not in use
BH13	Confirmed	-26.27081552	27.29547657	1545		In use for house across the road
BH14	Confirmed	-26.2558467	27.25265594	1556	13.62	Not in use. No equipment visible.
BH15	Confirmed	-26.26014506	27.2541076	1569		Wind pump. No access. Seems in use. Unsure of owner.
BH16	Confirmed	-26.24293966	27.28359455	1591	13.84	Fitted with pump for domestic use.
BH17	Confirmed	-26.25265751	27.27338104	1587		Wind pump. Overgrown. Sealed. Not in use.
BH18	Confirmed	-26.23768682	27.28374029			Blocked by bee hive
BH19	Confirmed	-26.29498046	27.31027868	1548		Wind pump. Not in use.
No Access BH 1	No Access	-26.29499654	27.30241028		Noted as approx. 98	Neighbour of BH7/8. No Access. Owner not home.
No Access BH 2	No Access	-26.29583839	27.30608186	1537		No Access. Location unknown. Owner not home.
No Access BH 3	No Access	-26.27010029	27.30010506			No Access. Location unknown. Owner not home. Presence of BH confirmed by neighbour.
No Access BH 4	No Access	-26.27181848	27.29619507			BH drilled. No equipment yet
No Access BH 5	No Access	-26.27214197	27.29576491			BH drilled skew. Not in use.
No Access BH 6	No Access	-26.23821425	27.28340926			In use, domestic.
No Access BH 7	No Access	-26.26961023	27.31380813			JoJo tanks visible, oral confirmation of BH. Owner not home, staff home.
No Access BH 8	No Access	-26.27182675	27.31550197			BH visible, no access gained. Equipment installed.
No Access BH 9	No Access	-26.27969087	27.28591383			Owners not home. Location inaccurate. Oral confirmation of BH
No Access BH 10	No Access	-26.25285565	27.22723648	1540		Wind pump and dam. Could not access property and could not see BH.
Possible BH 1	*Unconfirmed*	*-26.25981046*	*27.25286163*			*No access gained to the property. Looked like a borehole collar from far.*
Possible BH 2	*Unconfirmed*	*-26.26381898*	*27.22741753*			*JoJo tanks visible, no confirmation of BH*
Possible BH 3	*Unconfirmed*	*-26.28376081*	*27.32139359*			*JoJo tanks visible, no confirmation of BH*

Possible BH 4	*Unconfirmed*	*-26.27772658*	*27.30150316*			*JoJo tanks visible, no confirmation of BH. Owner not home.*
Possible BH 5	*Unconfirmed*	*-26.2761143*	*27.30030119*			*JoJo tanks visible, no confirmation of BH. Owner not home.*
Possible BH 6	*Unconfirmed*	*-26.27534137*	*27.28747051*			*JoJo tanks visible, no confirmation of BH. Owner not home.*
Possible BH 7	*Unconfirmed*	*-26.26266593*	*27.31152892*			*JoJo tanks visible, no confirmation of BH. Owner not home.*
Possible BH 8	*Unconfirmed*	*-26.25599033*	*27.3189231*			*JoJo tanks visible, no confirmation of BH. Owner not home.*
Possible BH 9	*Unconfirmed*	*-26.25484742*	*27.31393419*			*JoJo tanks visible, no confirmation of BH. No access gained.*
Rica Meats	*Unconfirmed*	*-26.23952395*	*27.31355298*			*Rica Meats Entrance. No access gained. JoJo tanks visible.*

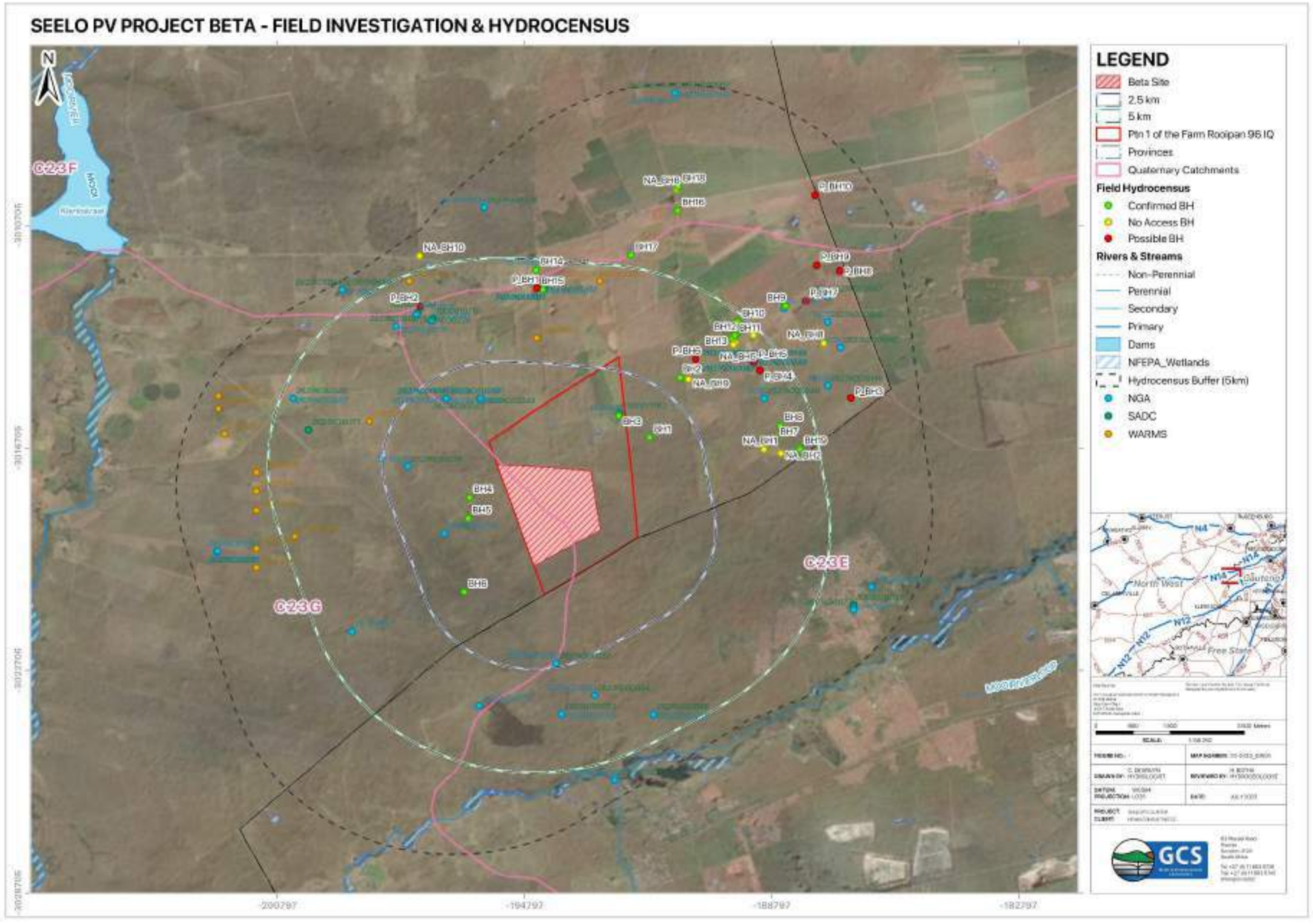


Figure 4-1: Groundwater users identified in the study area

4.4 Groundwater recharge calculations

Recharge is defined as the process by which water is added to the zone of saturation of an aquifer, either directly into a formation or indirectly in another way. The effective rainfall recharge is dependent on catchment geology, soils and surface run-off and stream morphology. Seepage from onsite infrastructure such as the return water dams and/or pollution control dams may contribute a small proportion of recharge to the system.

Groundwater recharge was estimated from the literature and geohydrology maps for the study area (Barnard & Baran, 1999; du Toit, et al., 1999).

4.5 Groundwater quantity/availability assessment

An Intermediate Groundwater Reserve Determination (IGRD) (Parsons & Wentzel, 2007) was conducted for the study area to fulfil the requirements of the Water Use License concerning groundwater use, in terms of Section 21a of the National Water Act (No. 36 of 1998) (NWA, 1998). The IGRD aims to establish the groundwater reserve thereby quantifying the safe aquifer yield, which is required to determine aquifer dewatering impacts.

It is necessary, from a groundwater point of view, to determine the groundwater quantity and likely future impacts on quantity. Moreover, the groundwater balance gives an estimate of how much groundwater can safely be abstracted on a sub-catchment level (i.e., groundwater dewatering or wellfield dewatering).

The IGRD considers the following parameters:

- Effective recharge from rainfall and specific geological conditions;
- Basic human needs for the sub-catchment;
- Groundwater contribution to surface water (baseflow);
- Existing and proposed abstraction; and
- Surplus reserve.

The groundwater balance and the reserve determination on a sub-catchment scale are summarised below:

$$GW_{available} = (Re) - (EU + BHN + BF + PU) \quad (1)$$

Where:

$GW_{available}$	=	Available groundwater for use.
Re	=	Effective recharge to the aquifer.
BF	=	Baseflow to surface water streams.
EU	=	Existing groundwater abstraction/use (identified on sub-catchment, excluding applicant).
PU	=	Proposed use / likely dewatering use.
BHN	=	Basic Human Needs.

4.6 Geohydrological risk assessment

Due to the assessment forming part of a larger risk assessment for the study area, the potential impacts and the determination of impact significance were assessed. The process of assessing the potential impacts of the project includes the following four activities:

1. Identification and assessment of potential impacts.
2. Prediction of the nature, magnitude, extent, and duration of potentially significant impacts.
3. Identification of mitigation measures that could be implemented to reduce the severity or significance of the impacts of the activity; and
4. Evaluation of the significance of the impact after the mitigation measures have been implemented i.e., the significance of the residual impact.

As per GNR 982 of the EIA Regulations (2014), the significance of potential impacts was assessed in terms of the following criteria:

I. Cumulative impacts.
II. Nature of the impact.
III. The extent of the impact.
IV. Probability of the impact occurring.
V. The degree to which the impact can be reversed.
VI. The degree to which the impact may cause irreplaceable loss of resources; and
VII. The degree to which the impact can be mitigated.

Table 4-3 provides a summary of the criteria used to assess the significance of the potential impacts identified. An explanation of these impact criteria is provided in Table 4-4.

The net consequence is established by the following equation:

$$Consequence = (Duration + Extent + Irreplaceability\ of\ resource) \times Severity \quad (2)$$

And the environmental significance of an impact was determined by multiplying consequence by probability.

Table 4-3: Proposed Criteria and Rating Scales to be used in the Assessment of the Potential Impacts

Criteria	Rating Scales	Notes
Nature	Positive (+)	An evaluation of the effect of the impact related to the proposed development.
	Negative (-)	
Extent	Footprint (1)	The impact only affects the area in which the proposed activity will occur.
	Site (2)	The impact will affect only the development area.
	Local (3)	The impact affects the development area and adjacent properties.
	Regional (4)	The effect of the impact extends beyond municipal boundaries.
	National (5)	The effect of the impact extends beyond more than 2 regional/ provincial boundaries.
	International (6)	The effect of the impact extends beyond country borders.
Duration	Temporary (1)	The duration of the activity associated with the impact will last 0-6 months.
	Short-term (2)	The duration of the activity associated with the impact will last 6-18 months.
	Medium-term (3)	The duration of the activity associated with the impact will last 18 months-5 or years.
	Long-term (4)	The duration of the activity associated with the impact will last more than 5 years.
Severity	Low (1)	Where the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected.
	Moderate (2)	Where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive, or vulnerable systems or communities are negatively affected.
	High (3)	Where natural, cultural, or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive, or vulnerable systems or communities are substantially affected.
Potential for impact on irreplaceable resources	No (0)	No irreplaceable resources will be impacted.
	Yes (1)	Irreplaceable resources will be impacted.
Consequence	Extremely detrimental (-25 to -33)	A combination of extent, duration, intensity, and the potential for impact on irreplaceable resources.
	Highly detrimental (-19 to -24)	
	Moderately detrimental (-13 to -18)	
	Slightly detrimental (-7 to -12)	
	Negligible (-6 to 0)	
	Slightly beneficial (0 to 6)	
	Moderately beneficial (13 to 18)	
	Highly beneficial (19 to 24)	
	Extremely beneficial (25 to 33)	
Probability (the likelihood of the impact occurring)	Improbable (0)	It is highly unlikely or less than 50 % likely that an impact will occur.
	Probable (1)	It is between 50 and 70 % certain that the impact will occur.
	Definite (2)	It is more than 75 % certain that the impact will occur, or the impact will occur.
Significance	Very high - negative (-49 to -66)	A function of Consequence and Probability.
	High - negative (-37 to -48)	
	Moderate - negative (-25 to -36)	
	Low - negative (-13 to -24)	
	Neutral - Very low (0 to -12)	
	Low-positive (0 to 12)	
	Moderate-positive (13 to 24)	
	High-positive (37 to 48)	
	Very high - positive (49 to 66)	

Table 4-4: Explanation of Assessment Criteria

Criteria	Explanation
Nature	This is an evaluation of the type of effect the construction, operation, and management of the proposed development would have on the affected environment. Will the impact of change on the environment be positive, negative, or neutral?
Extent or Scale	This refers to the spatial scale at which the impact will occur. The extent of the impact is described as footprint (affecting only the footprint of the development), site (limited to the site), and regional (limited to the immediate surroundings and closest towns to the site). The extent of scale refers to the actual physical footprint of the impact, not to the spatial significance. It is acknowledged that some impacts, even though they may be of a small extent, are of very high importance, e.g., impacts on species of very restricted range. To avoid "double counting, specialists have been requested to indicate spatial significance under "intensity" or "impact on irreplaceable resources" but not under "extent" as well.
Duration	The lifespan of the impact is indicated as temporary, short, medium, and long-term.
Severity	This is a relative evaluation within the context of all the activities and the other impacts within the framework of the project. Does the activity destroy the impacted environment, alter its functioning, or render it slightly altered?
Impact on irreplaceable resources	This refers to the potential for an environmental resource to be replaced, should it be impacted. A resource could be replaced by natural processes (e.g., by natural colonization from surrounding areas), through artificial means (e.g., by reseeding disturbed areas or replanting rescued species) or by providing a substitute resource, in certain cases. In natural systems, providing substitute resources is usually not possible, but in social systems, substitutes are often possible (e.g., by constructing new social facilities for those that are lost). Should it not be possible to replace a resource, the resource is essentially irreplaceable e.g., red data species that are restricted to a particular site or habitat to a very limited extent.
Consequence	The consequence of the potential impacts is a summation of the above criteria, namely the extent, duration, intensity, and impact on irreplaceable resources.
Probability of occurrence	The probability of the impact occurring is based on the professional experience of the specialist with environments of a similar nature to the site and/or with similar projects. It is important to distinguish between the probability of the impact occurring and the probability that the activity causing a potential impact will occur. Probability is defined as the probability of the impact occurring, not as the probability of the activities that may result in the impact.
Significance	Impact significance is defined to be a combination of the consequence (as described below) and the probability of the impact occurring. The relationship between consequence and probability highlights that the risk (or impact significance) must be evaluated in terms of the seriousness (consequence) of the impact, weighted by the probability of the impact occurring. In simple terms, if the consequence and probability of an impact are high, then the impact will have a high significance. The significance defines the level to which the impact will influence the proposed development and/or environment. It determines whether mitigation measures need to be identified and implemented and whether the impact is important for decision-making.
Degree of confidence in predictions	Specialists and the EIR team were required to indicate the degree of confidence (low, medium, or high) that there is in the predictions made for each impact, based on the available information and their level of knowledge and expertise. The degree of confidence is not taken into account in the determination of consequence or probability.
Mitigation measures	Mitigation measures are designed to reduce the consequence or probability of an impact or to reduce both consequence and probability. The significance of impacts has been assessed both with mitigation and without mitigation.

4.7 Water monitoring plan

The monitoring network is based on the principles of a monitoring network design as described by the DWAF Best Practice Guidelines: G3 Monitoring (DWAF, 2007). The methodological approach that the monitoring plan follows is represented in Figure 4-2, below.

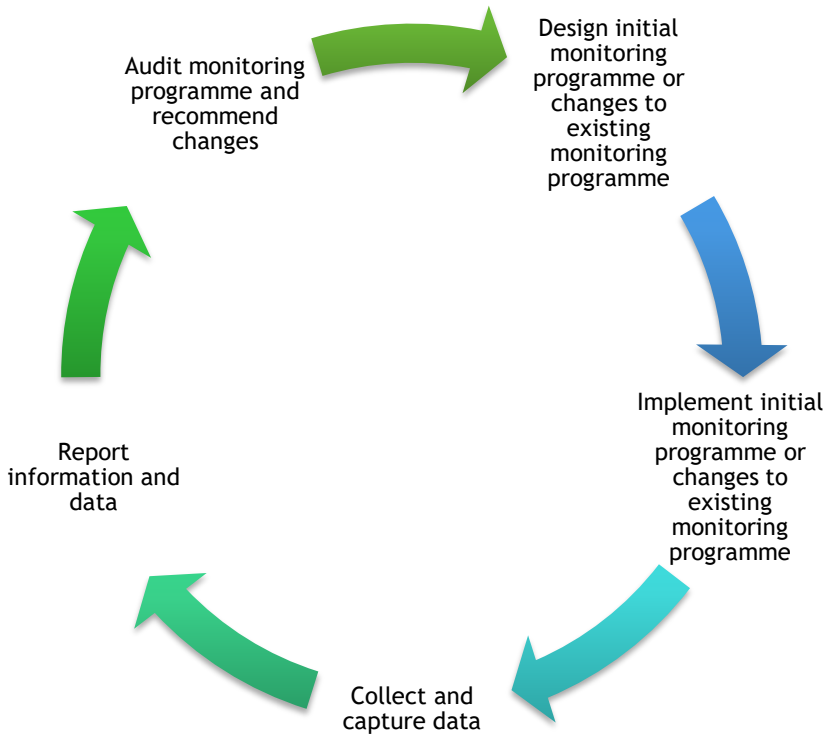


Figure 4-2: Monitoring Process

The monitoring plan considers both construction and operational phase risks and aims to monitor the environment for any changes in water quality.

4.8 Groundwater Management Plan

Groundwater management measures were formulated based on the results of the groundwater impact assessment. A groundwater monitoring network was proposed based on existing and predicted groundwater impacts.

5 PREVAILING GROUNDWATER CONDITIONS

The following section supplies an overview of the prevailing geohydrological conditions encountered in the area for the proposed redevelopment. The data were derived from available literature sources and completed fieldwork.

5.1 Local geology and soils

According to the 2626 West Rand - 1:250 000 Geological map series (DMEA, 1986), the local geology is dominated by dolomite and chert of the Malmani Subgroup, from the Chuniespoort Group and remnants of chert breccia of the Rooihoogte Formation (refer to Figure 5-3). North of the site location is a section of the Black Reef quartzite, conglomerate, and shale. Other scattered surface geology includes undifferentiated granite and gneiss, quartzite and shale, amygdaloidal lava, alluvium, and gravel. Various lineaments occur in the surrounding area, which could indicate possible dykes. Diabase dykes and quartz veins also appear in the area.

These lineaments compartmentalise the dolomites of the Chuniespoort Group. The dykes create impervious walls, which confine each compartment hydraulically. This will be discussed in further detail in Section 5.3.

Soils in the area are typically sandy loams to sandy clay loams from the soil series Mispah, Glenrosa and Hutton. According to WR2012 soil data for the area, the erodibility of the soils for the area can be considered high (WRC, 2015). The hydrological soil group (HSG) classification for the site is group C and soils in this group tend to have moderately high runoff potential when thoroughly wet. These soils tend to have a clay content of 20% to 40% and sand or gravel content of <50% (USDA, 2009).

5.2 Aquifer characteristics, classification, and groundwater recharge

The general aquifer characteristics and aquifer classification are summarised in Table 5-1.

Table 5-1: Aquifer characteristics and classification

Characteristics	Aquifer Classification
The aquifer host rock comprises predominantly carbonate rocks (dolomite) of the Chuniespoort Group, and meta-arenaceous rocks (quartzites). The aquifer has a medium to high hydraulic conductivity (K-value), 2% and 10% porosity (n-value) and transmissivities of 10^4 m^2/d or higher. The aquifer is mainly secondary. The aquifer can be referred to as being primarily karst (King, et al., 1998). Groundwater is typically encountered in: • Solution channels and fractures occurring in the carbonate rocks of the Chuniespoort Group; and	Available literature and site observation data suggest that two (2) aquifers exist in the area: 1. A shallow aquifer system associated with weathered dolomite as well as moderately to partially weathered chert, shale, limestone, and quartzite; and 2. A deeper intergranular and fractured aquifer network is associated with the Malmani Subgroup of the Chuniespoort Group within the Transvaal Sequence. The aquifer present is classified as a Major Aquifer system (Parsons, 1995)

Characteristics	Aquifer Classification
• Joints and fractures in competent arenaceous rocks related to tensional or compressional stresses and offloading (King, et al., 1998) Recharge to the underlying aquifer is estimated to range from 6.2 to 7.2 % (average 6.7% = 41.14 mm/a) of the MAP (614 mm) which falls within quaternary catchment C23E and C23G (DWAF, 2006). The aquifer's (Turffontein Compartment) weathered zone is reported to be approx. 7 – 45 m thick, with the fractured zone approx. 137 - 243 m thick (DWAF, 2006). The combined aquifer thickness is estimated to be in the order of 183 m. The aquifer is an important contributor to groundwater baseflow to streams and rivers (King, et al., 1998).	This aquifer underlying the site can be regarded as a high-yielding aquifer, with reported yields of >0.5 l/sec - Class c5 aquifer. Northern areas of the site are underlain by a Class c2 aquifer, having a yield of 0.1 – 0.5 l/sec.

5.3 Depth to groundwater

According to (Vegter, 1995), and DWAF (2006), the groundwater levels within the region are expected to range from 12 to 505 mbgl (meters below ground level). The local hydrocensus boreholes indicate a water level range of 13 mbgl (measured) to 120 mbgl (according to owners) (refer to Table 4-2).

Figure 5-1 plots available groundwater elevation data for the area. There is a good relationship for the shallow water levels (R = 93.33%), between groundwater and topography elevation. Deeper water levels have a lower correlation of R = 65.44% which suggests that the deeper groundwater table does not mimic the topography as with the shallow water levels. Groundwater levels in dolomitic aquifers are characterised by low gradients bounded by steps (DWAF, 2006).

Dykes in the area compartmentalise the dolomites, which act as impermeable barriers. It is noted that springs are commonly located at these dykes (Fleisher, 1979). The data suggest that groundwater levels are shallower close to non-perennial and perennial streams and wetlands where groundwater contributes to streamflow as baseflow seepage. These areas are typically prominent groundwater-surface water interaction areas. Bayesian interpolation of available groundwater level data was applied to the area to conceptualize the groundwater flow. Figure 5-4 indicates the generated Bayesian interpolated groundwater elevations for the area. The data suggest that the general groundwater movement is from NE to SW.

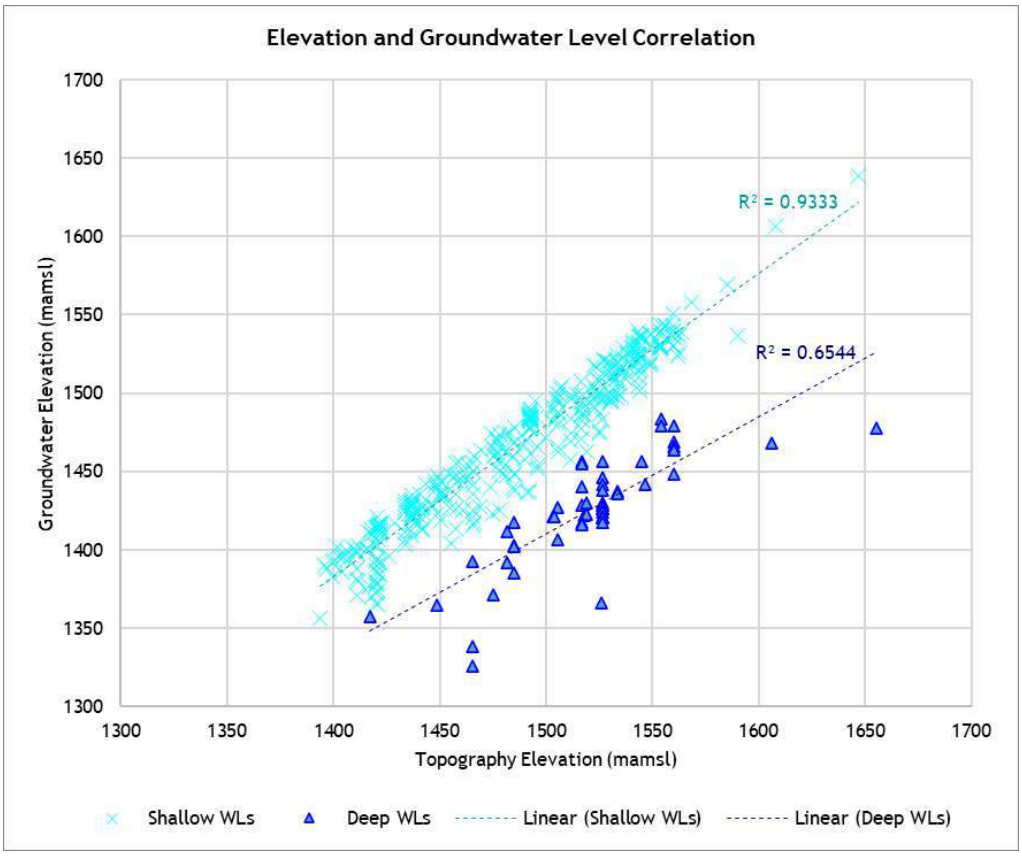


Figure 5-1: Groundwater elevation vs topography elevation correlation

5.4 Groundwater quantity

Intermediate groundwater (GW) Reserve Determination (IGRD) was conducted for the study area to establish the GW reserve. The data used for the calculation was derived from the WRC 90 Water Resources of South Africa 2012 Study (WR2012) and GW Resource Assessment Ver. 2 (GRAII) datasets.

5.4.1 Sub-catchment delineation

Sub-catchments were delineated with Global Mapper. A 30 m Digital Elevation Model (DTM) from the Advanced Land Observing Satellite (ALOS) was used as input, and the drainage systems were delineated for the local area (1:50 000 stream count and 30 m DTM fill). Although delineated sub-catchments generally indicate possible aquifer extents, the dolomitic aquifers on which the site is situated are a complex system.

As discussed in Section 5.3, dykes create compartments within the dolomites. The compartment on which the site is situated is known as the Turffontein Compartment. The extent of this compartment will be used as the sub-catchment, as it is hydraulically separated from adjacent compartments. The Turffontein Compartment is indicated in Figure 5-4. The total area is in the order of 975.94 km^2.

5.4.2 Quaternary catchment

Data from relevant geohydrological databases, including the Groundwater Resource Directed Measures (GRDM), was obtained from the Department of Water and Sanitation and associated Aquiworx software (Aquiworx, 2015) and is indicated in Table 5-2.

Table 5-2: Summarised Quaternary Catchment Information (Aquiworx, 2015)

Quaternary Catchment	Total Area (km^2)	Recharge (%)	Rainfall (mm/a)	Baseflow (mm/a)
C23E	849.9	6.2	630.6	9.54
C23G	613.1	7.2	597.4	8.74
C23H	451.2	7.4	603.5	8.97
The average for the entire area	1 914.2	6.9	608.9	9.0

An assumption is made that the recharge values assigned to each quaternary catchment are not representative of the local geology at the site and may influence reserve determinations. Therefore, a representative value for the local geology was calculated. The Malmani Group has an approximate recharge value of 20%, while the surrounding geology (Pretoria and Platberg group) has approximately 10% recharge. A weighted average of 17% or 104.92 mm/a was used in the calculations.

5.4.3 Existing GW usage (EU)

According to the latest available information from the Water Authorisation Registration and Management System (WARMS) database, the average volume of groundwater abstracted within the confines of the Turffontein Compartment sub-catchment is in the order of 16 821 390 m^3/a.

It should be noted that estimates of existing groundwater abstractions are based on the results of the registration of water use required in terms of the National Water Act. The registered groundwater use does not imply that this volume is used on an annual basis and probably represents a maximum consumption rate, as most users only resort to groundwater in years of low rainfall when dams are not sufficiently filled. Where registered groundwater use is greater than actual use, the groundwater balance results will be conservative.

5.4.4 Basic human needs (BHN)

According to the Government Gazette no 46798 of 26 August 2022, the BHN Reserve provides for the essential needs of individuals served by the water resource in question and includes water for drinking, food preparation and personal hygiene. Basic Human need is set by the Water Service Act (Act No. 108 of 1997) at 25 litres per person per day. The reserve is calculated by multiplying the number of people living within the confines of a source unit by 25 L/d.

The sub-catchment is located in the local municipalities of JB Marks and Merafong City. According to the 2016 census, the local municipalities (area of ~8 028 km^2) have a combined population of 432 370. This equates to approximately 52 562 people living within the delineated sub-catchment. The estimated BHN is, therefore, in the order of 479 628 m^3/a for the delineated sub-catchment.

5.4.5 Proposed GW usage (PU)

No new groundwater abstraction is proposed at the Beta site.

5.4.6 Land use (LU)

Based on 2018 South African National Land Cover (SANLC) data for the sub-catchment, the sub-catchment consists predominantly of natural grass, cultivated land and forests, built-up areas, and water bodies/wetlands (DEA, 2019). Hence, the impact of land use on net-GW recharge is assumed to be below.

5.4.7 GW balance

The groundwater balance and the reserve determination on a sub-catchment scale are summarised below:

$$GW_{available} = (Re) - (EU + BHN + BF + PU) \quad (3)$$

Where:

$GW_{available}$	=	Available groundwater for use.
Re	=	Effective recharge to the aquifer.
BF	=	Baseflow to surface water streams.
EU	=	Existing groundwater abstraction/use (identified on sub-catchment, excluding applicant).
PU	=	Proposed use / likely dewatering use.
BHN	=	Basic Human Needs.

Calculations:

Re (sub-catchment)	=	104.92 mm/a × 975.94 km²	
	=	102 396 087.77 m³/a	(**280 537.23 m³/day**)
BHN	=	479 628 m³/a	(**1 314.05 m³/day**)
EU	=	16 821 390 m³/day	(**46 086.00 m³/day**)
BF	=	18 113 446.40 m³/day	(**49 625.88 m³/day**)
$GW_{available}$	=	(280 537.23 - [46 086 + 1 314.05 + 49 625.88 + 0])	
	=	**+ 183 511.30 m³/day**	

The GW balance indicates a surplus value of approx. + 183 511.30 m³/day available for abstraction on a sub-catchment scale.

5.5 Groundwater quality

Literature suggests that the electrical conductivity (EC) for the underlying aquifer generally ranges from 0 – 70 mS/m (Milli Siemens/metre) to 70 – 300 mS/m, with localised areas southwest of Carletonville above > 1000 mS/m. The pH ranges from 6 to 8. Groundwater abstracted from the aquifer can generally be used for domestic use (King, 1998).

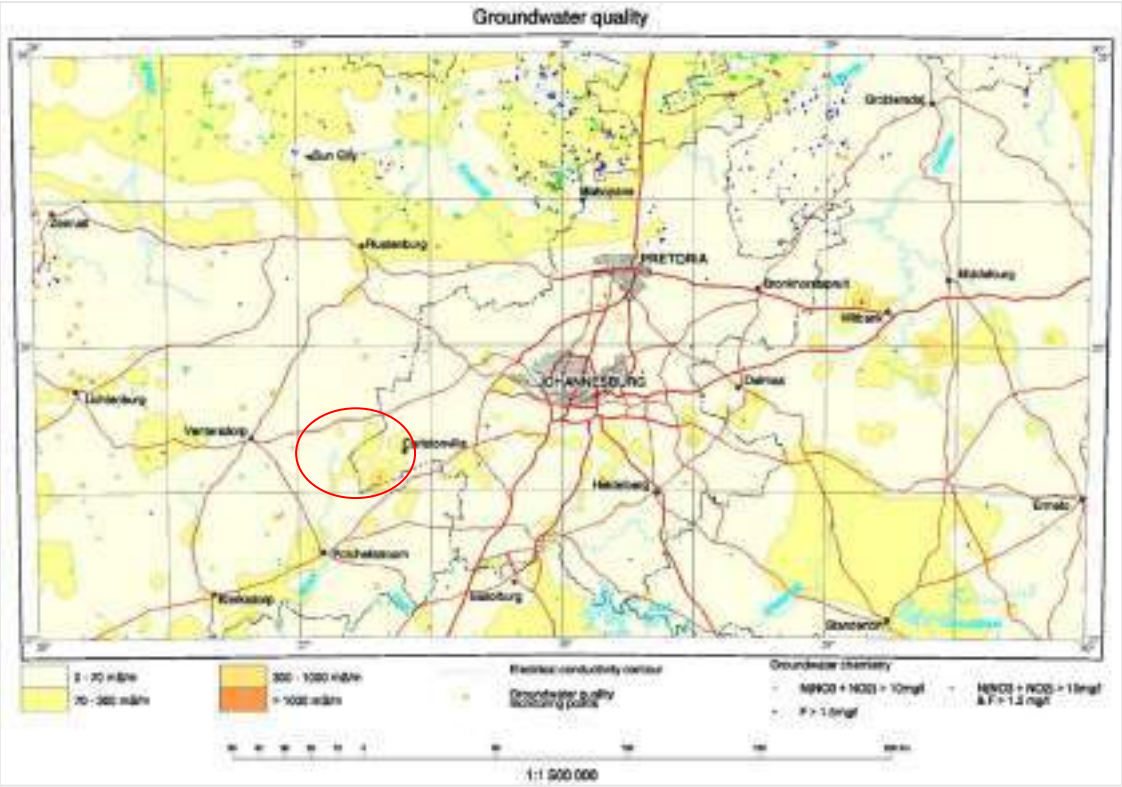


Figure 5-2: Groundwater conductivity for the study area (Barnard & Baran, 1999)

5.5.1 Site-specific hydrochemistry observations

No samples were collected for laboratory analysis during the hydrocensus, but in-field measurements were taken from seven (7) boreholes. All constituents are well within the target water quality ranges except BH8 has slightly elevated TDS levels.

The results indicate water is of good quality for domestic use, which all the sampled boreholes are used for. Users have not noted any adverse health effects due to consumption.

Table 5-3: Summary of groundwater quality data

Constituent	Unit	BH3	BH 4	BH 8	BH 9	BH 10	BH 14	BH 16	DWAF 1996 Domestic Use - TWQR
Temperature	°C	17.7	14	18	19	-	20.4	21	ns
pH in water	pH units	7.12	7.7	7.65	8.23	8.18	7.67	6.52	6 - 9
Conductivity in mS/m	mS/m	0.565	0.641	0.681	0.321	0.46	0.449	0.08	0 - 70
Total Dissolved Solids	mg/ℓ	391.55	443.49	469.46	227.74	308.65	311.64	54.04	0 - 450
ns = No Quality Range in Reference Guideline, Red = Above DWAF (1996) Ideal Water Quality Ranges									

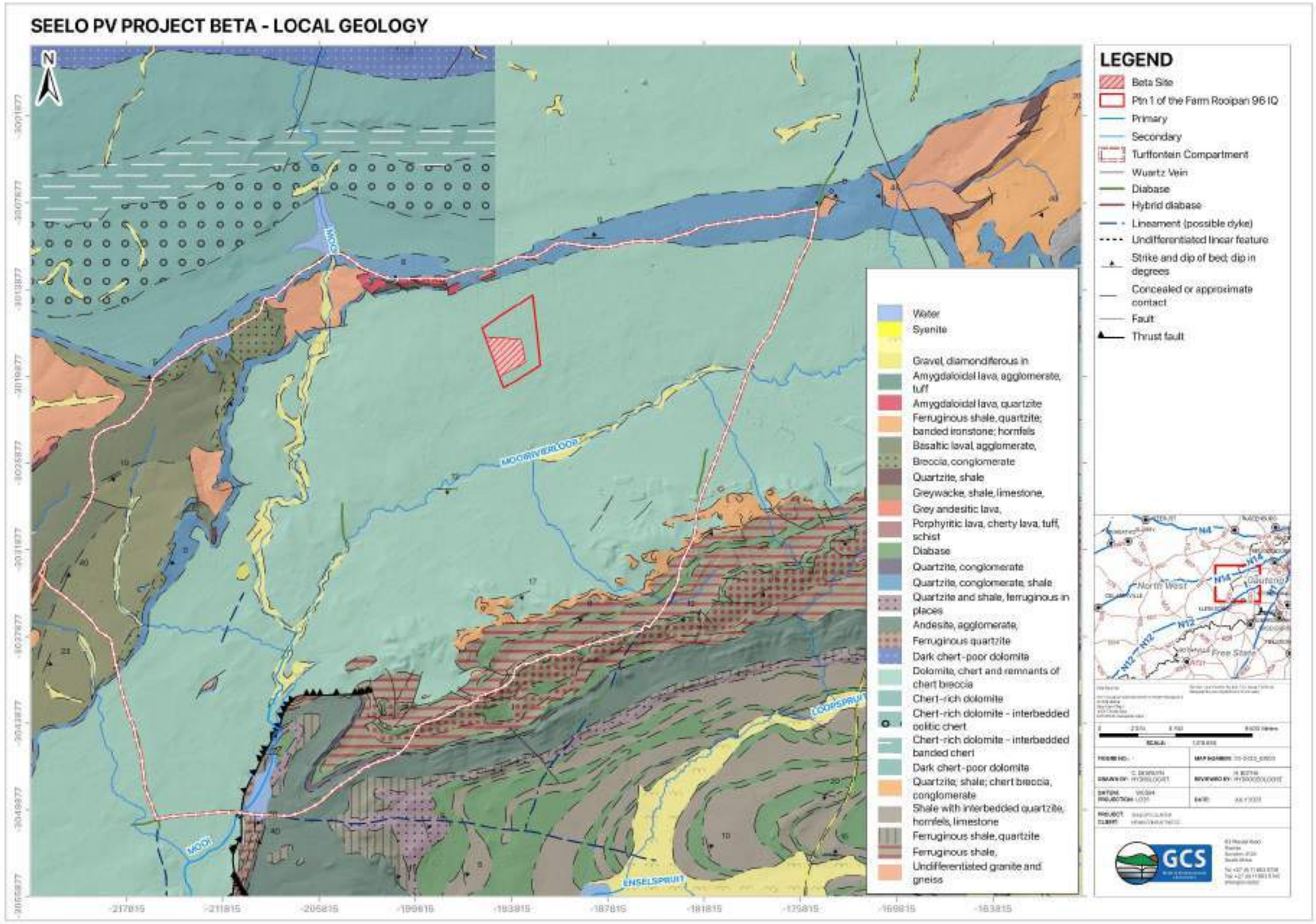


Figure 5-3: **Local geology**

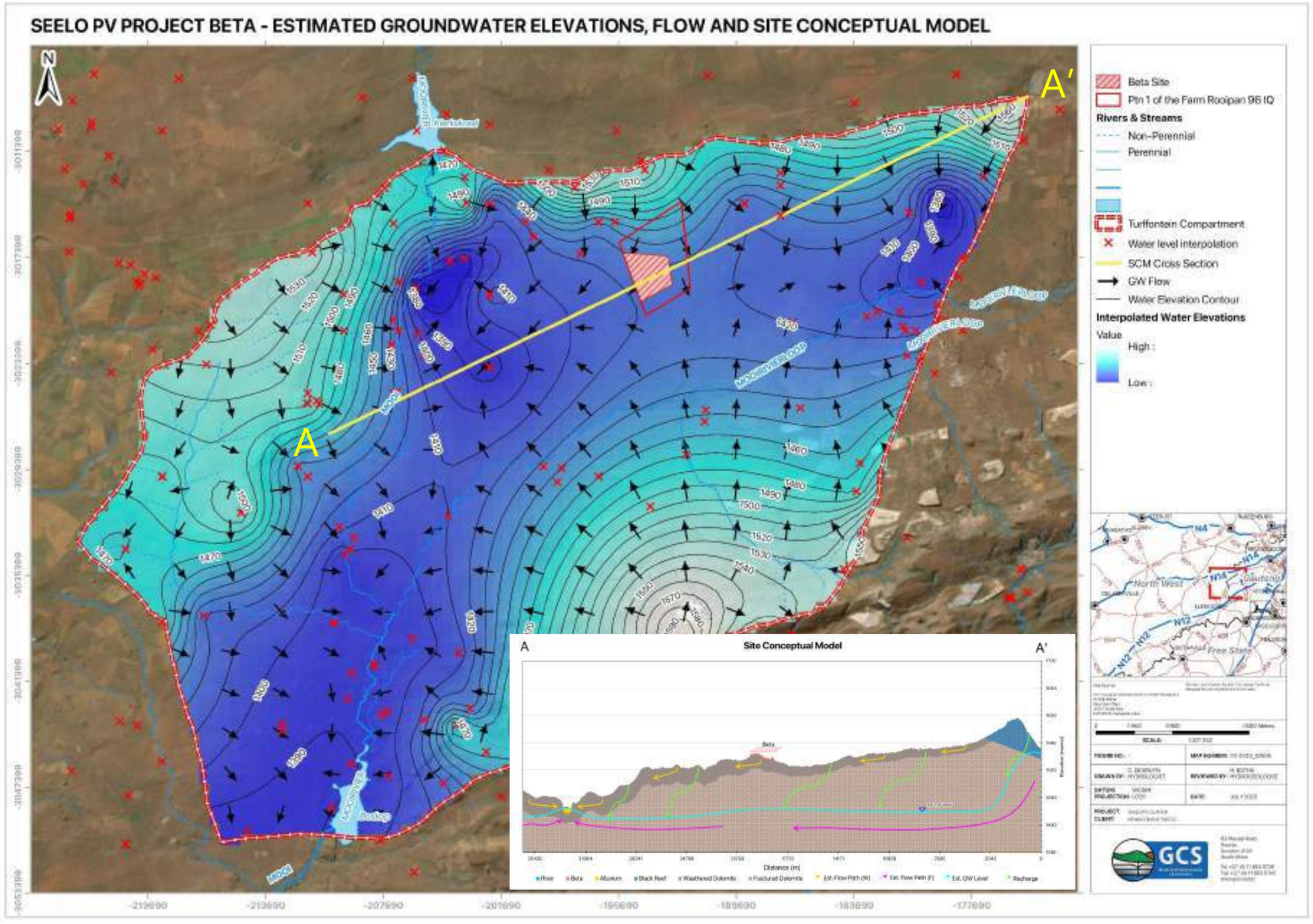


Figure 5-4: Estimated groundwater depth and flow directions

6 PRELIMINARY RISK AND IMPACT ASSESSMENT

In this section, the anticipated hydrogeological risks concerning the construction of the Beta PV plant at the site were assessed. The Source–Pathway-Receptor (SPR) model (DWAF, 2008) was considered to quantify and illustrate the potential groundwater risks.

6.1 Site conceptual model

The Site Conceptual Model (SCM) developed focused on the Beta PV Plant, and broader study area and is illustrated in Figure 6-1.

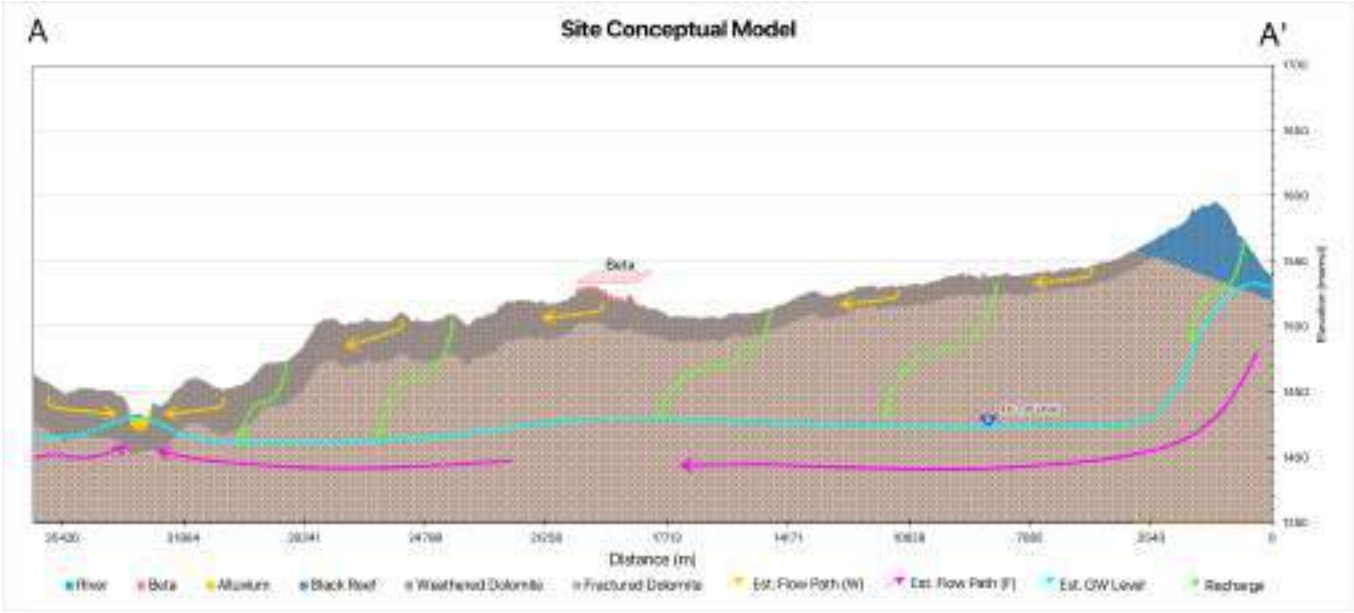


Figure 6-1: SCM – Cross-section A-A'

The SCM shows that two (2) aquifers exist in the area:

- Available literature and site observation data suggest that two (2) aquifers exist in the area:
    - A shallow aquifer system associated with weathered dolomite as well as moderately to partially weathered chert, shale, limestone, and quartzite; and
    - A deeper intergranular and fractured aquifer network is associated with the Malmani Subgroup of the Chuniespoort Group within the Transvaal Sequence.
- The aquifer underlying the Seelo PV plant can be regarded as a high-yielding aquifer, with reported yields ranging from >5 l/sec - Class c5 aquifer.

In the SCM, the main source of groundwater recharge is rainfall. The rainfall infiltrates into the ground to become groundwater through the Vadose Zone. The water then moves both vertically and horizontally in the weathered zone of the Chuniespoort Group. Water flowing horizontally towards the south and south-west is likely to discharge into the perennial river as base flow whereas water flowing vertically is likely to recharge the fractured aquifer (i.e., partially due to vertical percolation through the vadose zone and weathered aquifer zones).

6.2 Estimated groundwater pollution migration velocities

Based on available data and Darcy's Law[2] for groundwater flow through a saturated medium and aquifer hydraulic conductivity (K), the following pollution migration rates are likely:

1. Shallow and deeper aquifer zones:
    a. K-values for the aquifer rock in the study area typically range from 7×10^{-5} to 3.1×10^{-4} m/day and 2.9×10^{-6} to 1×10^{-5} m/day for weather zone aquifers and fractured zone aquifers, respectively.
    b. The estimated seepage velocity within the aquifer zones is estimated to range from 0.025 to 0.003 m/d.

The velocities are relatively slow and will have a low pollution migration potential.

[2] Darcy's Flow (Q) = kiA
Darcy Velocity (v) = ki/θ
Where k = hydraulic conductivity (m/day), i = hydraulic head is in the order of 0.001, A = flow cross sectional area, θ = effective porosity of flow media (ranges from 0.65 to 0.2).

6.3 Geohydrological impacts and mitigation measures

In terms of the proposed development (PV plant), several risks during the construction and operational phase of the development were identified. The potential impacts identified and environmental significance for the construction and operational phase are listed in Table 6-2 and Table 6-3. Based on the SPR model applied to the site (refer to Figure 6-2), the following potential geohydrological risks are identified:

- Construction phase risk:
    - Leakages from construction and contractor vehicles accessing the site may cause soil pollution (i.e., un-inspected vehicles dripping oils/hydrocarbons onto soils may cause contamination of soil and surface water resources).
    - Disturbing soils (land capability) due to some vegetation clearing may promote sedimented runoff during storm events.
- Operational phase risk:
    - Oil spillage from parked vehicles (service vehicles) may seep into the aquifer via the vadose zone.
    - Seepage from ruptured sewer lines (only if ruptures occur).
    - Sedimentation runoff from areas where no stormwater management measures are implemented; or where vegetation is not maintained.
    - Dewatering of dolomite aquifer.

The risk assessment for both the construction and post-construction phases of the project is considered low, with mostly reversible and manageable impacts. Intense dewatering of the dolomitic aquifer could cause sinkhole formation. Large-scale abstraction is not anticipated; therefore, the risk is low. The risk of poor-quality seepage via the vadose zone and impacts on groundwater water quality is predicted to be low and will only be a problem if the developing contractor allows leaking vehicles onto the site or cause deliberate environmental harm.

Key assumptions made:

- The risk/impact assessment conducted for the site is based on the topography, groundwater flow direction, groundwater levels, geology, and characteristics associated with the aquifer system.
- The risk/impact assessment incorporates a worst-case scenario approach.
- Bayesian interpolation of available groundwater data was applied to conceptualize the groundwater flow and groundwater depth in the study area.

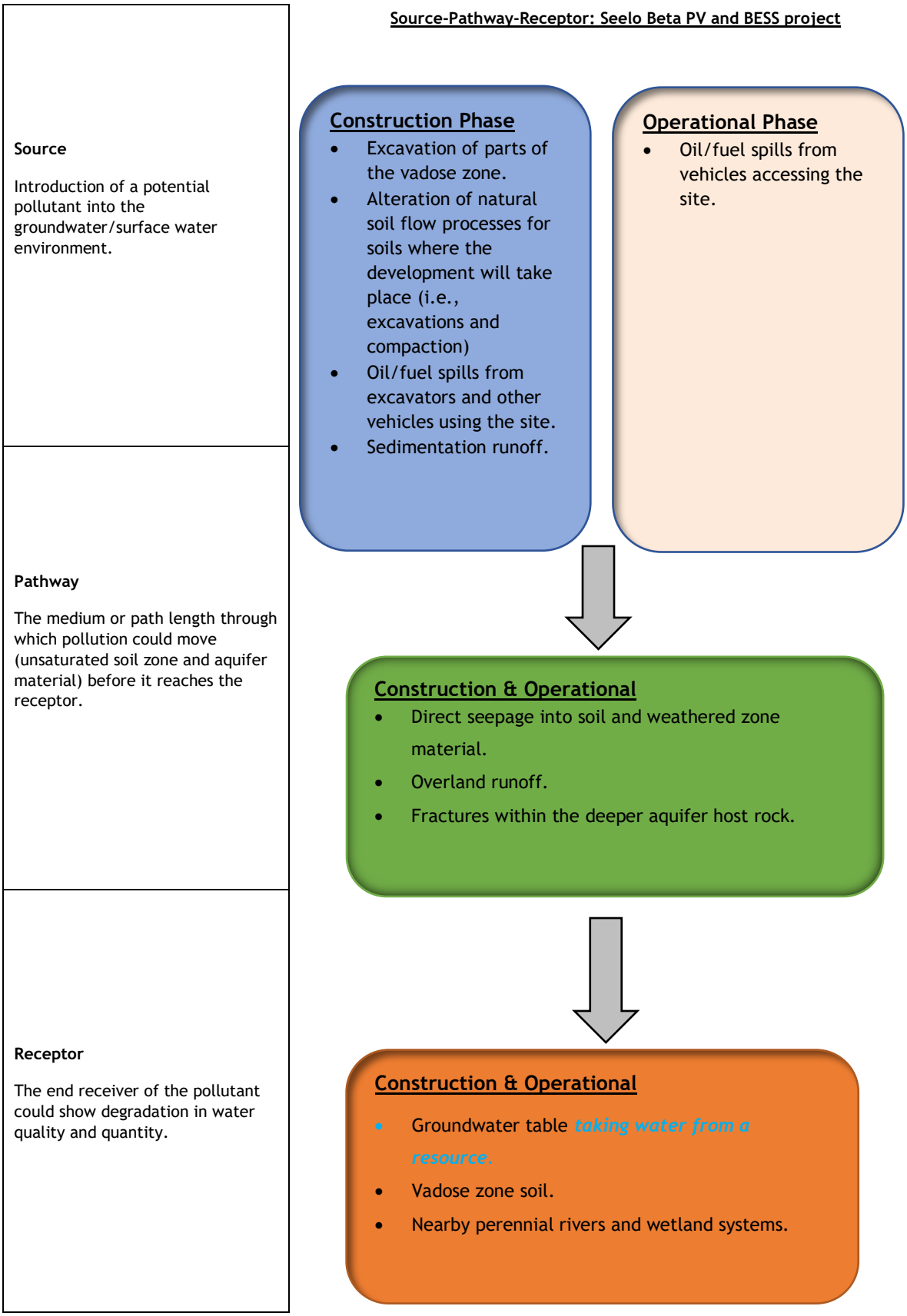


Figure 6-2: Seelo Beta PV and BESS project - SPR

6.4 Site sensitivity verification

It is understood that the development site in question was flagged as a sensitive area in terms of the DFFE Screening Tool (*Aquatic Biodiversity Theme*). However, based on the field and desktop findings the site sensitivity from a geohydrological perspective is considered low. This is based on the following geohydrological factors:

- No groundwater-surface water interactions could be found during the site visit.
- Limited groundwater users exist in the proposed footprint.
- The water table is very deep (>120m for dolomitic aquifer zones).
- The proposed development site falls within an area with low susceptibility to pollution.

6.5 Alternatives

The selected PV Site was identified through a feasibility study/screening process which took into consideration a set of location factors. The location factors which favour the selected PV site include:

- Suitable solar irradiation levels;
- Proximity to and availability of grid connection point. Many areas in South Africa do not have available generation connection capacity for the transmission network. The site is located approximately 13km from a grid connection point that has confirmed capacity to evacuate the electricity generated;
- Flat topography;
- Low agricultural sensitivity;
- Suitable site access; and
- Availability of the particular property for the development of a PV facility.

As a process was followed to identify the site for the proposed PV facility based on the application of the above location factors, alternative sites are not proposed for this project.

6.5.1 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), as identified in this assessment. An initial layout was proposed by the Applicant, however through the environmental screening process and with input from various specialists, the layout was later refined to consider sensitive environmental features. Therefore, currently, one layout alternative is presented for inclusion in the study.

6.5.2 Technology Alternatives

6.5.2.1 PV Technology

The Fixed and Tracking PV panel technologies are both considered for the proposed Solar PV Facility:

- Fixed/mounted PV panels; and
- Tracking PV panels (these solar panels rotate to follow the sun's movement/trajectory).

6.5.2.2 BESS Technology

As technological advances within battery energy storage systems (BESS) are frequent, two BESS technology alternatives are considered namely, solid-state battery electrolytes and redox-flow technology.

6.6 Cumulative impacts

As all activities will take place on the same property, there will be cumulative impacts. The operational phase risk table includes cumulative risk about the site and activities thereon. The net impact of all cumulative impacts is low.

As the site becomes more impervious than it was pre-development, rainfall infiltration is decreased, and runoff increases. Increased runoff causes erosion of soils, and in turn, sedimentation of watercourses. Reduced infiltration due to high impermeability, decreases recharge to the underlying aquifer, therefore impacting the water table and other groundwater users.

With regards to other proposed solar energy projects within a 30 km radius of the site, the following is noted (refer to Figure 6-3 and Table 6-1):

- The Seelo Beta development will be bound by the proposed Seelo Alpha and Charlie solar developments. These fall in the same drainage line and commutative impacts are considered in the impact tables below.
- There is one 200 MW PV facility at Sibanye Gold Limited about 27km east of the proposed development. This activity falls within a different drainage area as well as a diffirent geology setting. Therefore, no contribution to cumulative impacts is anticipated.

Table 6-1: List of other solar/energy projects within a 30 km radius of the site (REEA OR, 2023)

Project Title	Distance	DFFE Reference	Status
200MW PV facility for Sibanye Gold Limited on Portion 1, 2, 4, 5 and 6 of the Farm Uitval 280 within the Westonaria Local Municipality in the Gauteng Province	27km east	14/12/16/3/3/2/919	Approved

Figure 6-3: 30km buffer and other energy / solar projects

6.7 Impacts on the groundwater reserve

As there are no new proposed groundwater abstraction activities, there will be minimal impact on the reserve. Small-scale impacts in terms of groundwater recharge reduction are anticipated due to the scale and changes to runoff coefficients of the development (landscape becomes slightly less permeable).

Table 6-2: Construction (preparation and development) phase geohydrological

Component Being Impacted On	Activity Which May Cause the Impact	Activity	Pre- Mitigation							Recommended Mitigation Measures	Post Mitigation						
			Duration (D)	Extent (E)	Potential for impact on irreplaceable resources (I)	Severity (S)	Consequence (C)	Probability (P)	Significance		Duration (D)	Extent (E)	Potential for impact on irreplaceable resources (I)	Severity (S)	Consequence (C)	Probability (P)	Significance
Vadose zone soils	Hydrocarbon/oil spillages onto soils have the potential to contaminate the soils. Removal of soils along with deconstructed building material. Stripping of concrete laydown areas and placing of building material on soils where there may be leaching of contaminants into the soil.	Earthworks and deconstruction activities	Short-term (2)	Site (2)	Yes (1)	Medium (-2)	Slightly detrimental (-7 to -12) (-10)	Definite (2)	Low (-20)	• Only excavate / clear areas applicable to the project area. • Keep the site clean of all general and domestic wastes. • Have fuel/oil spill clean-up kits on site. • Exposed soils are to be protected using a suitable covering or sandbags or berms to control erosion.	Short-term (2)	Site (2)	Yes (1)	Low (1)	Negligible (0 to -6) (-5)	Definite (2)	Very Low - neutral (0 to -12) (-10)
Primary Surface Water Receivers - > Perennial streams	Erosion and sedimentation of watercourses due to unforeseen circumstances (i.e., bad weather).	Earthworks and deconstruction activities	Short-term (2)	Site (2)	Yes (1)	Medium (-2)	Slightly detrimental (-7 to -12) (-10)	Definite (2)	Low (-20)	• Cover building material and stockpiles with a temporary liner to prevent contamination (where required and visually determined). • Ensure a stormwater management plan is in place.	Short-term (2)	Site (2)	Yes (1)	Low (1)	Negligible (0 to -6) (-5)	Definite (2)	Very Low - neutral (0 to -12) (-10)
Regional groundwater table	Oil/fuel spillages may enter the regional groundwater table if prolonged percolation via the vadose zone takes place. Declining water table due to abstraction could form sinkholes.	Earthworks and deconstruction activities	Short-term (2)	Site (2)	Yes (1)	Low (-1)	Negligible (-6 to 0) (-5)	Improbable (0)	Very low (0 to -12) (0 - ZERO)	No mitigation is possible. Impact projected to be zero.							
Groundwater users	Poor quality seepage from oil/fuel spills during the construction phase, at any point in the project area, may impact the shallow groundwater table. Identified groundwater boreholes are not in the same drainage area.	Earthworks and deconstruction activities	Short-term (2)	Site (2)	Yes (1)	Low (1)	Negligible (0 to -6) (-5)	Improbable (0)	Very Low - neutral (0 to -12) (0 - ZERO)	No mitigation required							

Table 6-3: Operational phase geohydrological risk

Component Being Impacted On	Activity Which May Cause the Impact	Activity	Pre- Mitigation							Recommended Mitigation Measures	Post Mitigation						
			Duration (D)	Extent (E)	Potential for impact on irreplaceable resources (I)	Severity (S)	Consequence (C)	Probability (P)	Significance		Duration (D)	Extent (E)	Potential for impact on irreplaceable resources (I)	Severity (S)	Consequence (C)	Probability (P)	Significance
Vadose zone soils	There is a potential for some erosion if there are storm events. Hydrocarbon/oil spillages onto soils have the potential to contaminate the soils.	Earth Net results of the development and operational activities on the site	Short-term (2)	Site (2)	Yes (1)	Medium (-2)	Slightly detrimental (-7 to -12) (-10)	Definite (2)	Low (-20)	• Keep the site clean of all general and domestic wastes. • All development footprint areas to remain as small as possible, and vegetation clearing to be limited to what is essential. • Retain as much indigenous vegetation as possible / re-vegetate. • Have fuel/oil spill clean-up kits on site. • Exposed soils are to be protected using a suitable covering or sandbags or berms to control erosion.	Short-term (2)	Site (2)	Yes (1)	Low (1)	Negligible (0 to -6) (-5)	Definite (2)	Very Low - neutral (0 to -12) (-10)
Primary Surface Water Receivers - > Perennial streams	Erosion and sedimentation of watercourses due to unforeseen circumstances (i.e., bad weather). Alteration of natural drainage lines may lead to ponding or increased runoff patterns (i.e., may cause stagnant water levels or increase erosion).	Net results of the development and operational activities on the site	Short-term (2)	Site (2)	Yes (1)	Medium (-2)	Slightly detrimental (-7 to -12) (-10)	Definite (2)	Low (-20)	• Cover soil stockpiles with a temporary liner to prevent contamination (where required and visually determined). • Ensure a stormwater management plan is in place.	Short-term (2)	Site (2)	Yes (1)	Low (1)	Negligible (0 to -6) (-5)	Definite (2)	Very Low - neutral (0 to -12) (-10)
Regional groundwater table	Oil/fuel spillages may enter the regional groundwater table if prolonged percolation via the vadose zone takes place. Declining water table due to abstraction could form sinkholes.	Net results of the development and operational activities on the site	Short-term (2)	Site (2)	Yes (1)	Low (-1)	Negligible (-6 to 0) (-5)	Improbable (0)	Very low (0 to -12) (0 - ZERO)	No mitigation is possible. Impact projected to be zero.							
Groundwater users	Poor quality seepage from oil/fuel spills during the construction phase, at any point in the project area, may impact the shallow groundwater table. Identified groundwater boreholes are not in the same drainage area.	Net results of the development and operational activities on the site	Short-term (2)	Site (2)	Yes (1)	Low (1)	Negligible (0 to -6) (-5)	Improbable (0)	Very Low - neutral (0 to -12) (0 - ZERO)	No mitigation required							

7 WATER MONITORING AND GROUNDWATER MANAGEMENT

Currently, no groundwater or surface water monitoring is taking place. It is proposed that a proper monitoring programme be implemented to monitor both the water quality and quantity at the site. The monitoring programme is divided into two phases:

- Phase 1: Monitoring during any construction activities (temporary monitoring); and
- Phase 2: Monitoring after development is complete (long-term or for a period after the activity).

7.1 Phase 1 monitoring

During any construction activities, water and soil monitoring should focus on active excavation sites and equipment/heavy machinery parking or housing areas. Regular visual inspections of these areas need to be undertaken. Moreover, placement and monitoring of drip trays underneath parked construction vehicles will help to determine which vehicles need to be repaired/taken off-site to prevent contamination while in service.

7.2 Phase 2 monitoring

From the assessment undertaken, it is anticipated that the wetland units towards the south and southwest of the site and perennial streams are likely to not be impacted. The vadose zone and underlying aquifers are viewed as receptors of potential pollution (i.e., poor-quality seepage) and sedimentation. Phase 2 monitoring should focus on these areas and will entail visual inspections annually during the operational phase of the development. Visual inspection entail observing if erosion is increasing in the area in and around the project area, as well as oil/fuel spillage from vehicles parked on site that will be transported via runoff if not removed.

It is of critical importance that the groundwater be monitored for water level fluctuations. The boreholes within the 1 km buffer zone should be monitored for drawdown, water levels, flow, and abstraction volumes. It is proposed that a flow meter be installed to achieve accurate abstraction volumes. The proposed monitoring positions are indicated in Figure 7-1.

If visual observations during the construction phase show areas of concern (i.e., where pollution is observed), then it is advised that a water quality sample be obtained from the observation point. Mitigation measures should then be formulated based on the scale of impact observed.

7.3 Monitoring duration

It is proposed that monthly monitoring be undertaken during the construction phase of the project. During the operational phase, an annual hydrocensus must occur, monitoring drawdown, water levels, flow, and abstraction volumes (collectively referred to as physical characteristics). The need for further monitoring of the site can be evaluated by the local environmental authorities or DWS representative.

7.4 Monitoring responsibility

It is proposed that the developer be responsible for Phase 1 and Phase 2 monitoring. The proposed monitoring type, frequencies, and constituents to monitor are listed in Table 7-1 below.

Table 7-1: Proposed monitoring points, frequencies and sample analyses

Site Type	Frequency	Type	Field Measurements	Laboratory Analyses
Soils	**Construction Phase:** • Monthly	Visual assessment • Spillage from vehicles	None	If field observations indicate a contaminant trend, it is advised that a sample be submitted for analytical testing. The following should typically be screened: • pH, Conductivity, Total dissolved solids (TDS), and total suspended solids (TSS) • BTEXN: benzene, toluene, ethylbenzene, xylenes, and naphthalene (hydrocarbons)
Borehole	**Operational Phase:** • Physical characteristics annually.	Field assessment and laboratory.	• Water level • Flow • Abstraction • Drawdown	If field measurements indicate a contaminant trend, it is advised that a sample be submitted for analytical testing. The following should typically be screened: • pH, Conductivity, Total dissolved solids (TDS), and total suspended solids (TSS) • Biological oxygen demand (BOD). • Calcium, Magnesium, Sodium, Potassium, Carbonate, Bicarbonate, Chloride, Sulphate, Nitrate, Iron, Manganese, Fluoride, Aluminium, Total Alkalinity (TALK), Ammonia, Ammonium. • Total coliforms, E. Coli, Faecal coliforms
Sewer lines	Quarterly visual assessments of maintenance holes and sewer mains intakes and offtakes.	Visual assessment Sample spillage if applicable.	None	As per above.

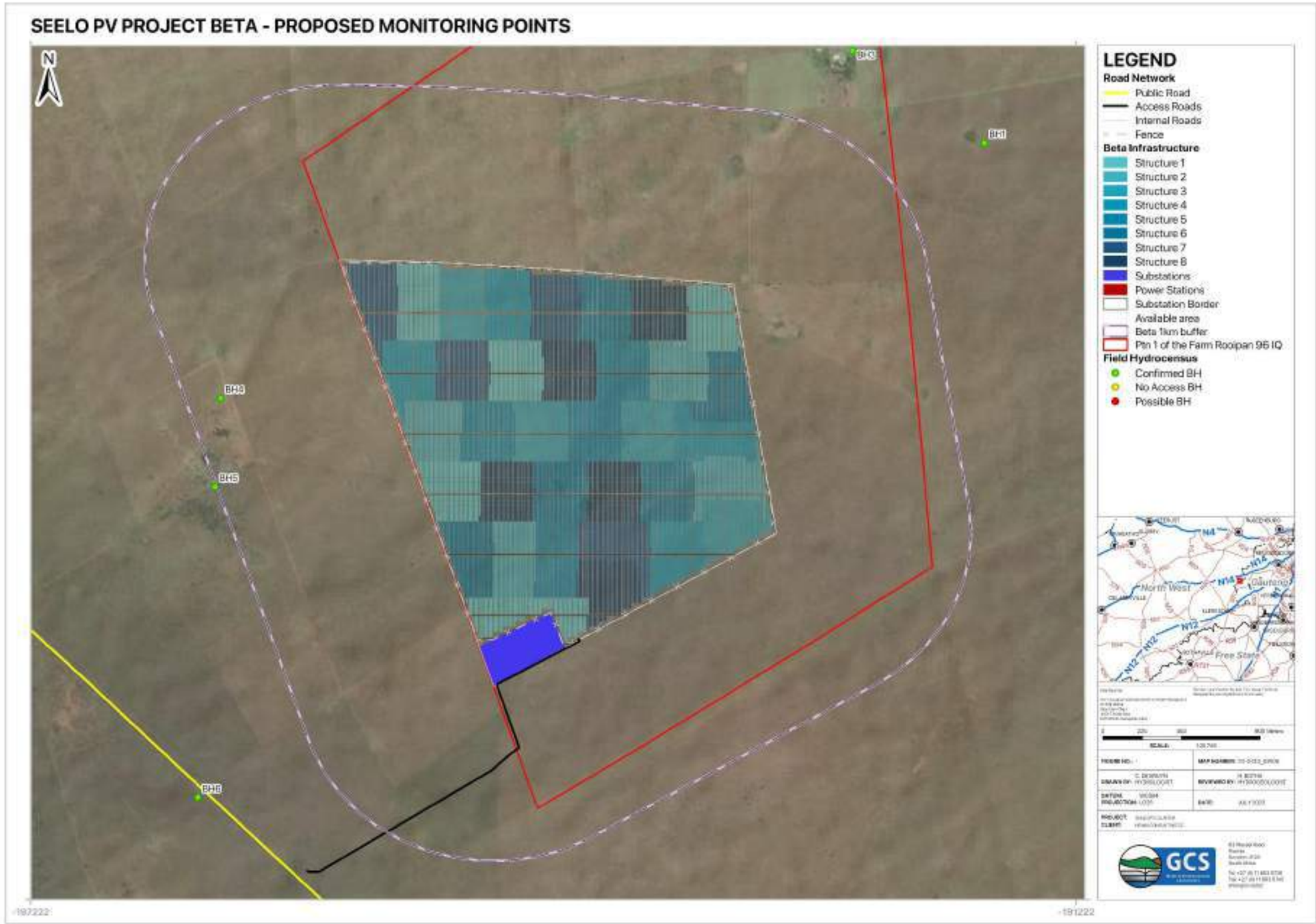


Figure 7-1: Proposed monitoring points

8 CONCLUSIONS

Based on the investigation undertaken, the following conclusions are made:

- The site is situated across the border of quaternary catchments C23E and C23G of the Vaal Management Area.
    - The site's mean annual precipitation (MAP) is in the order of 604.9 mm/a.
    - Natural runoff was recorded as approximately 7.4 mm/a, which represents approximately 1% of the MAP.
    - Evaporation is reported as 1 600 – 1 700 mm/a.
- Available literature and site observation data suggest that two (2) aquifers exist in the area:
    - A shallow aquifer system associated with weathered dolomite as well as moderately to partially weathered chert, shale, limestone, and quartzite; and
    - A deeper intergranular and fractured aquifer network is associated with the Malmani Subgroup of the Chuniespoort Group within the Transvaal Sequence.
- The aquifer underlying the Beta PV and BESS project can be regarded as a high-yielding aquifer, with reported yields ranging from >5 l/sec - Class c5 aquifer.
- Based on available GW-level data:
    - GW levels for the Seelo PV plant area are expected to range from 90 - 120 mbgl (average 105 mbgl); and
    - Literature suggests groundwater levels in the order of 12 - 505 mgbl, for the sub-catchment (DWAF, Groundwater Resource Assessment II, 2006).
- Recharge to the underlying aquifer is estimated to range from 6.2 to 7.2 % (average 6.7% = 41.14 mm/yr) of the MAP (614 mm) which falls within quaternary catchment C23E and C23G (DWAF, 2006). Recharge to dolomite aquifers is in the order of 20%.
- Based on the SPR model, the following receptors are noted for the project area:
    - The perennial streams and wetlands south and southwest of the site;
    - The vadose zone/soils in the study area; and
    - The groundwater aquifer underlying the site.
- Should additional water be required for the development, BH1 and BH2 is available on a neighbouring property (owned by the same owner as the property on which the Beta project will be located). These boreholes may not be feasible to pump due to the pumping depth. Alternatively, a borehole with shallow water levels were located on the property RE/5/96 which could be targeted for more feasible water supply.

8.1 Identification of any areas that should be avoided

Based on the proposed activities and the risk assessment undertaken, no geohydrological buffer areas or protected areas will be required.

8.2 Recommendations

The following recommendations are made:

- The current site plan and activities pose a low risk to the groundwater environment and the activities should be authorized provided that the developer implements recommended mitigation measures outlined in section 6.3.
- It is proposed that the physical characteristics of the aquifer be monitoring be implemented as discussed in Section 7, to monitor the impact of water abstraction and recharge changes on the aquifer.

8.3 Reasoned opinion on whether the activity should be authorised.

Based on the information made available for this assessment, it is predicted that the proposed activities at the site pose a low risk to the groundwater environment during the construction and operational phase. The authorisation of the proposed activities should be considered based on the findings of this report.

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APPENDIX A: PHOTOGRAPHIC LOGS

Client Name: Nemai	Site Location: Carletonville	Project No. 23-0433

Photo No.	Date
1	12/07/2023

Direction Photo Taken
N/A

Description

BH2

The photograph shows an unused and unequipped borehole located on 2/58.

Lat: 26° 16' 45.5410" S
Lon: 27° 17' 02.7886" E

Photo No.	Date
2	12/07/2023

Direction Photo Taken
N/A

Description

BH3

The borehole is equipped and in use for domestic and livestock watering purposes located on 1/96.

Lat: 26° 17' 15.6539" S
Lon: 27° 16' 14.4941" E

Photo No.	Date
3	12/07/2023

Direction Photo Taken
N/A

Description

BH4

The borehole is equipped and in use for domestic and livestock watering purposes located on 2/96.

Lat: 26° 18' 20.0411" S
Lon: 26° 18' 20.0411" S

Photo No.	Date
4	12/07/2023

Direction Photo Taken
N/A

Description

BH5

The borehole is equipped but not in use located on 2/96.

Lat: 26° 18' 36.4654" S
Lon: 27° 14' 16.1809" E

Photo No.	Date
5	12/07/2023

Direction Photo Taken
N/A

Description

BH6

The borehole is unequipped, not in use and sealed located on 2/96.

Lat: 26° 19' 34.0317" S
Lon: 27° 14' 12.9974" E

Photo No.	Date
6	12/07/2023

Direction Photo Taken
N/A

Description

BH8

The borehole is equipped and in use for domestic and livestock watering purposes located on 64/58.

Lat: 26° 17' 23.4533" S
Lon: 26° 17' 23.4533" S

Photo No.	Date
7	13/07/2023

Direction Photo Taken
N/A

Description

NA_BH8

The borehole is equipped and most likely in use for domestic and livestock watering purposes located on 37/58.

Lat: 26° 16' 18.5763" S
Lon: 27° 18' 55.8071" E

Photo No.	Date
8	13/07/2023

Direction Photo Taken
N/A

Description

BH9

The borehole is equipped and in use for domestic and poultry farming purposes located on 18/58.

Lat: 26° 15' 49.4974" S
Lon: 27° 18' 25.6705" E

Photo No.	Date
9	13/07/2023

Direction Photo Taken
N/A

Description

BH10

The borehole is equipped and in use for domestic purposes located on 10/58.

Lat: 26° 15' 49.4974" S
Lon: 27° 17' 47.9682" E

Photo No.	Date
10	13/07/2023

Direction Photo Taken
N/A

Description

BH11

The borehole is equipped but not in located on 10/58.

Lat: 26° 16' 12.6802" S
Lon: 27° 17' 45.7181" E

Photo No.	Date
11	13/07/2023

Direction Photo Taken
N/A

Description

BH12

The borehole is equipped but not in located on 10/58.

Lat: 26° 16' 12.3767" S
Lon: 27° 17' 46.6553" E

Photo No.	Date
12	13/07/2023

Direction Photo Taken
N/A

Description

BH13

The borehole is equipped and in use for domestic purposes located on 11/58. Water is pumped to 15/58.

Lat: 26° 16' 14.9359" S
Lon: 27° 17' 43.7157" E

Photo No.	Date
13	13/07/2023

Direction Photo Taken
N/A

Description

BH14

The borehole is unequipped and not in use located on RE/5/96.

Lat: 26° 15' 21.0481" S
Lon: 27° 15' 09.5614" E

Photo No.	Date
14	13/07/2023

Direction Photo Taken
N/A

Description

BH15

The borehole is equipped with windpump and likely in use located on RE/3/96.

Lat: 26° 15' 36.5222" S
Lon: 27° 15' 14.7874" E

Photo No.	Date
15	13/07/2023

Direction Photo Taken
N/A

Description

BH16

The borehole is equipped and in use for domestic and livestock purposes located on RE/1/58.

Lat: 26° 14' 34.5828" S
Lon: 27° 17' 00.9404" E

Photo No.	Date
16	13/07/2023

Direction Photo Taken
N/A

Description

BH17

The borehole is equipped but not in use located on RE/1/58.

Lat: 26° 15' 09.5670" S
Lon: 27° 16' 24.1717" E

Photo No.	Date
17	12/07/2023

Direction Photo Taken
N/A

Description

BH19

The borehole is equipped but not in use located on 74/58.

Lat: 26° 17' 41.9297" S
Lon: 27° 18' 37.0032" E

Photo No.	Date
18	12/07/2023

Direction Photo Taken
N/A

Description

NA_BH7

Oral confirmation of borehole. Could not be accessed. Currently not in use. Located on 37/58.

Lat: 26° 16' 10.5968" S
Lon: 27° 18' 49.7093" E

Photo No.	Date
19	13/07/2023

Direction Photo Taken
N/A

Description

NA_BH10

Could not be accessed.
Equipped with windpump.
Located on RE/2/64.

Lat: 26° 15' 10.2803" S
Lon: 27° 13' 38.0513" E

APPENDIX B: DISCLAIMER AND DECLARATION OF INDEPENDENCE

The opinions expressed in this Report have been based on site /project information supplied to GCS Water and Environment (Pty) Ltd (GCS) by Nemai Consulting CC and are based on public domain data and data supplied to GCS by the client. GCS has acted and undertaken this assessment objectively and independently.

GCS has exercised all due care in reviewing the supplied information and gathering field data. Whilst GCS has compared key supplied data with expected values, the accuracy of the results and conclusions are entirely reliant on the accuracy and completeness of the supplied data. GCS does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them.

Opinions presented in this report, apply to the site conditions, and features as they existed at the time of GCS's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this report, about which GCS had no prior knowledge nor had the opportunity to evaluate.

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Geohydrological Assessment for the proposed Seelo PV Cluster Beta

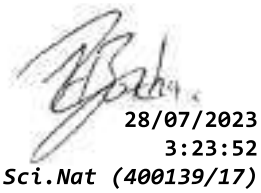
SPECIALIST INFORMATION

Specialist Company Name:	GCS Water and Environment SA			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	2	Percentage Procurement recognition	
Specialist name:	Hendrik Botha			
Specialist Qualifications:	MSc Environmental Sciences (Geohydrology & Geochemistry) BSc Hons. Environmental Sciences (Hydrology) BSc. Geology and Chemistry			
Professional affiliation/registration:	PR SCI NAT 400139/17			
Physical address:	1 Karbochem Road, Newcastle, KZN			
Postal address:				
Postal code:	2940	Cell:		
Telephone:	071 102 3819	Fax:		
E-mail:	hendrikb@gcs-sa.biz			

DECLARATION BY THE SPECIALIST

I, Hendrik Botha , declare that –

- I act as the independent specialist in this application.
- I will perform the work relating to the application objectively, even if this results in views and findings that are not favourable to the applicant.
- I declare that there are no circumstances that may compromise my objectivity in performing such work.
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, Regulations, and all other applicable legislation.
- I have no, and will not engage in, conflicting interests in the undertaking of the activity.
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken concerning the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority.
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



28/07/2023
3:23:52
Pr.Sci.Nat (400139/17)

Signature of the Specialist

GCS

Name of Company:

31 August 2023

Date

CV OF SPECIALIST

Hendrik Botha

Technical Director

LinkedIn:

CORE SKILLS

- Project management
- Analytical and numerical groundwater modelling
- Geochemical assessments and geochemical modelling
- Hydropedology, hydrological assessments & yield assessments
- Hydrology, floodline modelling & storm water management
- Groundwater vulnerability, impact, and risk assessments
- Technical report writing
- GIS and mapping

DETAILS

Qualifications

- BSc Chemistry and Geology (Environmental Sciences) (2012)
- BSc Hons Hydrology (Environmental Sciences) (2013)
- MSc Geohydrology and Hydrology (Environmental Sciences) (2014-2016)

Membership

- Groundwater Division of GSSA
- Groundwater Association of KwaZulu Natal Member
- International Mine Water Association (IMWA)

Languages

- Afrikaans - Speak, read, write.
- English - Speak, read, write.

Projects undertaken in

- South Africa
- Nigeria
- Namibia
- Liberia
- Malawi

PROFILE

Hendrik (Henri) Botha is currently the Technical Director at GCS Water and Environment. He holds an MSc in Environmental Science in Geohydrology & Geochemistry, and a BSc Hons. Degree in Hydrology. He is registered as a SACNASP Professional Natural Scientist in the Earth Science Field. Groundwater, geochemistry and surface hydrology, as well as knowledge of water chemistry together with GIS, and analytical and numerical modelling skills, are some of his sought-after expertise. General and applied logical knowledge are his key elements in problem-solving.

Professional Affiliations:

SACNASP Professional Natural Scientist (400139/17)

Areas of Expertise:

- Project Management of water and environmental projects for mining, industrial and agriculture sectors.
- Integrated Water Investigations
- Waste classification and Impact Assessments
- Aquifer vulnerability assessments
- Geochemical sampling, data interpretation and modelling
- Groundwater impact and risk assessments
- Numerical and Conceptual Visual Modelling (Visual Modflow, ModflowFLEX, Voxler, RockWorks, Surfer and Excel)
- Hydropedology (Hydrological Soil Types) & Soils Assessments
- Floodline Modelling (HEC-RAS)
- Conceptual Stormwater Management Assessments
- Surface Water Yield Assessments
- Water and Salt Balances

Page 1 of 8 SCAN ME PROJECT RECORD

APPENDIX E6: Heritage Impact Assessment

SEELO BETA SOLAR PV (RF) (PTY) LTD

PROPOSED 240MW SEELO BETA SOLAR PHOTOVOLTAIC & BATTERY ENERGY STORAGE SYSTEMS PROJECT, NEAR THE TOWN OF CARLETONVILLE, NORTH WEST PROVINCE, SOUTH AFRICA

HERITAGE IMPACT ASSESSMENT

31 AUGUST 2023 (Revision 3)

Submitted to : Nemai Consulting (PTY) Ltd

Prepared by:

Jennifer Kitto

Nitai Consulting (PTY) Ltd

147 Bram Fischer Drive

Ferndale

2194

NITAI CONSULTING

SPECIALIST ENVIRONMENTAL CONSULTING

The heritage impact assessment report has been compiled considering the NEMA Appendix 6 requirements for specialist reports as indicated in the table below.

Requirements of Appendix 6 – GN R326 EIAs Regulations (2014, amended 2017)	**Relevant section in report**
1.(1) (a) (i) Details of the specialist who prepared the report	Section 1.1.3 of Report
(ii) The expertise of that person to compile a specialist report including a curriculum vita	Section 1.1.3 and of Report and **Appendix 2**
(b) A declaration that the person is independent in a form as may be specified by the competent authority	Page iii of the report
(c) An indication of the scope of, and the purpose for which, the report was prepared	Section 1.1
(cA) An indication of the quality and age of base data used for the specialist report	N/A
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 5
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 6
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 7
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 5.4 and 5.5, Section 6
(g) An identification of any areas to be avoided, including buffers	Section 6
(h) A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	**Appendix 1**
(i) A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 3
(j) A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Sections 6, 11
(k) Any mitigation measures for inclusion in the EMPr	Section 8, 11
(l) Any conditions for inclusion in the environmental authorisation	N/A
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation	N/A
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Section 13
(n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and	
(n)(ii) If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 8, 12
(o) A description of any consultation process that was undertaken during the course of carrying out the study	Not applicable. A public consultation process will be handled as part of the EIAs and EMPr process.

Requirements of Appendix 6 – GN R326 EIAs Regulations (2014, amended 2017)	**Relevant section in report**
(p) A summary and copies if any comments that were received during any consultation process	Not applicable. To date no comments have been raised regarding heritage resources that require input from a specialist.
(q) Any other information requested by the competent authority.	Not applicable.
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Section 38(3) of the NHRA

Declaration of Independence

The report has been compiled by Nitai Consulting (Pty) Ltd, an appointed Heritage Specialist for Nemai Consulting for the Proposed 240MW Seelo Beta Solar Photovoltaic & Battery Energy Storage Systems Project near Carletonville, North West Province, South Africa. The views contained in this report are purely objective and no other interests are displayed during the Heritage Impact Assessment Process.

I, Jennifer Kitto, declare that –

General declaration:

- *I act as the independent heritage specialist*
- *I will perform the work in an objective manner, even if this results in views and findings that are not favourable to the project;*
- *I declare that there are no circumstances that may compromise my objectivity in performing such work;*
- *I have expertise in conducting heritage impact assessments, including knowledge of the NHR Act, Regulations and any guidelines that have relevance to the proposed activity;*
- *I will comply with the NHRA, Regulations and all other applicable legislation;*
- *I will take into account, to the extent possible, the matters listed in section 38 of the NHRA;*
- *I have no, and will not engage in, conflicting interests in the undertaking of the activity;*
- *I undertake to disclose to the project proponent and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;*
- *I will ensure that information containing all relevant facts in respect of the project is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;*
- *I will provide the competent authority with access to all information at my disposal regarding the project, whether such information is favourable to the project or not*
- *All the particulars furnished by me in this form are true and correct;*
- *I will perform all other obligations as expected of a heritage specialist in terms of the NHR Act and NEMA the constitutions of my affiliated professional bodies; and*
- *I realise that a false declaration is an offence in terms of regulation 71 of the NEMA Regulations and is punishable in terms of section 24F of the NEMA.*

Disclosure of Vested Interest

I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;

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PRINCIPAL HERITAGE PRACTITIONER – Jennifer Kitto

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SIGNATURE - _____

Executive Summary

The Applicant has proposed the development of the Seelo Beta 240MW Solar PV Project and BESS (the "Project") near the town of Carletonville, North West Province of South Africa. The electricity generated by the Project will be injected into the national grid via the existing Eskom 132 kV distribution system. The Applicant intends to bid for the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows.

The Project is located in the most eastern part of the North West Province (at the boundary between North West and Gauteng) and falls within the Dr Kenneth Kaunda District Municipality and the JB Marks Local Municipality. The site is located approximately 13km to the north-west of the town of Carletonville. The Seelo Beta Solar PV project is located on Portion 1 of Farm 96 (Rooipan) IQ and will cover up to approximately 355ha in extent of the total 1 130.74 ha of the farm portion. The project is intended to generate up to 240MW.

Methodology/ Significance Assessment

Both the archaeological and historical literature review and the site survey fieldwork identified no archaeological, cultural (graves) or historical heritage resources occurring within and adjacent to the project area footprint. However, there is a low possibility that some heritage resources were not identified, specifically, informal graves or burial sites.

Identification of Activities, Aspect and Impacts

The project area that will be impacted by the proposed solar PV project contains some areas that are currently used for cattle and game grazing activities.

The impact significance of the project on graves and cemeteries is low as no definite grave sites were identified.

The impact significance of the proposed project on protected historical structures is low as no historical structures were identified.

The impact significance of the proposed project on archaeological resources is low as no archaeological sites or material were identified.

Mitigation Measures

The proposed Seelo Beta Solar PV project should not impact on heritage resources as no archaeological, cultural (graves) or historical heritage resources were identified within or immediately adjacent to the project footprint area. However, However, there is a low possibility that sub-surface heritage resources, specifically, informal graves or burial sites or archaeological material could be uncovered. The General Heritage Management Guidelines contained in this report should be noted and implemented, if necessary.

Although the project area falls into an area where the underlying geology is mainly of Very High fossil sensitivity (according to the DFFE Screening tool and the SAHRIS Palaeontological sensitivity map), a separate palaeontological assessment and Site Sensitivity Verification (SSV) undertaken by a palaeontologist disputed the very high sensitivity designated and confirmed the site as having a low sensitivity (no fossiliferous outcrops were identified during a site inspection). Any recommendations and mitigation measures provided in the separate palaeontological assessment must be implemented where necessary.

Conclusion

No fatal flaws were identified during this study, therefore, it is the considered opinion of the heritage specialist that the construction of the proposed Seelo Beta Solar PV & BESS project within the footprint can proceed. There are no objections from a heritage perspective provided the recommendations and general heritage management guidelines contained in this report are implemented where necessary.

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List of Abbreviations

APHP	Association of Professional Heritage Practitioners
ASAPA	Association of Southern African Professional Archaeologists
BESS	Battery Energy Storage System
CRM	Cultural Resources Management
DALRRD	Department of Agriculture, Land Reform & Rural Development
DFFE	Department of Forestry, Fisheries and Environment
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EAP	Environmental Assessment Practitioner
EIA	Early Iron Age
EMPr	Environmental Management Programme
ESA	Early Stone Age
GIS	Geographic Information System
ha	Hectare
HIA	Heritage Impact Assessment
IAP	Interested and Affected Party
IAIAsa	International Association for Impact Assessment South Africa
km	Kilometre (1 000m)
LIA	Late Iron Age
kV	Kilo Volt
LSA	Later Stone Age
MSA	Middle Stone Age
MTS	Main Transmission Station
NEMA	National Environmental Management Act (No. 107 of 1998)
NHA	National Health Act, (No. 61 of 2003)
NHRA	National Heritage Resources Act (No 25 of 1999)
NHS	National Heritage Site
PHRA	Provincial Heritage Resources Authority
PV	Photo Voltaic
NW HRA	North West Heritage Resources Authority
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SAHRA	South African Heritage Resources Agency

1 INTRODUCTION

The Applicant has proposed the development of the Seelo Beta 240MW Solar PV with BESS Project ("the Project") near Carletonville, North West Province of South Africa. The electricity generated by the Project will be injected into the national grid via the existing Eskom 132 kV distribution system. The Applicant intends to bid for the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows.

The Project is located in the most eastern part of the North West Province (at the boundary between North West and Gauteng, South Africa) and falls within the Dr Kenneth Kaunda District Municipality and the JB Marks Local Municipality. The site is located approximately 13km to the north-west of the town of Carletonville.

The Seelo Beta Solar PV project will be located on Portion 1 of Farm 96 (Rooipan) IQ and will cover up to approximately 355ha in extent of the total 1130.74ha of the farm portion. The project is intended to generate up to 240MW.

Nitai Consulting has been appointed by Nemai Consulting to conduct the Heritage Impact Assessment (HIA) specialist study.

1.1 Scope & Terms of Reference for the HIA report

1.1.1 Summary of Key Issues & Triggers Identified During Scoping

In terms of the NHRA, the following proposed activities trigger the need for a Heritage Impact Assessment (HIA):

- Potential occurrence of heritage resources, graves and structures older than 60 years within the Project's footprint.
- Proposed development that is more than 5000m^2
- Proposed linear development that is longer than 300m
- Proposed development where an impact assessment is triggered in terms of NEMA.

1.1.2 Approach

- Undertake a Heritage Impact Assessment in accordance with the NHRA.
- Identify and map all heritage resources in the area affected, as defined in Section 2 of the NHRA, including archaeological sites on or near (within 100m of) the proposed developments.
- Assess the significance of such resources in terms of the heritage assessment criteria as set out in the regulations.
- Assess the impacts of the Project on such heritage resources.
- Prepare a heritage sensitivity map (GIS-based), based on the findings of the study.

- Identify heritage resources to be monitored.
- Comply with specific requirements and guidelines of NW PHRA and SAHRA.

1.1.3 Nominated Specialist Details

Organisation:	Nitai Consulting
Name:	Jennifer Kitto
Qualifications:	BA Archaeology and Social Anthropology; BA (Hons) Social Anthropology
No. of years' experience:	24
Affiliation (if applicable):	Association of Southern African Professional Archaeologists (ASAPA) - Technical member No.444 International Association for Impact Assessment (IAIAsa) – Member No. 7151

1.2 Project Description

The Applicant has proposed the development of the Seelo Beta 240MW Solar PV with BESS Project near Carletonville, in the North West Province of South Africa. The electricity generated by the Project will be injected into the national grid via the existing Eskom 132 kV distribution system. The Applicant intends to bid for the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows.

The Seelo Beta Solar PV project will be located on Portion 1 of Farm 96 (Rooipan) IQ and will cover up to approximately 355ha in extent of the total 1130.74ha of the farm portion. The project is intended to generate up to 240MW.

2 LEGISLATION

The identification, evaluation and assessment of any cultural heritage site, artefact or find in the South African context is required and governed by various pieces of legislation, including the National Heritage Resources Act, 25 of 1999 (NHRA) and associated Regulations, National Environmental Management Act, Act 107 of 1998 (NEMA) and associated Regulations and, as well as the National Health Act, Act No. 61 of 2003 (NHA), specific Regulations governing human remains.

2.1 National Heritage Resources Act, No 25 of 1999 (NHRA)

The NHRA is the defines cultural heritage resources (section 3), provides protection to specific types of heritage resources (sections 34, 35, 36) and also requires an impact assessment of such resources for specific development activities (section 38(1)). Section 38(8) further allows for cooperation and integration of the management of such impact assessment between the national or provincial heritage authority (SAHRA or a PHRA) and the national environmental authority (DEFF).

In terms of section 38(1)(a) of the NHRA, the specific types of development activity that may require a Heritage Impact Assessment (HIA) include: the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length. As the proposed solar PV project is larger than 5000m^2, this study falls under s38(8) and requires comment from the relevant heritage resources authority. (South African Heritage Resources Authority-SAHRA and/or the Free State Provincial Heritage Authority).

Sections 34-36 of the NHRA further stipulate the protections afforded to specific types of heritage resources, *i.e*. structures older than 60 years (s34); archaeological, palaeontological, meteorites (s35); graves and burial grounds (s36), as well as the mitigation process to be followed if these resources need to be disturbed. The construction of the solar PV project and powerline may result in impacts to any of these types of heritage resources.

2.2 National Environmental Management Act, Act 107 of 1998 (NEMA)

NEMA states that an integrated Environment Management Plan (EMP) should, (23 -2 (b)) "…identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage". In addition, the NEMA and associated Regulations GNR 982 (Government Gazette 38282, 14 December 2014, amended 2017) state that, "the objective of an environmental impact assessment process is to, … identify the location of the development footprint within the preferred site … focussing on the geographical, physical, biological, social, economic, *cultural and heritage aspects* of the environment" (GNR 982, Appendix 3(2)(c), emphasis added).

The EIA Regulations, 2014 (as amended), published in GNR 982 of 2014 (Government Gazette 38282) promulgated under the (NEMA) contain specific requirements to be addressed in the different types or impact assessment repots (Regulations 19, 21 and 23) as well as requirements for Specialist Reports (Appendix 6).

2.3 The National Health Act, No. 61 of 2003 (NHA), Regulations 2013

In the case of graves and/or burial grounds that could be impacted by a proposed development, and which are identified through an impact assessment, specific Regulations relating to the Management of Human Remains (GNR 363 of 2013 in Government Gazette 36473) address the exhumation and reburial of human remains: Regulations 26, 27 and 28.

3 ASSUMPTIONS AND CONSTRAINTS

This assessment assumes that all the information provided by 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 visibility was slightly restricted by dense vegetation (mainly grasses) 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 tall 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.

4 PROJECT DESCRIPTION

4.1 Project Location

The Project is located in the most eastern part of the North West Province (at the boundary between North West and Gauteng) and falls within the Dr Kenneth Kaunda District Municipality and the JB Marks Local Municipality. The site is located approximately 13km to the north-west of the town of Carletonville, North West Province of South Africa.

The property earmarked for the Project [Portion 1 of Farm 96 (Rooipan) IQ] covers a combined area of approximately 1130.74 ha, of which the buildable area determined by the engineering team is approximately 355 ha.

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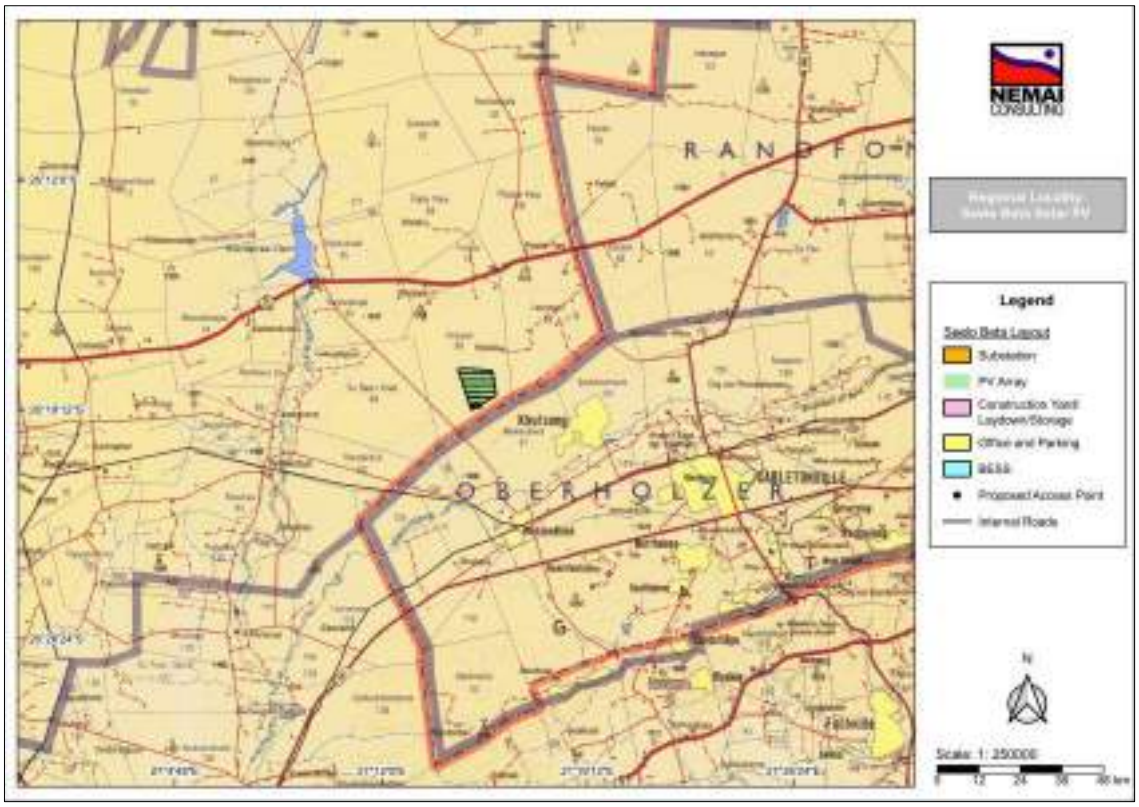

Figure 1: Seelo Beta Solar PV Locality near Carletonville (Nemai 2023)

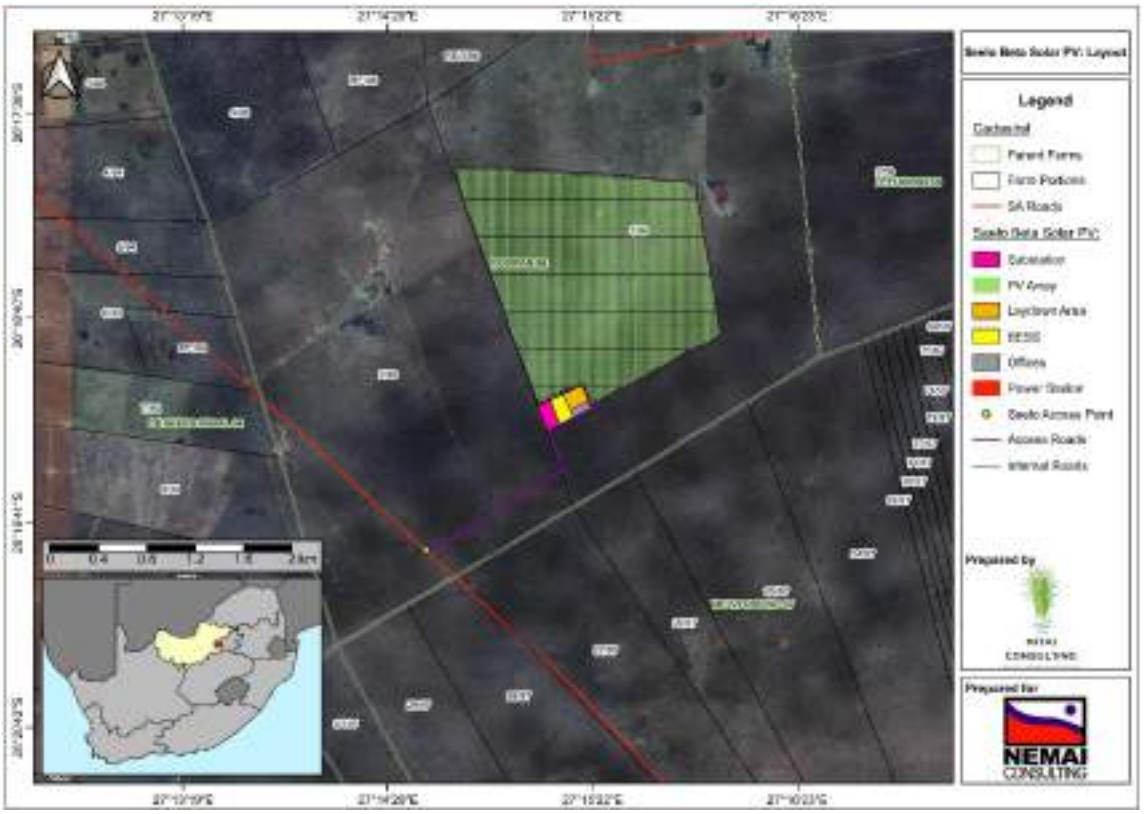

Figure 2: Seelo Beta Solar PV Project Layout (Nitai 2023)

4.2 Project Technical Details

4.2.1 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.

4.2.2 PV Technology Overview

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

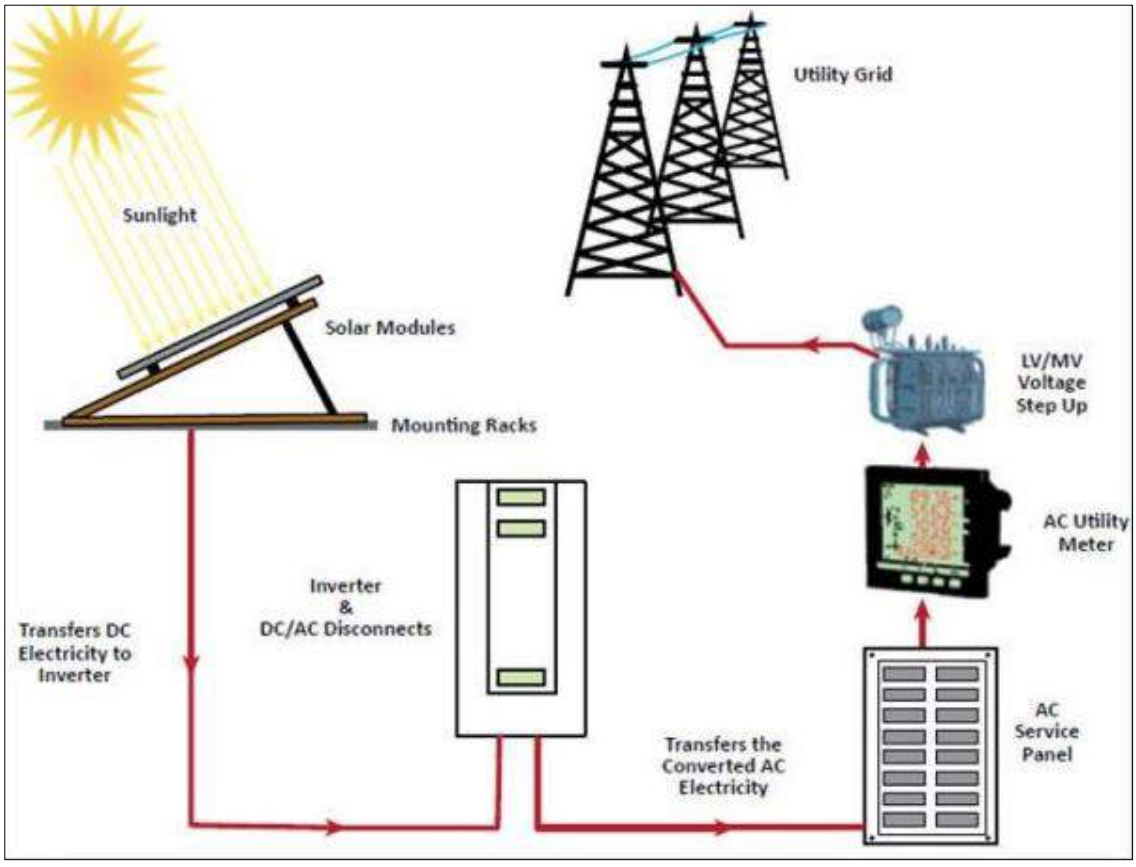

Figure 3: Overview of Solar PV Power Plant (International Finance Corporation, 2015. Utility-Scale Solar Photovoltaic Power Plan.)

The proposed Solar PV Projects have a design life of a minimum of 25 years. The extension of the life of the plant will be considered when assessing the plant's economic viability to remain operational after its end of life.

4.2.3 Overview of Technical Details:

The technical details of the proposed Seelo Beta Solar PV Plant & BESS are captured in Table 1 below.

Table 1: Technical details of the proposed PV Plant

No.	Component	Description / Dimensions
1.	Height of PV panels	± 1-6m
2.	Area of Project (excl. access roads)	Total area of ± 355 ha
3.	Area of PV Array	Total area of ± 345 ha
4.	No. of PV Modules	±525 000
5.	Number of inverters required	Approximately 70
6.	Area occupied by inverter / transformer stations / substations	▪ Area occupied by inverter stations (± 70 inverter stations) = ± 0.5 ha ▪ Area occupied by the facility transformer stations = ± 0.5 ha ▪ Area occupied by facility (step-up/switching) substation = ± 3 ha
7.	Capacity of on-site substation	132/ 33 kV
8.	BESS footprint	BESS = ± 3 ha
9.	Area occupied by both permanent and construction laydown areas	▪ Construction laydown areas = ± 2 ha ▪ Operation & Maintenance infrastructure = ± 1 ha ▪ Total combined = ± 3 ha
10.	Area occupied by buildings	± 3 ha Including Operational Control Centre, Operation and Maintenance Area / Warehouse / Workshop and Office, Ablution Facilities and Substation Building
11.	Length of internal roads	18km – internal
12.	Width of internal roads	▪ The internal roads = 12 m reserve and road width of 6 m. ▪ Access roads = 14 m reserve and road width of 8 m.
13.	Proximity to grid connection	Approximately 12.5 km 132 kV transmission line from PV Site to existing Eskom's Carmel Main Transmission Substation
14.	Height of fencing	Up to 3.5m
15.	Type of fencing	Type will vary (e.g., welded mesh, palisade and electric fencing)

4.2.4 Project Layout

The overall layout of the Solar PV Plant is shown in **Figure 2**, above. The desirability of the earmarked site for the development of the proposed Solar PV Plant is due to the following key characteristics:

- Solar Irradiation: The feasibility of a solar facility, is dependent on the direct solar irradiation levels.

- 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 connection: The electricity generated by the Solar PV Plant will be injected into the existing Eskom 132 kV distribution system. The PV Site is located relatively close to the Eskom grid.
- Extent of site: The overall extent of the site is sufficient for the installation of the PV facility
- Site access: Access to the Project is proposed off District Road 331 approximately 150m from the most southern border of Portion 2 of the Farm Rooipan No. 96 IQ. The exact location of the access point along the D331 is to be determined together with the road authority, ensuring that adequate sight distance and access spacing are adhered to. The internal access road will utilise an existing servitude right of way along the southern boundary of Portion 2 of Farm 96 IQ for approximately 1km before following an existing internal road heading in a northerly direction for approximately 700m on Portion 1 of Farm No. 96 IQ until it reaches the southern boundary of the Project.

4.2.5 Components of the Proposed Solar PV Plant

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

- PV panel arrays, which are the subsystems which convert incoming sunlight into electrical energy;
- Mounting structures to support the PV panels;
- On-site inverters to convert DC to facilitate AC connection between the solar energy facility and electricity grid;
- BESS;
- IPP substation;
- Eskom switching substation (the dedicated grid connection for the proposed Project which includes a 132/33 kV switching substation which does not form part of the current application for EA);
- Cabling between the Project's components, to be laid underground (where practical);
- Administration Buildings (Offices);
- Workshop areas for maintenance and storage;
- Temporary and permanent laydown areas;
- Internal access roads and perimeter fencing of the footprint;
- High Voltage (HV) Transformers; and
- Security Infrastructure.

4.3 Battery Energy Storage System (BESS)

The Battery Energy Storage System (BESS) allows for the storage of surplus energy generated by the solar PV facility for later use. The BESS enables a balance between supply and demand of electricity during the day and uses the stored energy during peak demand periods (i.e., morning and evenings). Energy generated from the PV panel array is DC and is converted to an AC by the inverters and then transferred to the onsite substation where it is determined if the energy should be stored or evacuated. When the energy is required,

it is evacuated into the grid network. Should the energy not be required, it is transferred to the BESS and stored for later use. A BESS typically either consists of stacked containers or a multistorey building with a maximum height of 8 m and will have a footprint of up to 3 ha.

4.4 Grid Connection

It is proposed that a 33/132 kV substation is constructed, hereafter referred to as the IPP substation, which will include inverter-stations, transformers, switchgear and internal electrical reticulation. It is estimated that the maximum size of the facility substation will not exceed 1.5 hectare (ha). The electricity generated will be transmitted to the Eskom switching substation located immediately adjacent to the IPP substation. Thereafter, the generated electricity is to be transmitted with a 132 kV Overhead Power Line to connect to the existing Carmel Main Transmission Substation. The location and installation of the 132 kV line is subject to a separate application process for EA.

5 STATUS QUO ANALYSIS

5.1 General Existing Condition of Receiving Environment

The Project is located approximately 15km north-west of the town of Carletonville's business district (CBD) and falls within Ward 28 of the JB Marks Local Municipality (JBMLM), in the North West Province of South Africa. The Project's PV Site is vacant and was historically used for agricultural purposes. Agriculture is the dominant land use in the Project area. The following land uses are encountered around the Project's PV Site:

- Farming activities on the property and surrounding properties;
- The Abe Bailey Provincial Nature Reserve is located approx. 606.47m south of the site (in Gauteng); and
- The National Road (N14) is located approximately 10km north of the site which provides regional access to the area.

The project area terrain is situated on the central western section of Portion 1 of Farm 96 (Rooipan) IQ. The general area is covered mostly with grassland which varies from short and sparse to tall and dense. The terrain is mostly flat, however, there are signs of previous and recent disturbance, e.g. many large piles of rock were noted on the property. The current use of the property is cattle and game grazing. The area is dominated by dolomite outcrops as well as quartzite/sandstone outcrops. A large number of sinkholes and subsidences occur in the area.

Figure 4: View of the footprint area, showing the short dense grass and bushes in one section

Figure 5: Another View of very short grass covering a section of the project footprint

Figure 6: View of one of the sandstone outcrops occurring within the project footprint

Figure 7: View of one of the dolomite outcrops occurring within the project footprint

Figure 8: View of one of the many piles of rocks scattered all over the project footprint

Figure 9: View of another area with piles of rock along a fence line

5.2 Cultural-Heritage Receiving Environment

5.2.1 DFFE Environmental Screening Tool

The DFFE Environmental Screening Tool was accessed for information on the cultural-heritage sensitivity of the general region. This tool indicated that the Archaeological and Cultural Heritage Sensitivity of the general region is Low (**Figure 10**). However, the Palaeontological sensitivity of the region is indicated as being of High sensitivity (**Figure 11**).

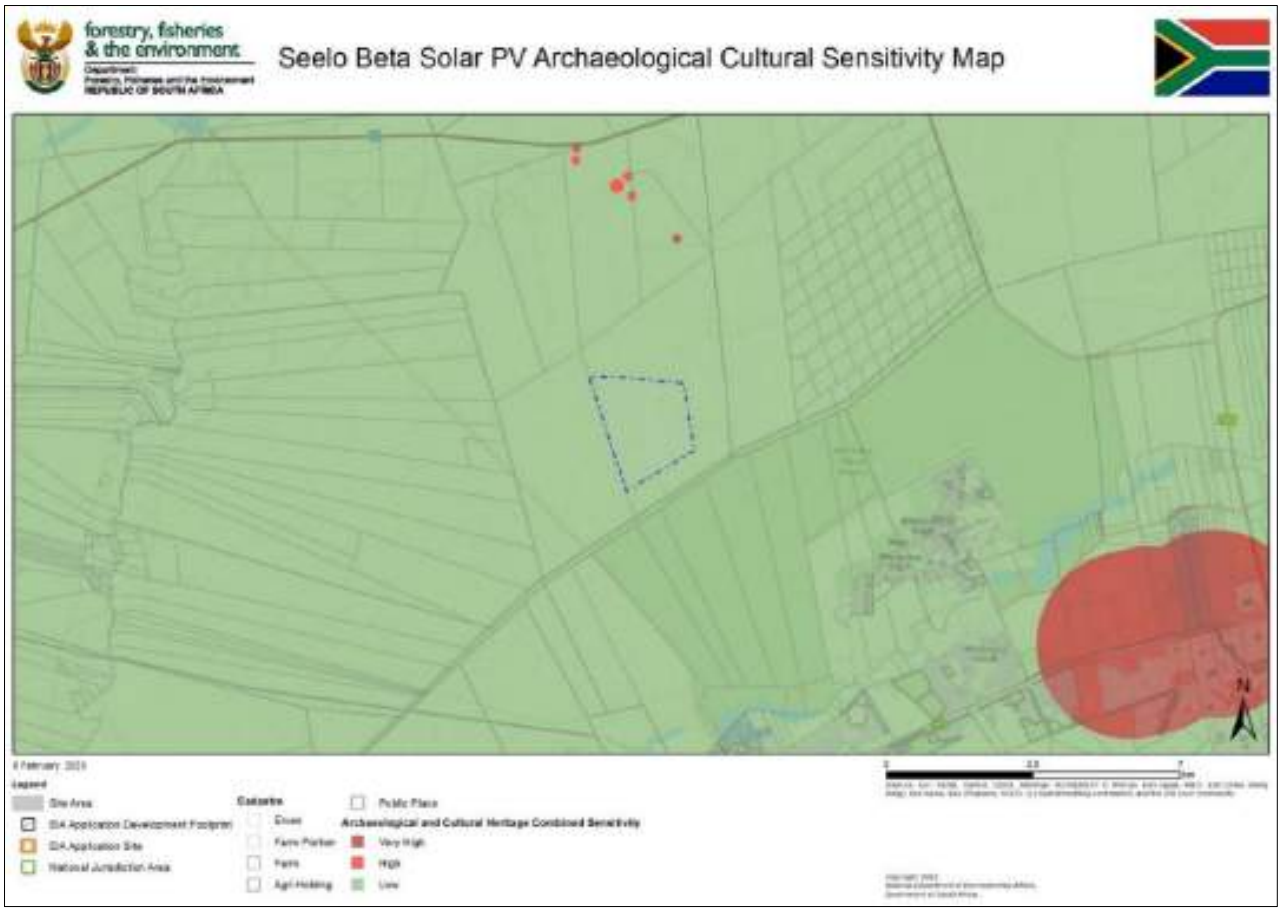

Figure 10: Archaeological Cultural Sensitivity map indicating that the project footprint is located within a region of mainly low archaeological and cultural heritage sensitivity (DFFE Screening Tool).

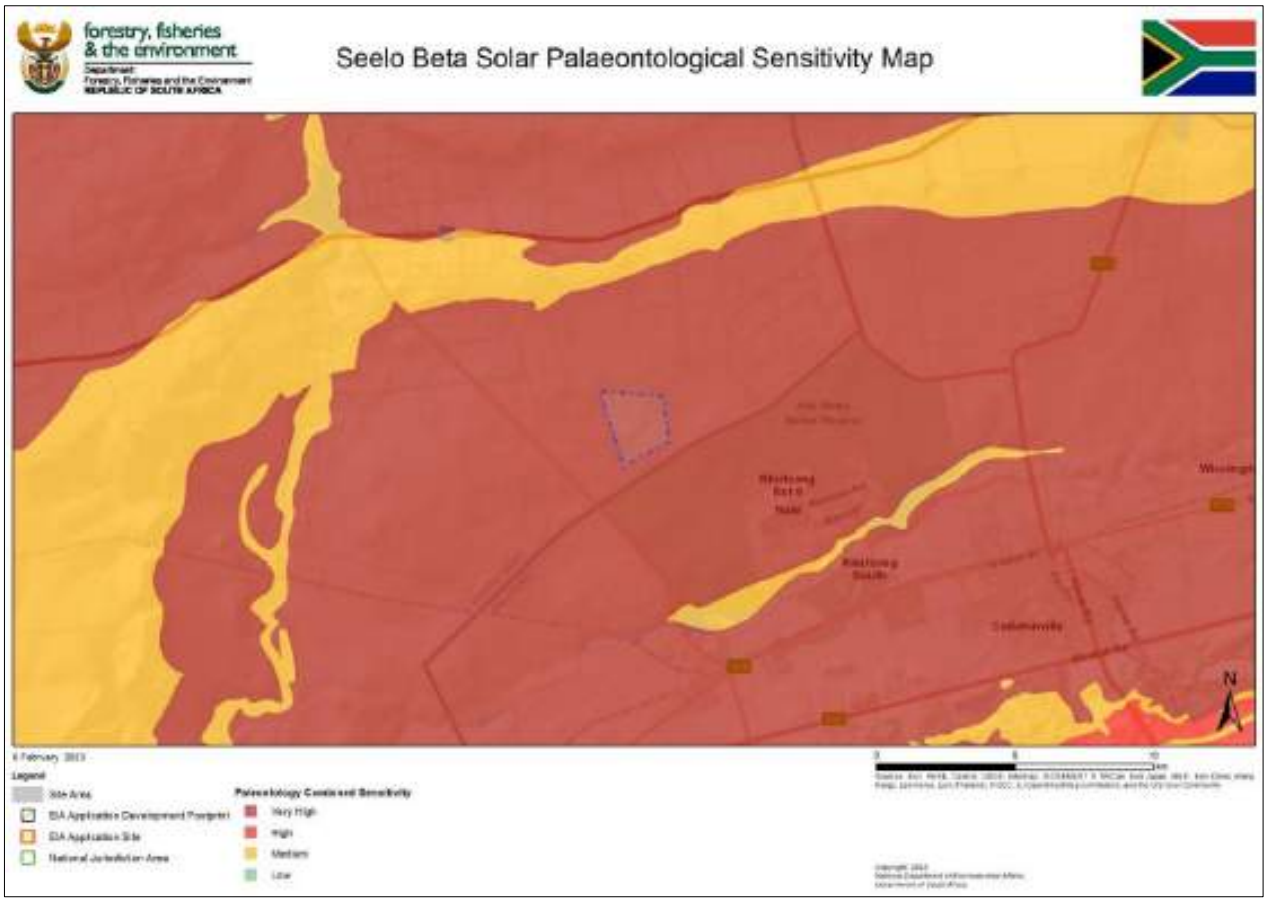

Figure 11: Palaeontological Sensitivity map indicating that the project footprint is located within a region of High palaeontological sensitivity (DFFE Screening Tool).

5.2.2 Palaeontological sensitivity

According to the Palaeontological Map of the South African Heritage Resources Information System (SAHRIS), the Palaeontological Sensitivity of the site is Very High (**Figure 12** below) which triggers the requirement for a field-based palaeontological assessment and protocol for finds. This corresponds with the Environmental Screening Tool relative palaeontology theme which designates the site as having a very high sensitivity (**Figure 11**, above).

Therefore, a separate palaeontological assessment was undertaken by a professional palaeontologist. A Site Sensitivity Verification (SSV) was also undertaken by the palaeontologist, which disputed the very high sensitivity designated and confirmed the site as having a low sensitivity as no fossiliferous outcrops were identified during the site inspection. Any recommendations and mitigation measures provided by the palaeontologist must be implemented and adhered to where necessary.

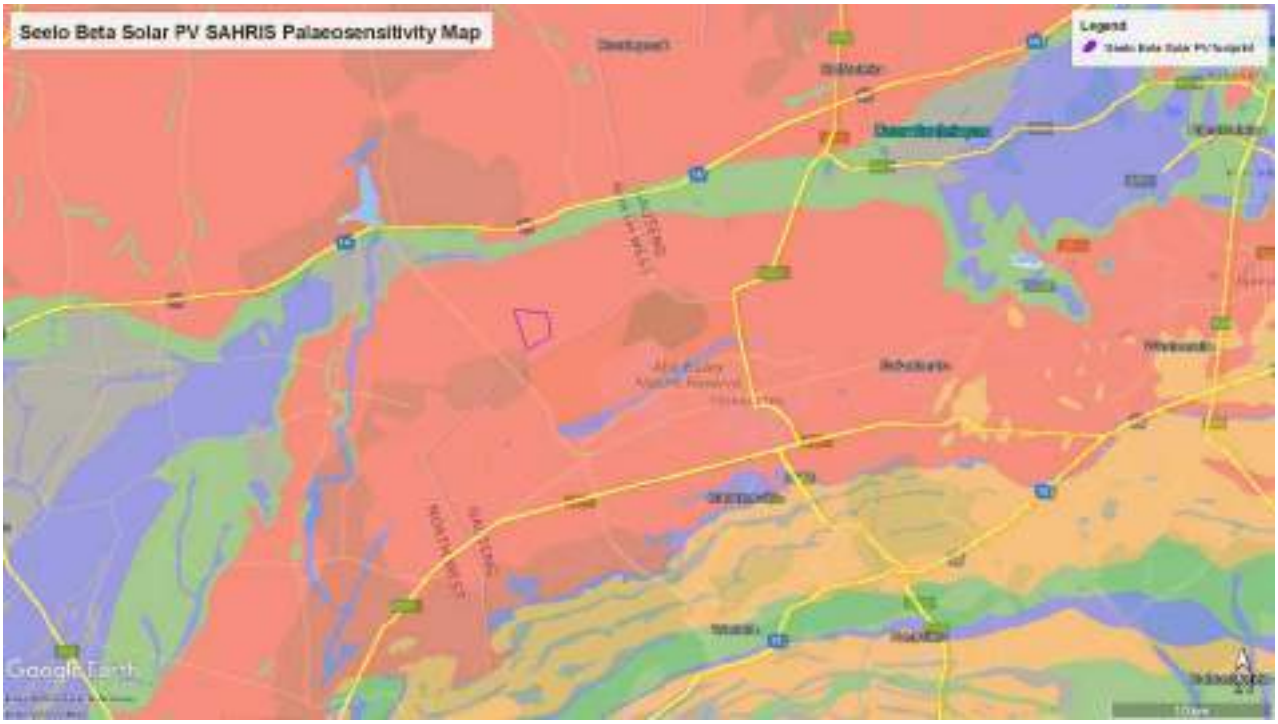

Figure 12: SAHRIS Palaeontological sensitivity map overlain on the Seelo Beta Solar PV project footprint (purple polygon). The underlying geology is shown as of Very High fossil sensitivity (red).

Table 2: SAHRIS Fossil Map Palaeontological Sensitivity Ratings and Required Actions

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

5.2.3 Historical Background of Surrounding Region (archaeological and historical literature survey)

The archaeological history of the area can broadly be divided into a Stone Age, Iron Age and Historic or Colonial Period. An archaeological and historical overview of the general region is presented below.

The Stone Age

The Earlier Stone Age (ESA) is the first and oldest phase identified in South Africa's archaeological history and comprises two technological phases. The earliest of these is known as Oldowan and is associated with crude flakes and hammer stones. It dates to approximately 2 million years ago. The second technological phase is the Acheulian which comprises more refined stone artefacts such as the cleaver and bifacial hand axe. The Acheulian dates to approximately 1.5 million years ago. No significant ESA sites are known from the area. However, a few isolated finds of ESA material were recorded roughly 50km to the southeast of the study area around the Waterpan area (Fourie and Kitto 2021). Other known sites dating to the Acheulian period sites have been recorded mainly quite a distance away *e.g*: the Amcor factory site in Vereeniging, Kantienkoppie in Vanderbijlpark and Acacia Rd, Northcliff in Johannesburg (Bergh 1999). Some rock engravings were recorded close to Carletonville (Bergh 1999).

The Middle Stone Age (MSA) is associated with flakes, points and blades manufactured by means of the prepared core technique. This phase is furthermore associated with modern humans and complex cognition (Wadley, 2013). No significant MSA sites are known in the region of the study area.

The Later Stone Age (LSA) is the third archaeological phase identified and this is characterised by very small stone tools known as microliths, as well many rock art sites (paintings and engravings). LSA stone artefacts are more specialised, in that specific tools were created for specific purposes (Mitchell 2002) and they commonly include tools such as scrapers and segments, and sometimes bone points. The LSA is further defined by evidence of ritual practices and complex societies (Deacon & Deacon 1999). This period is associated with hunter-gatherers (San) as well as early pastoralists (Khoekhoe) and continued until the arrival of Iron Age and European communities (and often for quite a while after that).

The Iron Age

The Iron Age in South Africa (AD 1600 – AD 1840) encompasses pre-colonial farming communities and is associated with both agricultural and pastoralist farming activities, metal working, cultural customs such as lobola and stone-walled settlements known as the 'Central Cattle Pattern' (Huffman, 2007).

The entire Carletonville/Westonaria region, including the Gatsrand range that spans east to west from Orange farm in the east to the Potchefstroom in the west, is scattered with stone walled complexes associated with the early Iron Age farming communities. Studies by Fourie (1997) and Vorster (1969, 1983) have shown that the Gatsrand range, between Waterpan and Jachtfontein in the east and Glenharvie in the west, was settled by the Bakwena-Bamare-a-Phogole people from the 1700s up to the Difaqane period (Fourie and Kitto 2021).

Historical/Colonial Period

From approximately the 1820s., During the so-called Difaqane, the Khumalo Ndebele (also known as the Matabele) of Mzilikazi established themselves along the banks of the Vaal River (Bergh, 1999). Although the study area is located some distance north of the Vaal River, it can be expected that the influence area of the Matabele would have included the study area as well. In c. 1827 the Matabele moved further north and

settled along the Magaliesberg Mountain and in 1832 they settled along the Marico River (Fourie and Kitto. 2021).

In 1836 the first Voortrekker parties started crossing the Vaal River and between 1839 – 1840, the first farms were established by the Voortrekkers in the general region of the study area. The district of Potchefstroom was also established in 1839 (Bergh, 1999), which included the project area.

In 1898 the first gold-mining activity occurred in the region, when the Pullinger brothers started drilling boreholes and intersected the Ventersdorp Contact Reef (VCR) and Middelvlei Reef (MR) at depth. In 1909 a shaft was sunk, but it became flooded with water from the dolomites, and was abandoned (https://www.sibanyegold.co.za/operations/kloof/history).

The South African War (1899 – 1902) was fought between the Boer Republics of the Transvaal and Free State and Great Britain, but is referred to as the South African War as the victims and participants of the war were not restricted to British or Boer citizens only. Although there is evidence that troops of both the British and the Boer forces were present throughout the general region, including the Carletonville/Westonaria area (van der Bergh, 2009), no evidence for battles or skirmishes from within the study area was found during the desktop study. However, evidence was found for a skirmish that took place 23km to the south east of the study area (Fourie and Kitto. 2021).

This incident was an ambush planned for the morning of 5 September 1900 by Commandant Danie Theron and his scouts together with General Liebenberg and members of the Potchefstroom Commando. A large British convoy comprising 1,000 men was expected to be moving from Johannesburg to Potchefstroom. However, the planned attack was jeopardised by the unexplained absence of Genl. Liebenberg. Theron and one of his men went to look for Liebenberg and when Theron came to the ridge south of the wagon road where Liebenberg and his men should have been stationed, he was apparently surprised by a British scouting force instead. Nevertheless, he killed three of the British soldiers on the hill before firing on the British column apparently as a bluff. The British forces started shelling the summit of the hill with howitzers and Theron was killed. The British forces subsequently buried Theron on the border between the farms Buffelsdoorn and Elandsfontein with the three British soldiers he had killed. However, a few months later, (in September 1900), Theron's body was exhumed by his men and buried in the Pienaar family cemetery on the farm Elandsfontein. After the war (on 10 March 1903) his men exhumed his body again and buried him next to the grave of his fiancé at Eikenhof, south of Johannesburg (Fourie and Kitto 2021). Subsequently, in 1950, The Danie Theron Monument was unveiled on the summit of the ridge where he died. The monument was built with funds collected by the Voortrekker organisation (http://www.afrikanergeskiedenis.co.za/presidente/monumente-en-erfenisterreine/danie-theronmonument-gatsrand/).

Between 1930-1932 the discovery of the West Wits Line goldfields contributed to the revival of the South African gold industry. According to Davenport (2013), Guy Carleton Jones, the consulting engineer for Goldfields, and Dr Leopold Reinecke, Goldfield's consulting geologist, hired Dr Rudolph Krahmann to conduct a magnetic survey of the farms that lay to the south-west of Randfontein to trace the magnetic shale beds believed to be associated with gold-bearing conglomerates of the Witwatersrand system. The

survey did plot magnetic shales at depth in the area south-west of Randfontein. Consequently, Goldfields secured options over a large amount of land that covered 30 000 mining claims and stretched 50km from the west of Randfontein to the Mooi River. The effects of the Depression on the South African economy meant that the only other mining house willing to invest in the potential new goldfield was Anglo American. A subsidiary company, West Witwatersrand Areas Limited, was established on 12 November 1932, by Goldfields with the assistance of Anglo American. The institution of an extensive drilling programme by West Wits intersected payable reef and revealed the existence of two new gold-bearing conglomerates: the Ventersdorp Contact Reef and the Carbon Leader Reef (Davenport, 2013).

In November 1946, the company West Witwatersrand Areas Limited applied to the administrator of Transvaal to proclaim Twyfelvlakte for the purpose of a town to accommodate the increased population resulting from the establishment of the mines Blyvooruitzicht and West Driefontein during the 1930s and 1940s. The application was approved on 20 January 1948 and the town of Carletonville was established and named after Guy Carleton Jones (Van Eeden, 1998).

Khutsong, a Tswana word meaning 'place of peace or rest,' was set up in 1958 as a satellite township to house mining labourers outside the 'whites-only' town of Carletonville (Kirshner and Phokela 2010; Raper 2014).

In September 1973 eleven miners were shot by police when demonstrating for increased wages at the Western Deep Levels Gold Mine at Carletonville (Reddy 1992).

5.2.4 Cartographic findings

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 study area falls between two map sheets (2627AC and 2627AD). The first edition of both sheets dates to the 1950s, so it was not considered necessary to examine the later edition map sheets. Any heritage resources that are 60 years or older would be depicted on the 1950 edition sheets. The topographical maps were obtained from the Department of Agriculture Land Reform and Rural Development (DALRRD) in Cape Town.

The following two 1:50 000 map sheets were assessed for the Seelo Beta Solar PV footprint: 2627AC Rysmierbult Edition 1 1953 and 2627AD Carletonville Edition 1 1958. The maps were surveyed in 1953 and 1958 respectively and drawn in 1955 and 1959 respectively by the Trigonometrical Survey Office of the Union of South Africa, both from aerial photographs taken in 1948. As can be seen in **Figure 13** the two map sheets depict one homestead (hut) and a ruin within the Seelo Beta Solar PV footprint. Another homestead is depicted just outside the northern boundary of the footprint area.

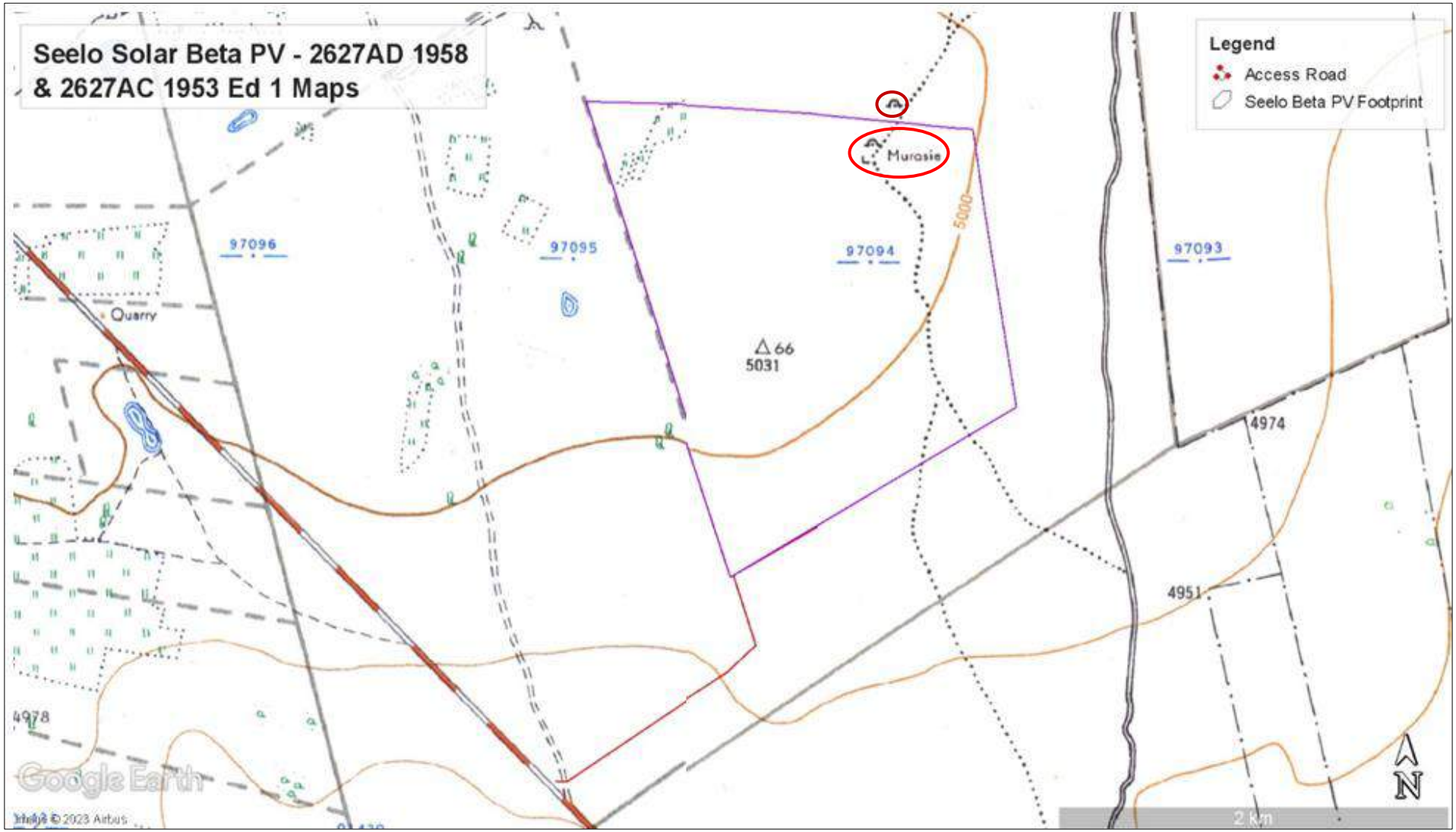

Figure 13: Enlarged view of topographic map sheets 2627AC Ed 1 1953 and 2627AD Ed 1 1958, depicting one homestead (hut) and a ruin within the Seelo Beta Solar PV footprint (purple polygon). Another homestead is depicted just outside the northern boundary of the footprint area (red circles)

5.3 Previous HIA reports in the area

A search on the South African Heritage Resources Information System (SAHRIS) has identified several Heritage Impact Assessments conducted in and around the study area. The project area of one of these reports (vd Walt 2015) covered a portion of the Farm Rooipan 96 IQ, which is located immediately northwest of portion 1 (which contains the current project area). Only two sites of cultural significance were identified in that report: an informal cemetery and two dolomite outcrops (possible fossils).

Dreyer, C. 2006. *A First Phase Archaeological and Cultural heritage Assessment of the Proposed developments at the Farms Bovenste Oog 68 IQ (Mooi River), Digby Plain 63 IQ, Somerville 62 IQ, Preton Pans 59 IQ and Drylands 64 IQ, Ventersdorp, Gauteng*. Several heritage sites were identified on the farm Bovenste Oog, including: historical structure remains (farm houses and kraal), Iron Age stone-walled structures, historical prospecting holes and mine shafts and a graveyard as well as three separate graves.

Van Schalkwyk, J. 2014. *Cultural Heritage Assessment for the Libanon 132kv Loop-In Line, Carletonville Region, Westonaria Magisterial District, Gauteng Province*. For GIBB Engineering and Architecture. No sites, features or objects of cultural heritage significance were identified in the development area

Van der Walt, J. 2015. *Heritage Opinion For the Proposed Prospecting Activities on the farm Rooipan 96 IQ, Ventersdorp, North West Province*. Within the study area 4 areas of interest were recorded. These consisted of a farm house complex and farm labourer complex, an informal cemetery and two areas where dolomite is exposed.

Fourie, W, J Kitto and G Groenewald. 2016. *Environmental Impact Assessment Process: 200 Megawatt Photovoltaic Energy Facility Proposed for Sibanye Gold, West Witwatersrand, Gauteng - Heritage Impact Assessment.* A total of nine heritage resources were identified. Three of the sites were recent historical structures. Six of the sites contained historical structures as well as a possible grave site.

Fourie, W; J Kitto and I Smeyatsky. 2019. *HIA for Westrand Strengthening Project, Spanning Randfontein, Krugersdorp & Westonaria, Westrand District Municipality, Gauteng Province*. The project was a proposed new 400-kV Transmission line from the Pluto Substation to the Westgate Substation and for the loop inns/outs connecting the Hera-Westgate 400-kV line. West Rand District Municipality, Gauteng. The study identified 23 heritage sites which included 12 burial grounds, (four were municipal cemeteries) and 11 historical structures or dwellings.

Muroyi, R. 2020. *Phase 1 HIA for the proposed Khutsong South Ext. 8 Development, Merafong City Local Municipality, West Rand District Municipality, Gauteng*. This background study revealed that there are no archaeological sites within the immediate vicinity of the proposed development site.

Fourie W and J Kitto. 2021. *Heritage Impact Assessment as part of the Environmental Impact Assessment Report for the New 200MW Photovoltaic Energy Facility Proposed For Sibanye Gold, West Rand District, Gauteng*. This study was specifically for the transmission lines associated with the PV facility that was

covered by the 2016 HIA study. The total number of sites identified as potentially affected by the transmission lines was 28. These included: two grave sites, several historical farmsteads and associated agricultural enclosures or walls, two recent farmsteads, three historical mine-related structures, one religious site and one isolated prehistoric stone tool.

5.4 Findings of the Historical Desktop Study

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 (1953) of the 1:50 000 topographical maps produced by overlying the maps with satellite Imagery (Google Earth) has shown that only one homestead and a ruin are depicted within the project footprint.

The Site Survey fieldwork identified no visible heritage resources occurring within or adjacent to the project area footprint.

6 SITE SURVEY/FIELDWORK RESULTS

The survey of the Seelo Solar Beta project footprint took place over one day (19 January 2023) by the author (heritage specialist) in association with other specialists and accompanied by the landowner. A vehicle was used to access the project footprint area and the survey was conducted by both vehicle and on foot (at selected areas). The survey covered as much of the project footprint area as was feasibly accessible, given the long grass covering several areas.

The author used a Global Positioning System (GPS) application to navigate access roads in the study area and for recording the tracklog of the survey and waypoints of the identified heritage resources. A Sony digital camera was used for photographic recording of identified heritage resources and general images of the project study area.

The survey aimed to find and identify archaeological and other heritage resources such as burial grounds and graves (BGG), archaeological material or sites, historic built environment and landscape features of cultural heritage significance. The inspection of the area that was surveyed identified no heritage resources within the project footprint (Error! Reference source not found. and **Figure 14**). The project footprint area has been disturbed extensively in the past as evidenced by the many large heaps of stone scattered all over the area, which are the result of stone clearing for past agricultural or possible past prospecting activities (see **Figure 8** and **Figure 9**).

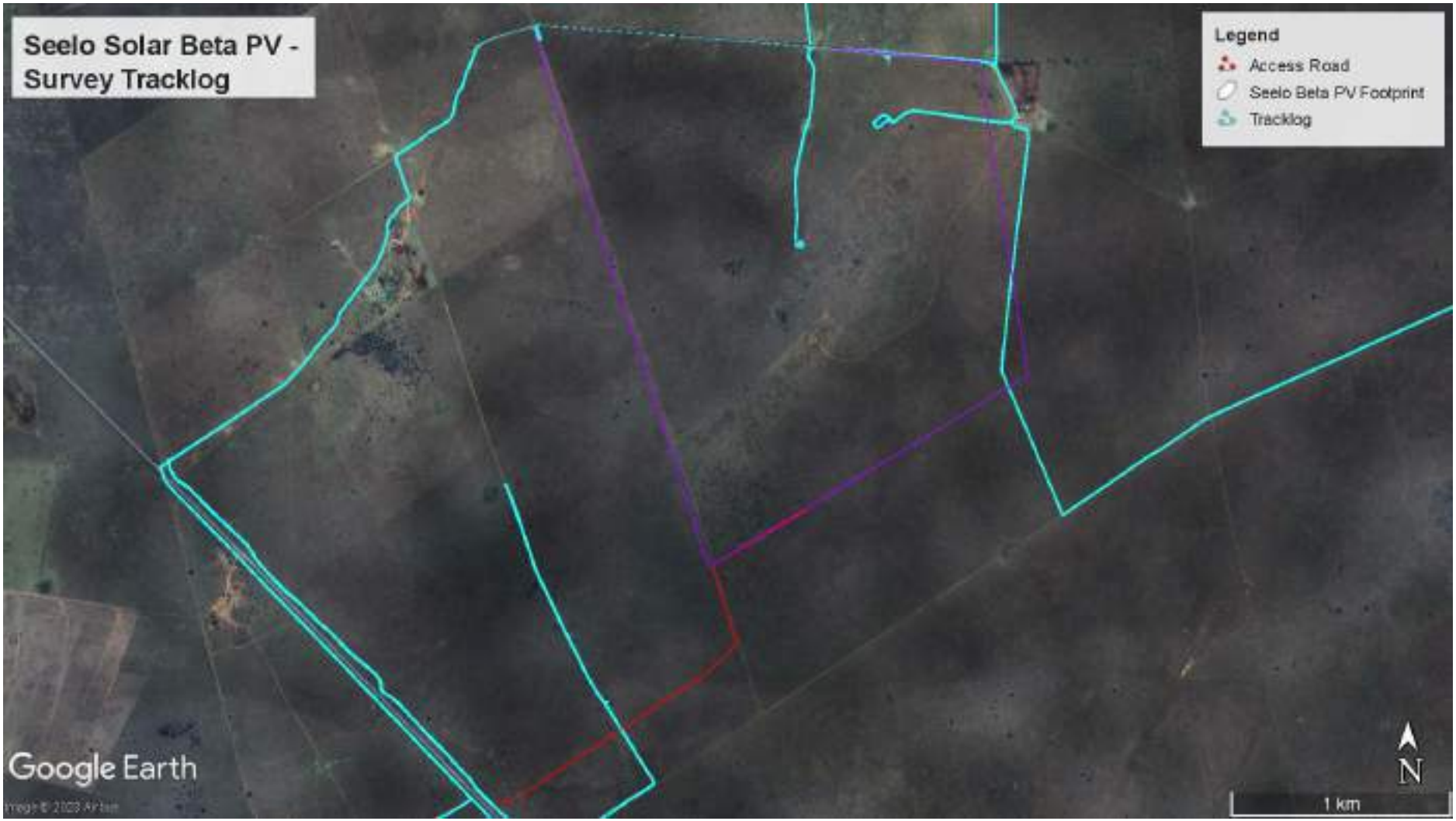

Figure 14: Site Survey Tracklog overlaid on the project layout. No heritage resources were identified within the project footprint

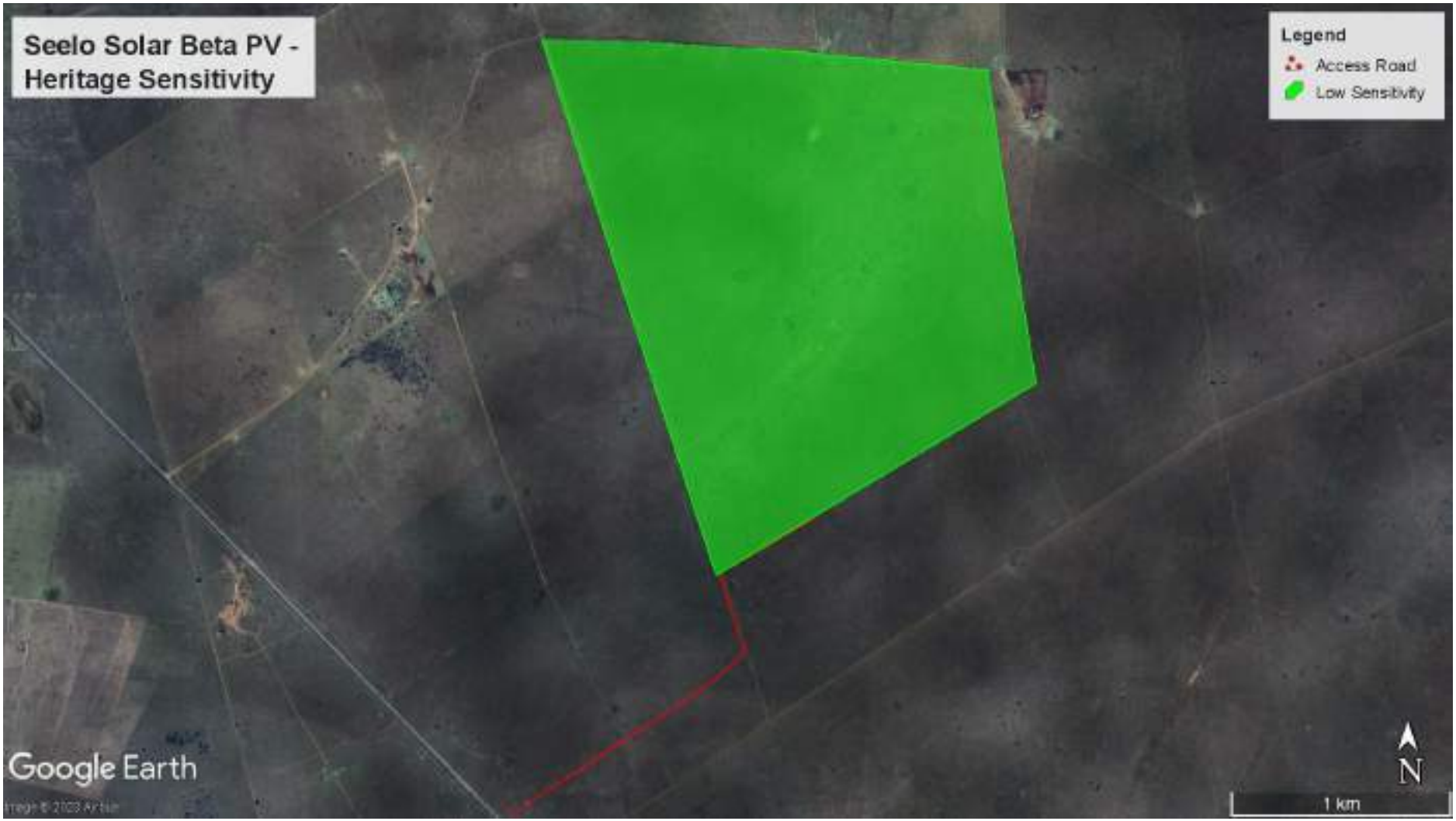

Figure 15: Site Sensitivity of the project layout is considered low as no heritage resources were identified within or adjacent to the project footprint

7 SIGNIFICANCE ASSESSMENT

Methodology for Assessing Heritage Site Significance

The applicable maps, tables and figures are included, as stipulated in NHRA and NEMA. The HIA process consists of three steps:

Literature Review

The desktop literature review provided information on the Heritage Background of the general region and project area. This included investigating published sources as well as past HIA studies conducted for the project area and surrounding region. An examination of historical 1:50 000 topographical maps and/or archival maps (if available) was also undertaken. The relevant early editions of the 2727CD topographical map sheets were obtained from the Department of Rural Development & Land Reform, Cape Town.

A number of internet sites were also accessed for information including, https://www.sibanyegold.co.za; http://www.afrikanergeskiedenis.co.za and https://www.atlanticphilanthropies.org .

Literature resources accessed are listed in Table 3.

Table 3: Literature sources accessed

Source	Information
Background Information Document - Nemai	Project location and description details
Published and unpublished sources and Past HIAs	Historical and archaeological background on Carletonville and surrounding region
Directorate: National Geo-spatial Information of the Department of Rural Development & Land Reform, Cape Town	Historical topographic maps, 1:50 000 2627AC Rysmierbult Edition 1 1953 and 2627AD Carletonville Edition 1 1958

Field Survey

A physical Site Inspection or Field Survey was conducted, predominantly by vehicle with selected areas traversed on foot, through the project area by an experienced heritage specialist as part of a specialist team. This focussed on identifying and documenting heritage resources situated within and immediately adjacent to the proposed project area footprint, such as graves, historical structures or remains and archaeological sites or material.

HIA Report

The final step involved the recording and documentation of the identified heritage resources, the assessment of such resources in terms of heritage significance and impact assessment criteria, producing a heritage sensitivity map and compiling the heritage impact assessment report with constructive recommendations for mitigation, if required.

Impacts on these sites by the development will be evaluated as follows:

Site Significance

Site significance classification standards use is based on the heritage classification of s3 in the NHRA and developed for implementation keeping in mind the grading system approved by SAHRA for archaeological impact assessments. The update classification and rating system as developed by Heritage Western Cape (2021) is implemented in this report.

Site significance classification standards prescribed by the Heritage Western Cape Guideline (2016), were used for the purpose of this report (see **Table 4** and **Table 5**).

Table 4: Rating system for archaeological resources

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Langebaanweg (West Coast Fossil Park), Cradle of Humankind	May be declared as a National Heritage Site managed by SAHRA. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Highest Significance
II	Heritage resources with special qualities which make them significant, but do not fulfil the criteria for Grade I status. Current examples: Blombos, Paternoster Midden.	May be declared as a Provincial Heritage Site managed by Provincial Heritage Authority. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Exceptionally High Significance
III	Heritage resources that contribute to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. Current examples: Varschedrift; Peers Cave; Brobartia Road Midden at Bettys Bay	Resource must be retained. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	High Significance

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree.	Resource must be retained where possible where not possible it must be fully investigated and/or mitigated.	Medium Significance
IIIC	Such a resource is of contributing significance.	Resource must be satisfactorily studied before impact. If the recording already done (such as in an HIA or permit application) is not sufficient, further recording or even mitigation may be required.	Low Significance
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant or the consultant and approved by the authority.	No research potential or other cultural significance

Table 5: Rating system for built environment resources

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Robben Island	May be declared as a National Heritage Site managed by SAHRA.	Highest Significance
II	Heritage resources with special qualities which make them significant in the context of a province or region, but do not fulfil the criteria for Grade I status. Current examples: St George's Cathedral, Community House	May be declared as a Provincial Heritage Site managed by Provincial Heritage Authority.	Exceptionally High Significance
II	Such a resource contributes to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does		

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
	not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. These are heritage resources which are significant in the context of an area.	This grading is applied to buildings and sites that have sufficient intrinsic significance to be regarded as local heritage resources; and are significant enough to warrant that any alteration, both internal and external, is regulated. Such buildings and sites may be representative, being excellent examples of their kind, or may be rare. In either case, they should receive maximum protection at local level.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree. These are heritage resources which are significant in the context of a townscape, neighbourhood, settlement or community.	Like Grade IIIA buildings and sites, such buildings and sites may be representative, being excellent examples of their kind, or may be rare, but less so than Grade IIIA examples. They would receive less stringent protection than Grade IIIA buildings and sites at local level.	Medium Significance
IIIC	Such a resource is of contributing significance to the environs These are heritage resources which are significant in the context of a streetscape or direct neighbourhood.	This grading is applied to buildings and/or sites whose significance is contextual, i.e., in large part due to its contribution to the character or significance of the environs. These buildings and sites should, as a consequence, only be regulated if the significance of the environs is sufficient to warrant protective measures, regardless of whether the site falls within a Conservation or Heritage Area. Internal alterations should not necessarily be regulated.	Low Significance

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant and approved by the authority. Section 34 can even be lifted by the PHRA for structures in this category if they are older than 60 years.	Not Conservation worthy – no research potential or other cultural significance

Table 6: Site significance classification standards as prescribed by SAHRA.

FIELD RATING	GRADE	SIGNIFICANCE	RECOMMENDED MITIGATION
National Significance (NS)	Grade 1	Very High - of National Significance	Conservation; National Site nomination
Provincial Significance (PS)	Grade 2	Very High – of Provincial Significance	Conservation; Provincial Site nomination
Local Significance (LS)	Grade 3A	High Significance	Conservation; Mitigation not advised
Local Significance (LS)	Grade 3B	High Significance	Mitigation (Part of site should be retained)
Generally Protected A (GP.A)		High / Medium Significance	Mitigation before destruction
Generally Protected B (GP.B)		Medium Significance	Recording before destruction
Generally Protected C (GP.C)		Low Significance	Destruction

8 IDENTIFICATION OF IMPACTS

8.1 Impacts and Mitigation Framework

All impacts are analysed in the section to follow with regard to their nature, extent, magnitude, duration, probability and significance.

ISO 14001-2004 defines impacts as "any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects".

When considering an assessment of the impacts and their mitigation, the following definitions as per Table 7 apply.

Table 7: Impact and Mitigation Quantification Framework

Nature	The project could have a positive, negative or neutral impact on the environment.
Extent	**Local** – extend to the site and its immediate surroundings. **Regional** – impact on the region but within the province. **National** – impact on an interprovincial scale. **International** – impact outside of South Africa.
Magnitude	Degree to which impact may cause irreplaceable loss of resources: **Low** – natural and socio-economic functions and processes are not affected or minimally affected. **Medium** – affected environment is notably altered; natural and socio-economic functions and processes continue albeit in a modified way. **High** – natural or socio-economic functions or processes could be substantially affected or altered to the extent that they could temporarily or permanently cease.
Duration	**Short term** – 0-5 years. **Medium term** – 5-11 years. **Long term** – impact ceases after the operational life cycle of the activity either because of natural processes or by human intervention. **Permanent** – mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.
Probability	**Almost certain** – the event is expected to occur in most circumstances. **Likely** – the event will probably occur in most circumstances. **Moderate** – the event should occur at some time. **Unlikely** – the event could occur at some time. **Rare/Remote** – the event may occur only in exceptional circumstances.
Significance	Provides an overall impression of an impact's importance, and the degree to which it can be mitigated. The range for significance ratings is as follows- **0** – Impact will not affect the environment. No mitigation necessary. **1** – No impact after mitigation. **2** – Residual impact after mitigation.

	3 – Impact cannot be mitigated.
Mitigation	Information on the impacts together with literature from socio-economic science journals, case studies and field work will be used to provide mitigation recommendations to ensure that any negative impacts are decreased and positive benefits are enhanced.
Monitoring	Monitoring usually involves developing and implementing a monitoring programme to identify deviations from the proposed action and to manage any negative impacts. The recommended mitigation measures will also include monitoring measures.

Table 8: Impact Methodology Table

Nature				
Negative		Neutral		Positive
-1		0		+1
Extent				
Local	Regional		National	International
1	2		3	4
Magnitude				
Low		Medium		High
1		2		3
Duration				
Short Term (0-5yrs)	Medium Term (5-11yrs)		Long Term	Permanent
1	2		3	4
Probability				
Rare/Remote	Unlikely	Moderate	Likely	Almost Certain
1	2	3	4	5
Significance				
No Impact/None	No Impact After Mitigation/Low		Residual Impact After Mitigation/Medium	Impact Cannot be Mitigated/High
0	1		2	3

8.2 Identification of Activities and Aspects

An "Activity" is defined as a distinct process or risks undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or pieces of infrastructure that are possessed by an organisation (International Organization for Standardization, 2011).

An aspect is defined as elements of an organisation's activities or products or services that can interact with the environment.

In order to capture the impacts associated with the proposed infrastructure, an activity – aspect – impact table was created, refer to Table 9 below.

Table 9: Activity, Aspects and Impacts of the Project

Activity	Aspect	Potential Impact – Positive	Potential Impact – Negative
Site clearance/ construction camp	Heritage	N/A	Damage to unidentified graves
Construction	Heritage	N/A	Damage to unidentified graves
Operation	Heritage	N/A	N/A

8.3 Impact and Mitigation Assessment

No archaeological, historical structures or graves were identified within or close to the Seelo Beta Solar PV project footprint area. Therefore, no impacts on heritage resources are anticipated. However, there is a possibility that some heritage resources were not identified, specifically, informal graves or burial sites.

8.4 Impacts During the Planning, Construction and Operation Phases

As no impact on heritage resources are anticipated, no impact/mitigation table has been generated.

8.5 Cumulative Impacts

The project area and surrounding region has been affected by impacts of activities occurring in the past, current activities and proposed future developments. These will be discussed below.

Past impacts: The past HIA reports recovered from the SAHRIS database indicated that the Seelo Beta Solar PV project footprint and surrounding region has been affected by several development and other activities that would have disturbed the heritage resources which occur in the area. These include: a prospecting project proposed for the northern section of the farm Rooipan 96 IQ (which could have indirectly impacted the current project area), a solar PV project closer to Carletonville, the construction of several powerlines, and the development and later expansion of the Khutsong township which is located directly south of the project area. Most of these developments could have impacted previously identified heritage resources which were historical structures or grave sites and of low or medium to high heritage significance.

Current impacts: the immediate area of the Seelo Beta Solar PV footprint is affected by cattle and game farming activities, as well as the existing road running to the south of the proposed Project footprint. No heritage resources were identified, however, as there is always a low possibility that sub-surface graves or archaeological material could occur, a chance finds procedure is included in the general heritage management guideline (**Section 11**).

Future impacts: two Solar PV projects (Seelo Alpha and Seelo Charlie) are proposed for development in the immediately adjacent area of the Seelo Beta Solar PV footprint, one located immediately east and one located immediately west of the Seelo Beta PV project. No heritage impacts were recorded in the HIA reports for these two adjacent projects (Alpha and Charlie). In addition, a 200 MegaWatt (MW) PV Energy Facility for Sibanye Gold has been approved in Westonaria Local Municipality, Gauteng which is located approximately 29km east of the Seelo Beta PV project. While several heritage resources of low to medium significance (historical structures and two possible grave sites) were recorded for the Sibanye Gold PV project HIA report, these heritage resources would have been affected only indirectly.

Overall, the cumulative impacts for both the immediate project area and the general region are considered low to medium for Heritage resources (before mitigation), and additional project impacts are not expected to increase the significance of the existing baseline impacts, where the cumulative unmitigated impact will probably be of a low to medium significance. The impact is going to happen and will be long-term in nature, however the impact risk class (after mitigation) will be Low.

Table 10: Cumulative Impact - Heritage Resources

Environmental Feature	Heritage resources					
Project life cycle	Construction and Operation					
Potential Impact	The extent that the addition of this project will have on the overall impact of developments in the region on heritage resources					
Possible damage to or destruction of identified heritage resources	Although several HIA reports for previous projects within the greater region identified various heritage resources (including historical structures, graves, historical mining or prospecting remains and a few Iron Age stone-walled structures), no heritage resources were identified within the Beta Solar PV project footprint (or the HIA reports for the two proposed solar PV projects immediately adjacent (Seelo Alpha and Seelo Charlie). .					
Possible damage to or destruction of unidentified heritage resources	There is a low possibility that sub-surface heritage resources could exist (graves, archaeological material) and therefore a Chance Find procedure should be included in the EMPr.					
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Regional	Medium	Permanent	Moderate	1
After Mitigation	Positive	Regional	Low	Long-term	Unlikely	0

Significance of Impact	As no heritage resources were identified within the Beta Solar PV project footprint or either of the two immediately adjacent solar PV project footprints (Alpha and Charlie) it is considered that the additional load on the overall impact on heritage resources will be low.

Figure 16: Cumulative Impact Map showing all known Solar PV projects within 30km radius of Seelo Solar Beta PV (orange polygon)

9 ALTERNATIVES

9.1 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.

9.2 Site Alternatives

The selected PV Site was identified through a prefeasibility study/screening process which took into consideration a set of location factors. The location factors which favour the selected PV site include:

- Suitable solar irradiation levels;

- Proximity to and availability of grid connection point. Many areas in South Africa do not have available generation connection capacity of the transmission network. The site is located approximately 13km from a grid connection point that has confirmed capacity to evacuate the electricity generated;
- Flat topography;
- Low agricultural sensitivity;
- Suitable site access; and
- Availability of the particular property for the development of a PV facility.

As a process was followed to identify the site for the proposed PV facility based on the application of the above location factors, alternative sites are not proposed for this project.

9.3 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, which will be determined in the EIA Phase through the specialist studies.

9.4 Technology Alternatives

9.4.1 PV Technology

Very few technological options exist as far as PV technologies are concerned; those that are available are usually differentiated by climatic conditions that prevail. The impacts of the different PV technologies on the environment are very similar. The construction, operation and decommissioning activities associated with the facility will all be the same, irrespective of the chosen technology. Both technology alternatives are considered reasonable and relevant to this application, based on the current technology available and potential engineered simplification of solar tracking systems in the coming years.

The Fixed and Tracking PV panel technologies are both considered for the proposed Solar PV Facility. The different solar PV panel technologies are briefly discussed in the following subheadings:

- Fixed / mounted PV panels; and,
- Tracking PV panels (these solar panels rotate to follow the sun's movement/trajectory).

9.4.1.1 Fixed Mounted PV System

In a fixed mounted PV System (**Figure 17**), the PV panels are installed at a pre-determined angle from which they will not move during the lifetime of the plant's operation. The limitations imposed on this system due to its static placement are countered by the fact that the PV panels are able to absorb incident radiation reflected from surrounding objects. In addition, the misalignment of the angle of the PV panels have been shown to affect the efficiency of energy collection only marginally. There are advantages which are gained from fixed mounted systems, and includes the following:

- The maintenance and installation costs of a fixed mounted PV system are lower than that of a tracking system, which is mechanically more complex given that these PV mountings include moving panels;
- Fixed mounted PV systems are an established technology with a proven track record in terms of reliable functioning. In addition, replacement parts are able to be sourced more economically and with greater ease than with alternative systems; and,
- Fixed mounted systems are robustly designed and able to withstand greater exposure to winds than tracking systems. A typical fixed structure will have two rows of twenty (20) modules (2 strings). The modules are placed in portrait arrangement. The foundation technology is usually a direct-driven (rammed) installation, with a ramming depth subject to the soil characteristics, or reinforced concrete strip footings.

Figure 17: Example of Fixed Solar Panels (Nemai 2023)

9.4.1.2 Dual Axis Tracking System

In a dual axis tracking system, PV panels are fixed to mountings which track the sun's trajectory. There are various tracking systems namely a single axis tracker or a dual axis tracker. A 'single axis tracker' will track the sun from east to west, while a 'dual axis tracker' will in addition be equipped to account for the seasonal waning of the sun. These systems utilise moving parts and complex technology, including solar irradiation sensors to optimise the exposure of PV panels to sunlight. Tracking systems are a new technology and, as such, are more complex to operate in South Africa. This is due to:

- A high degree of maintenance is required due to the nature of the machinery used in the system, which consists of numerous components and moving parts. A qualified technician is required to carry out regular servicing of these tracking systems, which are normally located in remote areas.
- The cost of the system is necessarily higher than a fixed mounted system due to the maintenance required for this system and given that separate mountings need to be placed apart from one another to allow for their tracking movement; and,
- A power source is needed to mechanically drive the tracking system and this would offset a certain portion of the net energy produced by the plant. However, the additional improvements in capacity factor and efficiency may make a tracking system attractive despite these challenges. This can only be determined with a financial model during the more detailed design phase of the project.

9.4.2 BESS Technology

As technological advances within battery energy storage systems (BESS) are frequent, two BESS technology alternatives are considered namely, solid state battery electrolytes and redox-flow technology.

9.5 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 alternative will be assessed during the EIA Phase, taking into consideration the findings of the specialist studies and the outcomes of public participation (amongst others).

10 STATEMENT OF IMPACT SIGNIFICANCE

The project area that will be impacted by the proposed Seelo Beta Solar PV project contains some areas that are currently disturbed by cattle and game farming activities.

The impact significance of the project on graves and cemeteries is **low** as no definite grave sites were identified.

The impact significance of the proposed project on protected historical structures is **low** as no historical structures were identified.

The impact significance of the proposed project on archaeological resources is **low** as no archaeological sites or material were identified.

11 HERITAGE MANAGEMENT GUIDELINES

11.1 General Management Guidelines

The following general heritage management guidelines should be followed:

1. It is advisable that an information section on cultural resources be included in the SHEQ training given to contractors involved in surface earthmoving activities. These sections must include basic information on:
    a. Heritage;
    b. Graves;
    c. Archaeological finds; and
    d. Historical Structures.

   This module must be tailor made to include all possible finds that could be expected in that area of construction. Possible finds include:
    a. Unidentified graves or burials;
    b. Historical structure remains;
    c. Palaeontological deposits such as bones and teeth or plant fossils.
2. In the event that a possible find is discovered during construction, all activities must be halted in the area of the discovery and a qualified archaeologist contacted.
3. The archaeologist needs to evaluate the finds on site and make recommendations towards possible mitigation measures.
4. If mitigation is necessary, an application for a rescue permit must be lodged with SAHRA.

5. After mitigation, an application must be lodged with SAHRA for a destruction permit. This application must be supported by the mitigation report generated during the rescue excavation. Only after the permit is issued may such a site be destroyed.
6. If during the initial survey sites of cultural significance are discovered, it will be necessary to develop a management plan for the preservation, documentation or destruction of such a site. Such a program must include an archaeological/palaeontological monitoring programme, timeframe and agreed upon schedule of actions between the company and the archaeologist.
7. In the event that human remains are uncovered, or previously unknown graves are discovered, a qualified archaeologist needs to be contacted and an evaluation of the finds made.
8. If the remains are to be exhumed and relocated, the relocation procedures as accepted by SAHRA need to be followed. This includes an extensive social consultation process.

12 Recommendations and Conclusion

The proposed Seelo Beta Solar PV project should not impact on heritage resources as no archaeological, cultural (graves) or historical heritage resources were identified within or immediately adjacent to the project footprint area. However, there is a low possibility that sub-surface heritage resources, specifically, informal graves or burial sites or archaeological material, could be uncovered the General Heritage Management Guidelines contained in this report should be noted and implemented, if necessary.

Although the project area falls into an area where the underlying geology is mainly of Very High fossil sensitivity, the Site Sensitivity Verification (SSV) and palaeontological assessment undertaken by a palaeontologist disputed the very high sensitivity designated and confirmed the site as having a low sensitivity as no fossiliferous outcrops were identified during a site inspection. Any recommendations and mitigation measures provided by the palaeontologist must be implemented where necessary.

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 and BESS project within the footprint can proceed. There are no objections from a heritage perspective provided the recommendations and general heritage management guidelines contained in this report are implemented where necessary.

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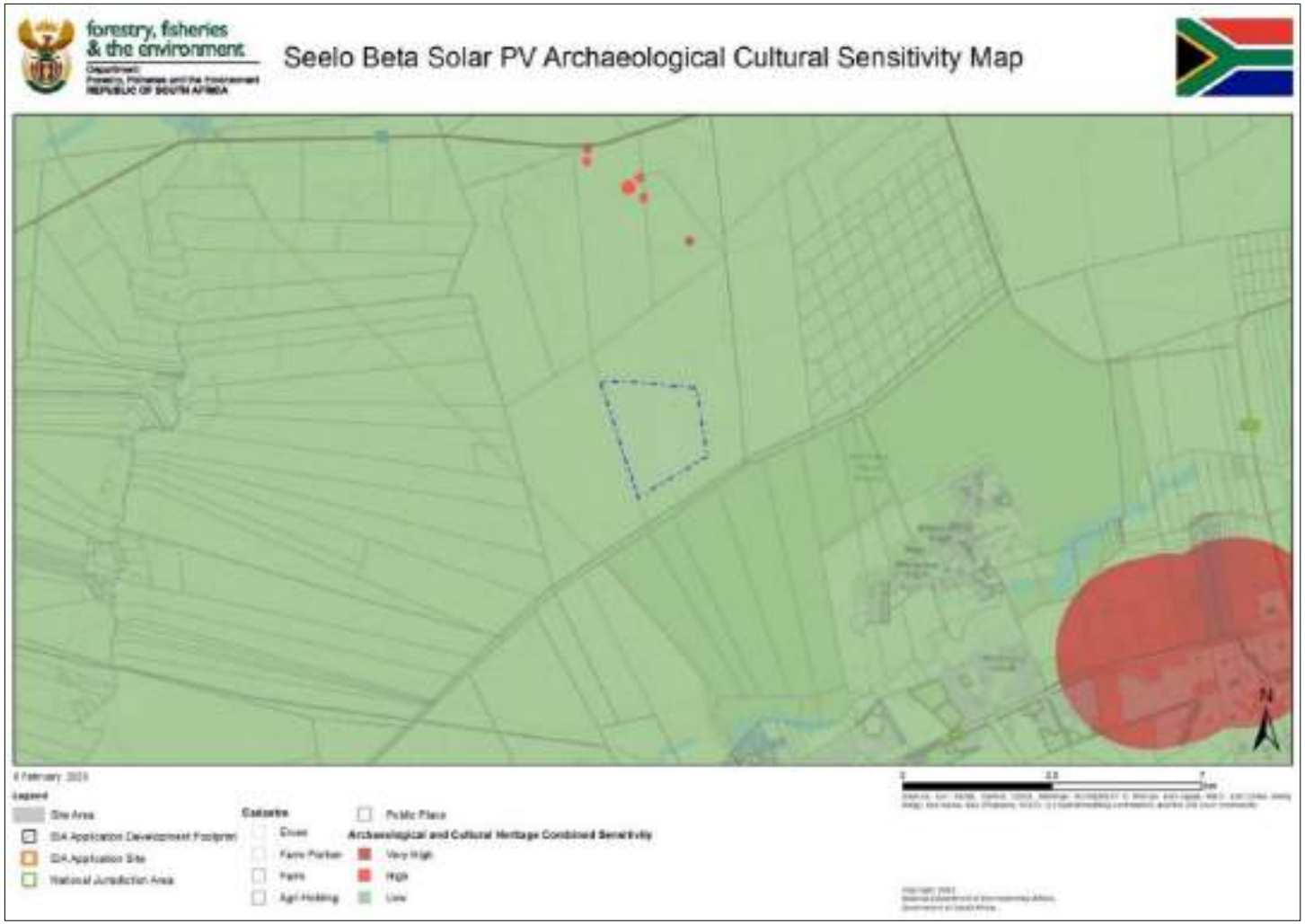
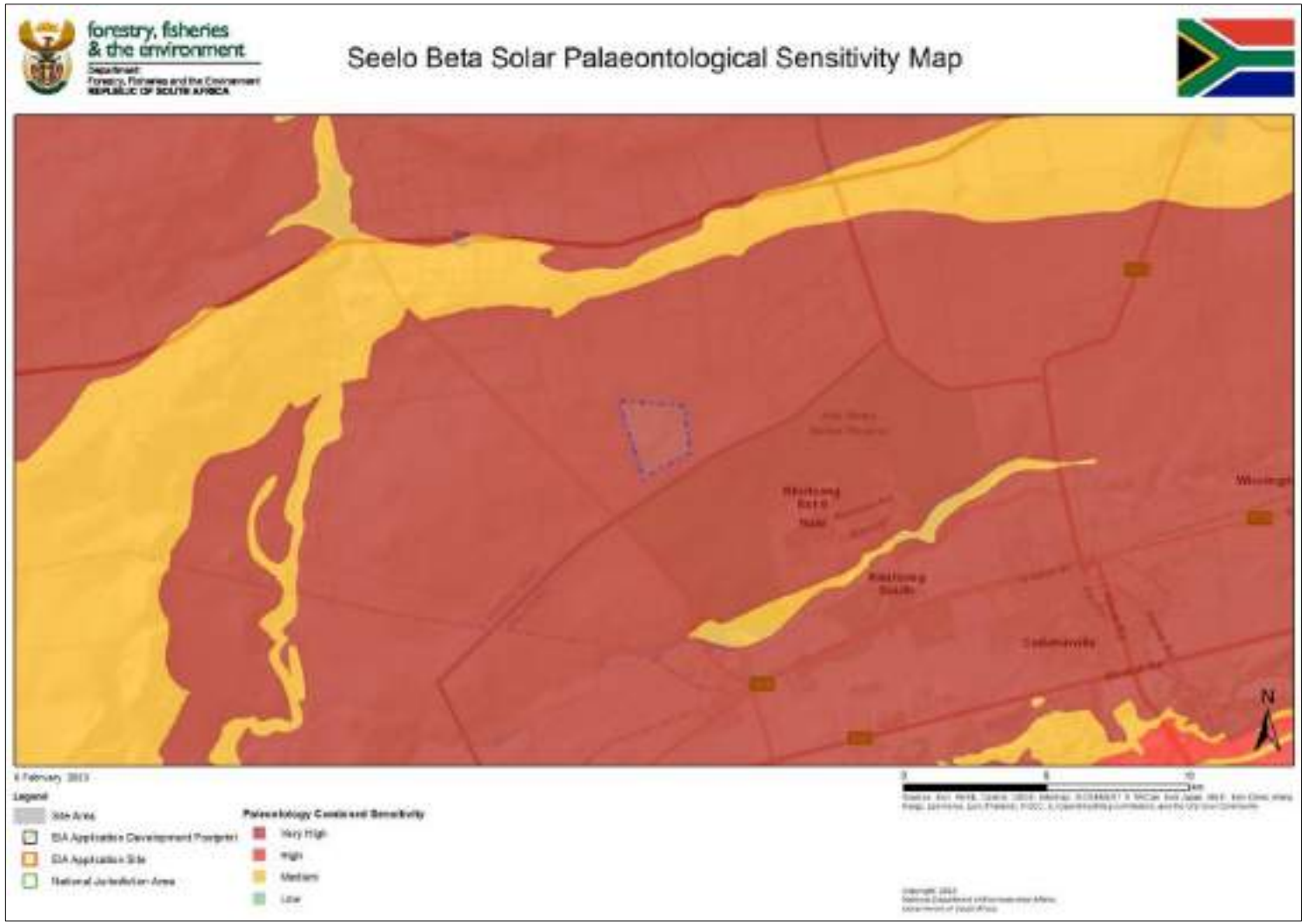
APPENDIX 1: HERITAGE SENSITIVITY MAP/S

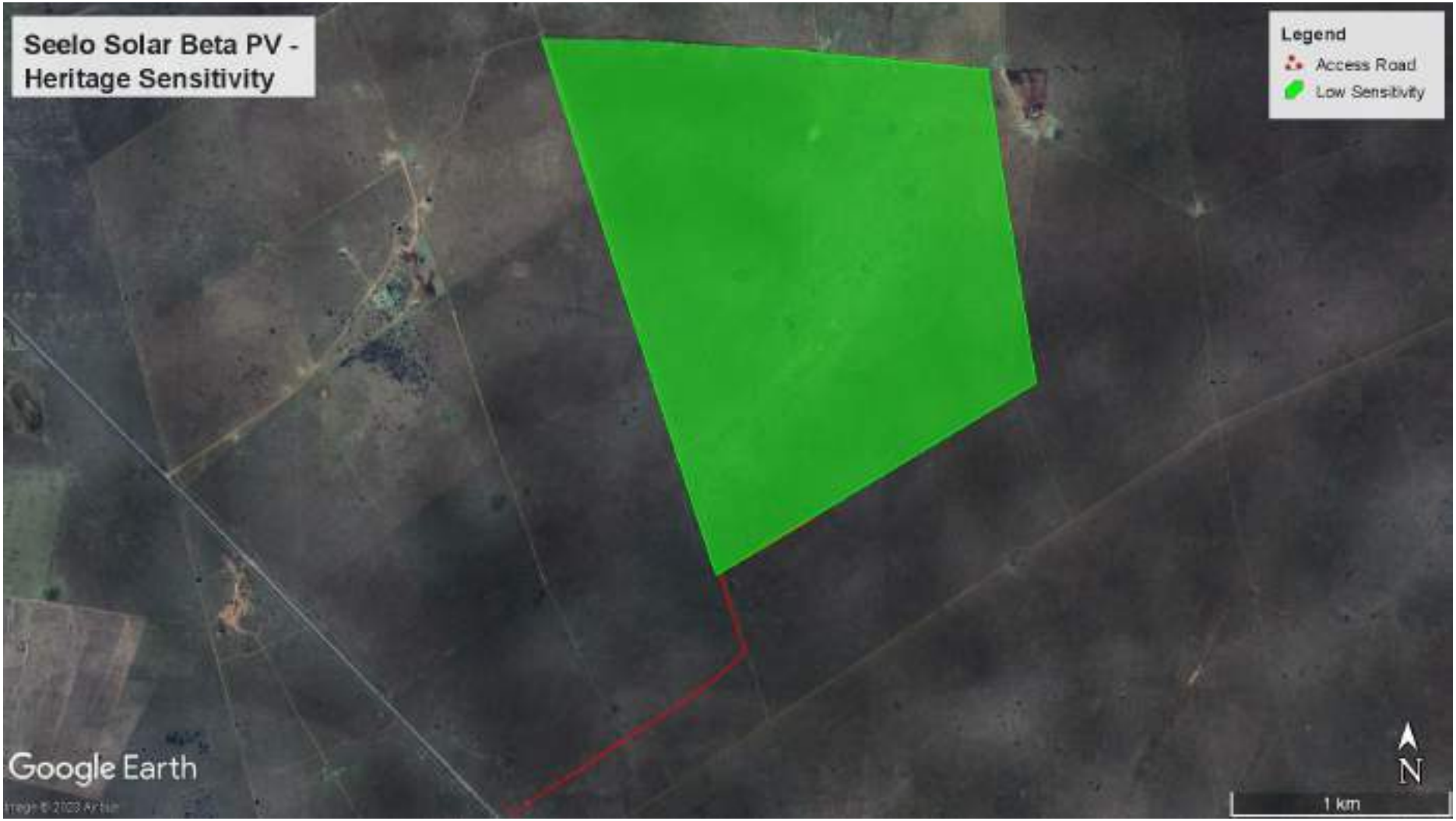
1. Cultural Heritage Sensitivity map from DFFE screening tool



2. Palaeontological Sensitivity map from DFFE screening tool



3. Heritage Sensitivity Maps based on the Site Inspection / Field survey and topographical map sheet



APPENDIX 2: CURRICULUM VITAE OF HERITAGE SPECIALIST

1 Personal Particulars

Profession:	Heritage Specialist
Date of Birth:	11 September 1966
Name of Firm:	Nitai Consulting
Name of Staff:	Jennifer Kitto
Nationality:	RSA
Membership of Professional Societies	Association of Southern African Professional Archaeologists (444); International Association for Impact Assessment South Africa (7151)

2 Education:

BA Hons Social Anthropology, WITS, South Africa, 1994

BA. Archaeology and Social Anthropology, WITS, South Africa, 1993

Higher National Diploma, Practical Archaeology, Dorset Institute for Higher Education (now Bournemouth University), UK, 1989

3 Employment Record:

2022 – Present Heritage Specialist, Nitai Consulting

Conduct Heritage Impact Assessments;

2012 – 2021 Heritage Specialist, PGS Heritage (Pty) Ltd

Conduct Heritage Impact Assessments

Compile Desktop Historical Research

Compile Heritage Audit and Management Plans

Compile and submit permit applications to National and Provincial Heritage Authorities for Section 34 building alterations and demolitions (under National Heritage Resources Act, 25 of 1999)

Compile and submit permit applications to Provincial and Municipal Health Authorities for Section 36 relocations of graves and burial grounds (under National Heritage Resources Act, 25 of 1999 and National Health Act, No 61 of 2003)

2008 – 2011 Cultural Heritage Officer (National), Burial Grounds and Graves Unit: South African Heritage Resources Agency (SAHRA)

Review and assessing permit applications for relocation of historical graves and burial grounds

1998 – 2008 Cultural Heritage Officer (Provincial), Provincial Office – Gauteng: SAHRA

Review and comment on heritage and archaeological impact reports

Research for the nomination and grading process for related to the declaration of specific heritage resources as National Heritage Sites

Monitoring of certain archaeological and built environment National Heritage Sites (e.g. The Cradle of Humankind World Heritage Site)

4 Selected Consultancies

4.1 GDID East Corridor, OHS Implementation, Tambo Memorial Regional Hospital (as sub-contractor to PGS Heritage (Pty) Ltd

2022 Independent Heritage Specialist. Compile Historical Archival Report of Tambo Hospital Boksburg, Gauteng for PGS Heritage (Pty) Ltd, Finalise HIA Report and submit HIA report to Gauteng Provincial Heritage Resources Authority

4.2 GDID East Corridor, OHS Implementation, Tembisa Regional Hospital (as sub-contractor to PGS Heritage (Pty) Ltd

2022 Independent Heritage Specialist. Compile Historical Archival Report of Tembisa Hospital, Ekurhuleni, Gauteng for PGS Heritage (Pty) Ltd, Finalise HIA Report and submit HIA report to Gauteng Provincial Heritage Resources Authority.

4.3 Kroonstad Solar PV Facilities

2022/2023 Heritage Specialist, Development of three Solar PV facilities near Kroonstad, Free State Province, South Africa, Identify, assess and map all heritage resources associated with the three solar PV facilities

4.4 Kroonstad South Solar PV Facilities

2022/2023 Heritage Specialist, Development of five Solar PV facilities near Kroonstad, Free State Province, South Africa, Undertake Heritage Impact Assessment of all heritage resources associated with the five solar PV facilities

4.5 Rustenburg Solar PV Facilities

2022/2023 Heritage Specialist, Development of three Solar PV facilities near Rustenburg, North West Province, South Africa, Undertake Heritage Impact Assessment all heritage resources associated with the three solar PV facilities.

4.7 Decommissioning of Komati Power Station

2023, Heritage Specialist, Proposed Decommissioning of the Komati Power Station, Middelburg, Mpumalanga, Undertake Heritage Impact Assessment of all heritage structures within the power station

5 Languages:

English - excellent speaking, reading, and writing

Afrikaans –fair speaking, reading and writing

SEELO SOLAR PV – BETA

ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME: SITE SENSITIVITY VERIFICATION REPORT

The National Web-based Environmental Screening Tool identified a Site Environmental sensitivity of **Low** for Archaeological Cultural Sensitivity for the proposed Seelo Beta Solar PV development site (see **Figure 1**, below). The proposed project site was first examined at a desktop level using early edition historical topographic maps (for the Archaeological Cultural heritage theme). This was followed by an on-site inspection.

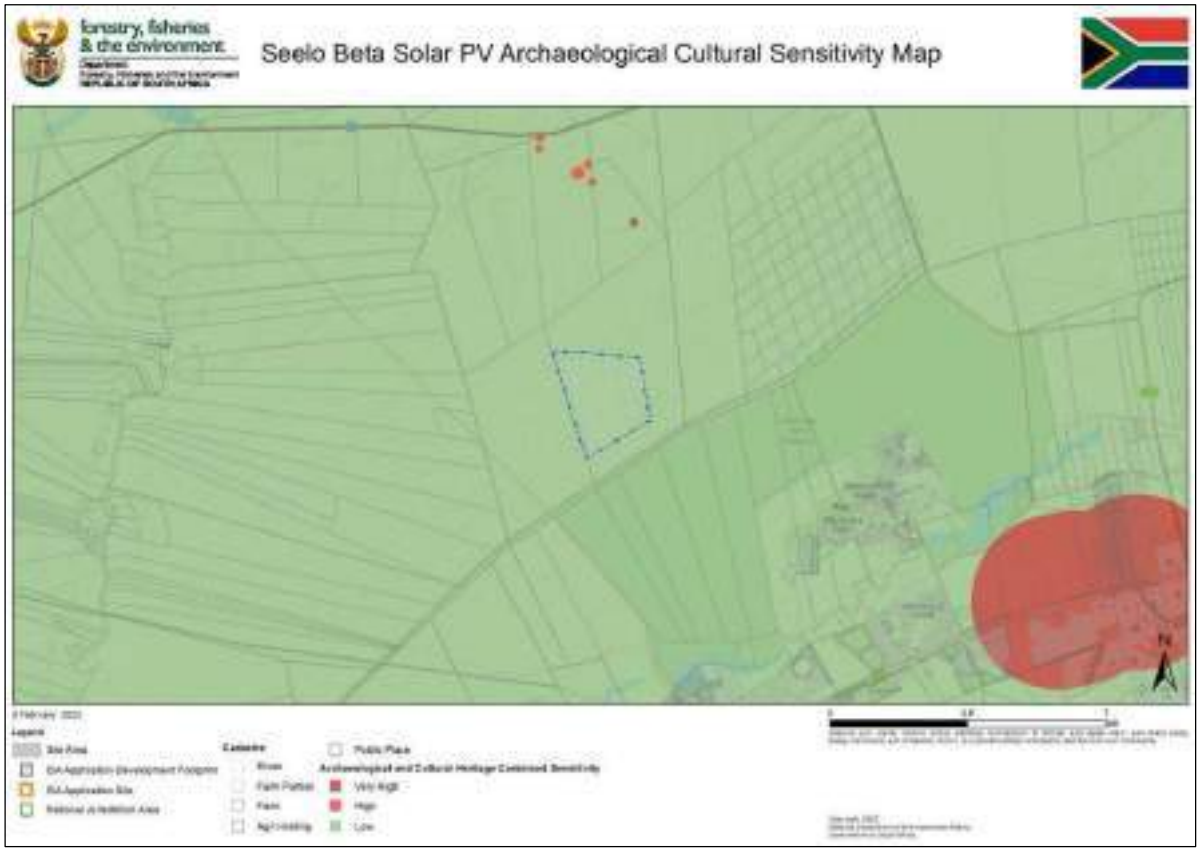


Figure 1: Archaeological Cultural Sensitivity map indicating that the Seelo Beta Solar PV project footprint is located within a region of low archaeological and cultural heritage sensitivity (DFFE Screening Tool).

Desktop Assessment

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 study area falls between two map sheets (2627AC and 2627AD). The first edition of both sheets dates to the 1950s, so it was not considered necessary to examine the later

edition map sheets. Any heritage resources that are 60 years or older would be depicted on the 1950 edition sheets. The topographical maps were obtained from the Department of Agriculture, Land Reform and Rural Development (DALRRD) in Cape Town.

The following two 1:50 000 map sheets were assessed for the Seelo Beta Solar PV footprint: 2627AC Rysmierbult Edition 1 1953 and 2627AD Carletonville Edition 1 1958. The maps were surveyed in 1953 and 1958 respectively and drawn in 1955 and 1959 respectively by the Trigonometrical Survey Office of the Union of South Africa, both from aerial photographs taken in 1948.

As can be seen in **Figure 2**, below, which is a combined view of the two map sheets, one homestead (hut) and a ruin are depicted within the Seelo Beta Solar PV footprint. Another homestead is depicted just outside the northern boundary of the footprint area.

Figure 2: Enlarged view of topographic map sheets 2627AC Ed 1 1953 and 2627AD Ed 1 1958, depicting one homestead (hut) and a ruin within the Seelo Beta Solar PV footprint. Another homestead is depicted just outside the northern boundary of the footprint area (red polygons)

On-site Inspection

The project area terrain is situated on the central-east section of Portion 1 of Farm 96 (Rooipan). The general area is covered mostly with a grassland which varies from shorter to long and dense. The terrain is mostly flat, however, there are signs of previous and recent disturbance, e.g. many large piles of rock were noted on the property. The current use of the property is cattle farming (grazing). The area contains dolomite outcrops as well as quartzite/sandstone outcrops.

The on-site inspection (conducted on 19 January 2023) of the study area identified no visible archaeological or cultural heritage resources within or close to the Seelo Beta Solar PV footprint area. However, the long and dense grass cover in some areas increases the possibility that not all heritage resources were identified, especially possible informal graves.

Conclusion/Recommendations

1. Based on the Site Sensitivity Verification, the environmental sensitivity of Low for the Archaeological and Cultural Heritage Theme is confirmed.
2. However, although no visible archaeological or cultural heritage resources were identified within or close to the Seelo Beta Solar PV project footprint, since the extent of the study area is larger than 5000m^2, a Heritage Impact Assessment is required in terms of section 38(1)(a) of the National Heritage Resources Act (No 25 of 1999).

Status Quo/Baseline Receiving Environment photographs

Figure 3: View of the footprint area, showing the short dense grass and bushes in one section

Figure 4: Another view of very short grass covering a section of the project footprint

Figure 5: View of one of the sandstone outcrops occurring within the project footprint

Figure 6: View of one of the dolomite outcrops occurring within the project footprint

Figure 7: View of one of the piles of rocks scattered all over the project footprint

Figure 8: View of another area with extensive piles of rock along a fence line

Figure 9: View of the long dense grass and other vegetation with scattered stands of acacia on one section of the project footprint

APPENDIX E7: Palaeontological Impact Assessment

BANZAI ENVIRONMENTAL

PALAEONTOLOGICAL IMPACT ASSESSMENT

SEELO BETA 240 MW SOLAR PV AND BATTERY ENERGY STORAGE SYSTEMS PROJECT, NEAR CARLETONVILLE, NORTH WEST PROVINCE.

2023

COMPILED FOR: NEMAI ENVIRONMENTAL

Declaration of Independence

I, Elize Butler, declare that –

General declaration:

- I act as the independent palaeontological specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favorable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting palaeontological impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favorable to the applicant or not
- All the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected a palaeontological specialist in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realize that a false declaration is an offense in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations.

PALAEONTOLOGICAL CONSULTANT: Banzai Environmental (Pty) Ltd

CONTACT PERSON: Elize Butler

Tel: +27 844478759

Email: elizebutler002@gmail.com

SIGNATURE:

This Palaeontological Impact Assessment (as part of the Heritage Impact Assessment report) has been compiled considering the National Environmental Management Act 1998 (NEMA) and Environmental Impact Regulations 2014 as amended, requirements for specialist reports, Appendix 6, as indicated in the table below.

Table 1: Checklist for Specialist studies in conformance with Appendix 6 of the EIA Regulations of 2014 (as amended)

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	**The relevant section in the report**	**Comment where not applicable.**
1.(1) (a) (i) Details of the specialist who prepared the report	Page ii and Section 3 of Report – Contact details and company and Appendix A	-
(ii) The expertise of that person to compile a specialist report including a curriculum vita	Section 3 – refer to **Appendix A**	-
(b) A declaration that the person is independent in a form as may be specified by the competent authority	Page ii of the report	-
(c) An indication of the scope of, and the purpose for which, the report was prepared	Section 5	-
(cA) An indication of the quality and age of base data used for the specialist report	Section 6 – Geological and Palaeontological history	-
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 10	-
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 1;9 & 11	

Table 1: Checklist for Specialist studies in conformance with Appendix 6 of the EIA Regulations of 2014 (as amended)

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	**The relevant section in the report**	**Comment where not applicable.**
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 5 Methods and Terms of Reference	-
(f) details of an assessment of the specifically identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 1& 11	
(g) An identification of any areas to be avoided, including buffers	Section 1 & 11	
(h) A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 6 – Geological and Palaeontological history	
(i) A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 5.1 – Assumptions and Limitation	-
(j) A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 1 and 11	
(k) Any mitigation measures for inclusion in the EMPr	Section 1 & 11	
(l) Any conditions for inclusion in the environmental authorisation	Section 1 & 11	
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 12	

Table 1: Checklist for Specialist studies in conformance with Appendix 6 of the EIA Regulations of 2014 (as amended)

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	**The relevant section in the report**	**Comment where not applicable.**
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Section 1 & 11	
(n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and		
(n)(ii) If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 1 & 11	-
(o) A description of any consultation process that was undertaken during the course of carrying out the study	N/A	Not applicable. A public consultation process was handled as part of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) process.
(p) A summary and copies of any comments that were received during any consultation process	N/A	Not applicable. To date, no comments regarding heritage

Table 1: Checklist for Specialist studies in conformance with Appendix 6 of the EIA Regulations of 2014 (as amended)

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	**The relevant section in the report**	**Comment where not applicable.**
		resources that require input from a specialist have been raised.
(q) Any other information requested by the competent authority.	N/A	Not applicable.
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Section 4 compliance with SAHRA guidelines	

EXECUTIVE SUMMARY

Banzai Environmental was appointed by Nemai Environmental to conduct the **Palaeontological Impact Assessment** (PIA) to assess the Seelo Beta 240MW Solar PV and Battery Energy Storage Systems (BESS) Project near Carletonville, in the North West Province. In accordance with the National Environmental Management Act 107 of 1998 (NEMA) and to comply with the National Heritage Resources Act (No 25 of 1999, section 38) (NHRA), this PIA is necessary to confirm if fossil material could potentially be present in the planned development area and to evaluate the potential impact of the proposed development on the Palaeontological Heritage of the area.

The Seelo Beta 240 MW Solar PV and Battery Energy Storage Systems (BESS) Project is entirely underlain by 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 (Almond *et al*, 2013; SAHRIS website). This Palaeontological Sensitivity triggered a site investigation. Updated Geology refined the geology of the original geological maps and also indicate that the proposed development is entirely underlain by the Malmani Subgroup.

A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on the weekend of the 13 March 2023. No fossiliferous outcrops were detected during the site visit. Based on the site investigation as well as desktop research it is concluded that fossil heritage of scientific and conservational interest in the development footprint is rare. This is in contrast with the High Sensitivity allocated to the development area by the SAHRIS Palaeosensitivity Map and DFFE Screening Tool. **A medium Palaeontological Significance has been allocated for the construction phase of the PV development pre-mitigation and a low significance post mitigation**. The construction phase will be the only development phase impacting Palaeontological Heritage and **no significant impacts are expected to impact the Operational and Decommissioning phases**. As the No-Go Alternative considers the option of 'do nothing' and maintaining the status quo, it will have a Neutral impact on the Palaeontological Heritage of the development. The **Cumulative impacts of the development near Carletonville 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. **The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.** It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

If significant fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the **Chance Find Protocol** must be implemented by the ECO/site manager in charge of these developments. These discoveries ought to be protected (if possible, *in situ*) and the ECO/site manager must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carry out by a paleontologist.

Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies suggested by SAHRA.

Impact Summary

Environmental parameter	**Issues**	**Rating prior to mitigation**	**Average**	**Rating post mitigation**	**Average**
Planning Stage Seelo Beta Solar PV	No Impact		No Impact		No Impact
Construction Stage Seelo Beta Solar PV	Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study	45	Negative Medium impact	15	Negative Low impact
Operational Phase Seelo Beta Solar PV	No Impact		No Impact		No Impact
Decommissioning Phase Seelo Beta Solar PV	No Impact		No Impact		No Impact

It is therefore considered that the proposed Seelo Beta Solar PV Facility, will not lead to detrimental impacts on the palaeontological reserves of the area if mitigation measures are adhered to. As such the construction of the development may be authorised in its whole extent.

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APPENDIX A: CV

1 INTRODUCTION

Seelo Beta Solar PV (RF) (Pty) Ltd (the Applicant) has proposed the development of the Seelo Beta 240MW Solar PV and Battery Energy Storage Systems (BESS) Project near the town of Carletonville, in the North West Province (the "Project"). The electricity generated by the Project will be injected into the existing Eskom 132 kV distribution system. The Applicant intends to bid for the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows.

The Project is located in the most eastern part of the North West Province (at the boundary between North West and Gauteng) and falls within the Dr Kenneth Kaunda District Municipality (DKKDM) and the JB Marks Local Municipality (JBMLM). The site is located approximately 13km to the north-west of the town of Carletonville.

The property earmarked for the Project covers a combined area of approximately 1130 ha, of which the buildable area determined by the engineering team is approximately 355 ha.

.

Seelo Beta Solar PV and associated infrastructure forms part of the Seelo Cluster comprising of three Solar PV facilities near Carletonville in the North West Province.

Table 2: Details of the affected properties

Farm Name	**21-digit Surveyor General (SG) Code**
Portion 1 of Farm 96 (Rooipan)	T0IQ00000000009600001

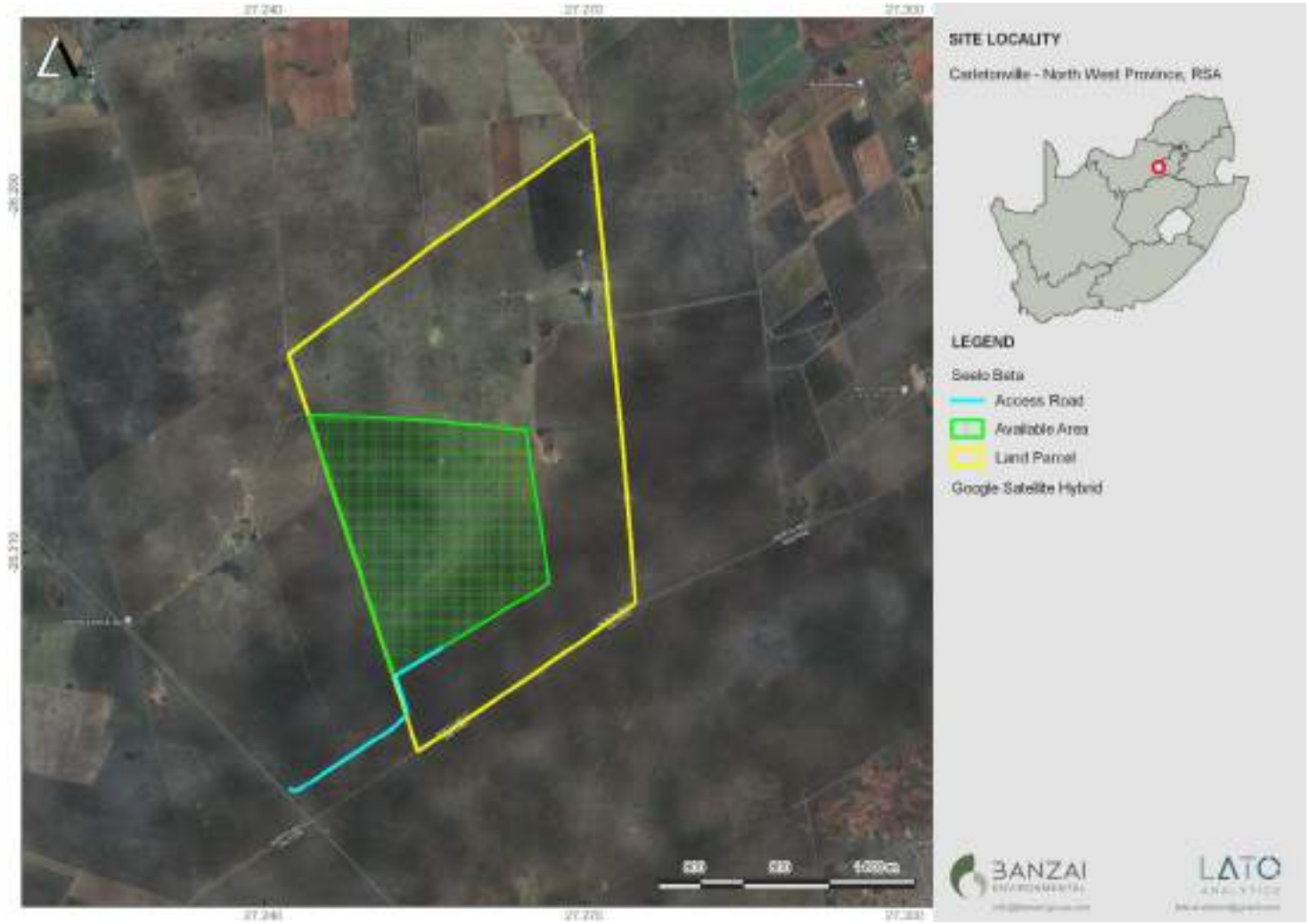


***Figure 1**: Regional context of the Seelo Beta Solar PV development.*

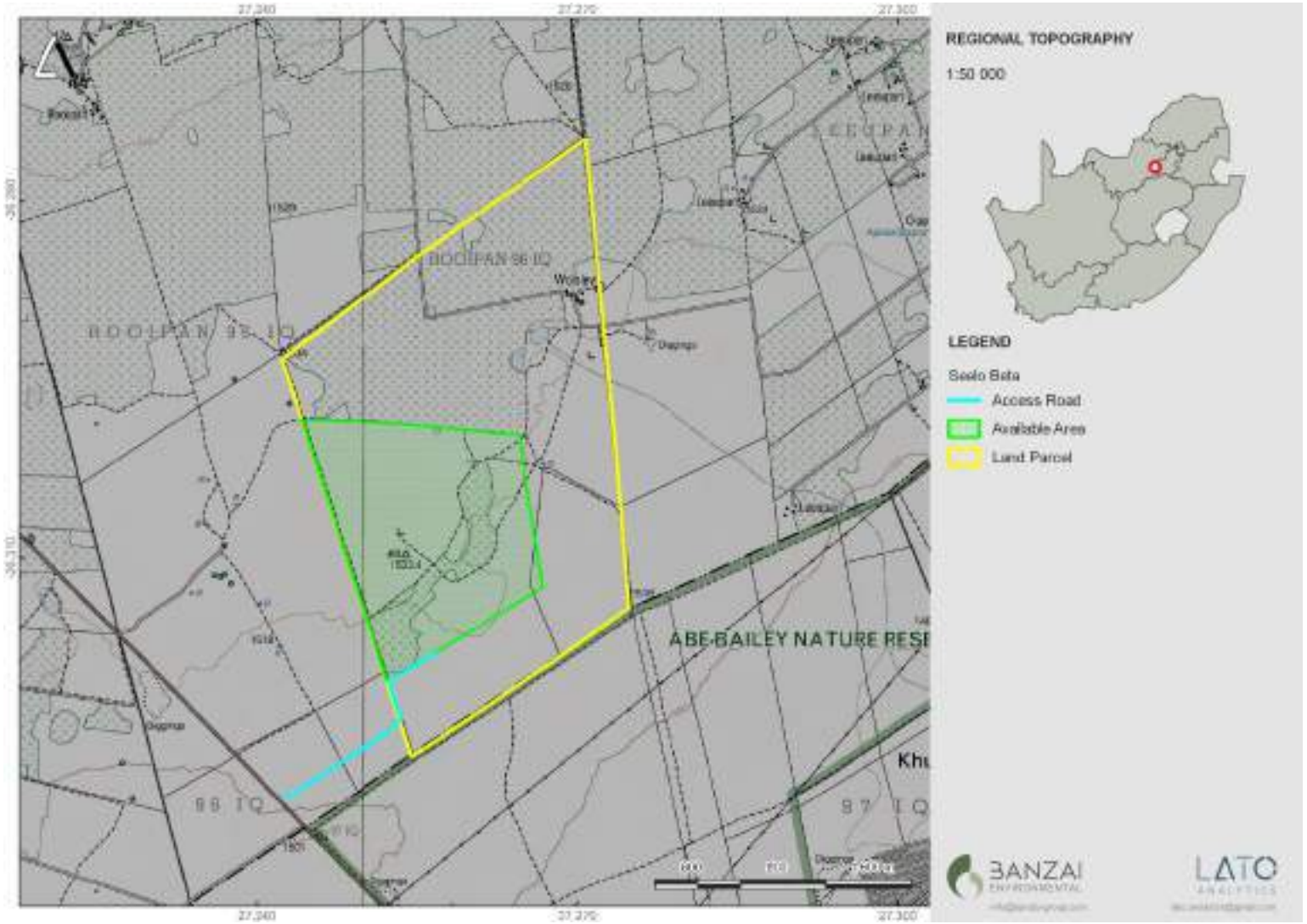


***Figure 2**: Local setting map of the proposed Seelo Beta Solar PV development.*

2 TECHNICAL DETAILS OF THE PROPOSED DEVLOPMENT

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

- PV panel arrays, which are the subsystems which convert incoming sunlight into electrical energy;
- Mounting structures to support the PV panels;
- On-site inverters to convert DC to facilitate AC connection between the solar energy facility and electricity grid;
- BESS);
- IPP substation;
- Eskom switching substation[1];
- Cabling between the Project's components, to be laid underground (where practical);
- Administration Buildings (Offices);
- Workshop areas for maintenance and storage;
- Temporary and permanent laydown areas;
- Internal access roads and perimeter fencing of the footprint;
- High Voltage (HV) Transformers; and
- Security Infrastructure.

3 QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

This study has been conducted by Mrs Elize Butler. She has conducted approximately 300 palaeontological impact assessments for developments in the Free State, KwaZulu-Natal, Eastern, Central, and Northern Cape, Northwest, Gauteng, Limpopo, and Mpumalanga. She has an MSc (*cum laude*) in Zoology (specializing in Palaeontology) from the University of the Free State, South Africa and has been working in Palaeontology for more than twenty-eight years. She has experience in locating, collecting, and curating fossils, including exploration field trips in search of new localities in the Karoo Basin. She has been a member of the Palaeontological Society of South Africa (PSSA) since 2006 and has been conducting PIAs since 2014.

4 LEGISLATION

National Heritage Resources Act (25 of 1999)

Cultural Heritage in South Africa, includes all heritage resources, is protected by the National Heritage Resources Act (Act 25 of 1999) (NHRA). Heritage resources as defined in Section 3 of the Act include

[1] The dedicated grid connection for the proposed Project which includes a 132/33 kV switching substation which does not form part of the current application for EA.

"all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens".

The identification, evaluation and assessment of any cultural heritage site, artefact or finds in the South African context is required and governed by the following legislation:

- National Environmental Management Act (NEMA) Act 107 of 1998
- National Heritage Resources Act (NHRA) Act 25 of 1999
- Minerals and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
- Notice 648 of the Government Gazette 45421- general requirements for undertaking an initial site sensitivity verification where no specific assessment protocol has been identified.

The next section in each Act is directly applicable to the identification, assessment, and evaluation of cultural heritage resources.

GNR 982 (Government Gazette 38282, 14 December 2014) promulgated under the National Environmental Management Act (NEMA) Act 107 of 1998

- Basic Assessment Report (BAR) – Regulations 19 and 23
- Environmental Impacts Assessment (EIA) – Regulation 23
- Environmental Scoping Report (ESR) – Regulation 21
- Environmental Management Programme (EMPr) – Regulations 19 and 23

National Heritage Resources Act (NHRA) Act 25 of 1999

- Protection of Heritage Resources – Sections 34 to 36
- Heritage Resources Management – Section 38

MPRDA Regulations of 2014

Environmental reports to be compiled for application of mining right – Regulation 48

- Contents of scoping report – Regulation 49
- Contents of environmental impact assessment report – Regulation 50
- Environmental management programme – Regulation 51
- Environmental management plan – Regulation 52

The NEMA (No 107 of 1998) states that an integrated EMP should (23:2 (b)) "…*identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage*".

In agreement with legislative requirements, EIA rating standards as well as SAHRA policies the following comprehensive and legally compatible PIA report have been compiled.

Palaeontological heritage is exceptional and non-renewable and is protected by the NHRA. Palaeontological resources and may not be unearthed, broken moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

This Palaeontological Impact assessment forms part of the Heritage Impact Assessment (HIA) and adhere to the conditions of the Act. According to **Section 38 (1)**, an HIA is required to assess any potential impacts to palaeontological heritage within the development footprint where:

- the construction of a road, wall, power line, 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; or
- involving three or more erven or divisions thereof which have been consolidated within the past five years; or
- the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority
- the re-zoning of a site exceeding 10 000 m^2 in extent.
- or any other category of development provided for in regulations by SAHRA or a Provincial heritage resources authority.

5 METHODS AND TERMS OF REFERENCE

The present field-based PIA assesses the potential impacts on Fossil Heritage on the development. This study forms part of the Heritage Impact Assessment Report. According to the "SAHRA APM Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports" the purpose of the PIA is: 1) to identify the palaeontological importance of the rock formations in the footprint; 2) to evaluate the palaeontological magnitude of the formations; 3) to clarify the **impact** on fossil heritage; and 4) to suggest how the developer might protect and lessen possible damage to fossil heritage.

The palaeontological status of each rock section is calculated as well as the possible impact of the development on fossil heritage by a) the palaeontological importance of the rocks, b) the type of development and c) the quantity of bedrock removed.

All possible information is consulted to compile a scoping report, and this includes the following: Provisional DFFE Screening Tool, SAHRIS Palaeosensitivity map, all Palaeontological Impact Assessment reports in the same area; aerial photos and Google Earth images, topographical and geological maps as well as scientific articles of specimens from the development area and Assemblage Zones.

When the development footprint has a moderate to high palaeontological sensitivity a field-based assessment is necessary. The desktop and the field survey of the exposed rock determine the impact significance of the planned development and recommendations for further studies or mitigation are made. Destructive impacts on palaeontological heritage usually only occur during the construction phase while the excavations will change the current topography and destruct or permanently seal-in fossils at or below the ground surface. Fossil Heritage will then no longer be accessible for scientific research.

During a site investigation the palaeontologist does not only survey the development but also tries to determine the density and diversity of fossils in the development area. This is confirmed by examining representative exposures of fossiliferous rocks (sedimentary rocks contain fossil heritage whereas igneous and metamorphic rocks are mostly unfossiliferous). Rock exposures that are investigated usually contains a large portion of the stratigraphic unit, can be accessed easily and comprise of unweathered (fresh) exposed rock. These exposures may be natural (rocky outcrops in stream or river banks, cliffs, dongas) but could also be artificial (quarries, open building excavations and even railway and road cuttings). It is common practice for palaeontologist to log well-preserved fossils (GPS, and stratigraphic data) during field assessment studies.

Mitigation usually precedes construction or may occur during construction when potentially fossiliferous bedrock is exposed. Mitigation comprises the collection and recording of fossils. Preceding excavation of any fossils, a permit from SAHRA must be obtained and the material will have to be housed in a permitted institution. When mitigation is applied correctly, a positive impact is possible as knowledge of local palaeontological heritage may be increased.

The fossil potential of Seelo Beta Solar PV development area was determined by criss-crossing the development footprint and by physically investigating the bedrock outcrops to determine the lithology and fossil content of the outcrops. Selected potentially fossiliferous sites were specifically investigated. Fossils occurring at the surface is very unpredictable and a representative sample size of the area has been investigated. However, it is important to note that the absence of fossils in a development footprint does not necessarily mean that palaeontological significant material is not present on site (on or beneath ground surface).

The terms of reference of a PIA are as follows:

General Requirements:

- Adherence to the content requirements for specialist reports in accordance with Appendix 6 of the EIA Regulations 2014, as amended;
- Adherence to all applicable best practice recommendations, appropriate legislation and authority requirements;
- Submit a comprehensive overview of all appropriate legislation, guidelines;
- Description of the proposed project and provide information regarding the developer and consultant who commissioned the study,
- Description and location of the proposed development and provide geological and topographical maps
- Provide palaeontological and geological history of the affected area.

- Identification of sensitive areas to be avoided (providing shapefiles/kmls) in the proposed development;
- Evaluation of the significance of the planned development during the Pre-construction, Construction, Operation, Decommissioning Phases and Cumulative impacts. Potential impacts should be rated in terms of the direct, indirect and cumulative:
    a. **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity.
    b. **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity.
    c. Cumulative impacts are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities.
- Fair assessment of alternatives (infrastructure alternatives have been provided):
- Recommend mitigation measures to minimise the impact of the proposed development; and
- Implications of specialist findings for the proposed development (such as permits, licenses etc).

5.1 Assumptions and Limitations

The focal point of geological maps is the geology of the area and the sheet explanations of the Geological Maps were not meant to focus on palaeontological heritage. Many inaccessible regions of South Africa have never been reviewed by palaeontologists and data is generally based on aerial photographs alone. Locality and geological information of museums and universities databases have not been kept up to date or data collected in the past have not always been accurately documented.

Comparable Assemblage Zones in other areas is also used to provide information on the existence of fossils in an area which has not documented in the past. When using similar Assemblage Zones and geological formations for Desktop studies it is generally **assumed** that exposed fossil heritage is present within the footprint. A field-assessment will thus improve the accuracy of the desktop assessment.

6 GEOLOGICAL AND PALAEONTOLOGICAL HISTORY

The Seelo Beta Solar PV (as part of the Seelo Solar PV Cluster), near Carletonville in the North West Province State is depicted on the 1: 250 000 West-Rand 2626 (1986) Geological Map (Council for Geosciences, Pretoria) (**Figure 3, Table 3**). This map indicates that the proposed development is completely underlain by the Precambrian dolomites and associated marine sedimentary rocks of the of the Malmani Subgroup (Vmd, light blue; Chuniespoort Group, Transvaal Supergroup). The Malmani Subgroup in this area is undifferentiated. According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) the Palaeontological Sensitivity of the Malmani Subgroup is

Very High (Almond et al, 2013; SAHRIS website; **Figure 4; Table 5**). Updated geology (Council of Geosciences, Pretoria) refines the geology and also indicates that the proposed development is underlain by the Malmani Subgroup (**Figure 5**). The Palaeotechnical report of the North West Province (Groenewald et al., 2014) indicates that the Malmani Subgroup has a High Palaeontological Sensitivity (**Table 4**). The National Environmental Web-based Screening Tool (**Figure 6**) indicates that the Palaeontological Sensitivity of the development is Very High (dark red).

The Malmani Subgroup is subdivided into five formations (**Figure 7**) that are classified by the amount of chert, stromatolitic morphology, erosion surfaces and intercalated shales in them. The Malmani Subgroup overlies the Black Reef Formation. The oldest Formation in the Malmani Subgroup is the Oaktree Formation that consists of stromatolitic dolomites, carbonaceous shales, and locally developed quartzites. This formation overlies the (Monte Christo Formation that comprises of stromatolitic and oolitic platform dolomites as well as erosive breccia. The Lyttleton Formation overlies the Monte Christo Formation and consists of stromatolitic dolomites as well as shale quartzites. The Eccles Formation follows and comprises of erosional breccias while the youngest Formation is the Frisco Formation that mostly comprises of stromatolitic dolomites.

The Malmani Subgroup carbonates of the Transvaal Basin (**Figure 7**) comprise of an assortment of stromatolites (microbial laminates), ranging from supratidal mats to intertidal columns and large subtidal domes (Eriksson *et al.* 2006). Stromatolites are layered mounds, columns and sheet-like sedimentary rocks (Figure 6). These structures were originally formed by the growth of layer upon layer of cyanobacteria, a single-celled photosynthesizing microbe. Cyanobacteria are prokaryotic cells (simplest form of modern carbon-bases life). Stromatolites are first found in Precambrian rocks and are known as the earliest known fossils. These algae photosynthesised in the low oxygen atmosphere and deposited layer upon layer of calcium sulphate, magnesium sulphate and calcium carbonate as well as other compounds to form these domes. Researchers have examined and classified the stromatolite structures but seldomly find preserved algal cells. The oxygen atmosphere that we depend on today was generated by numerous cyanobacteria photosynthesizing during the Archaean and Proterozoic Era.

Stromatolites and oolites from the Transvaal Supergroup have been described by various authors (Eriksson and Altermann, 1998). Detailed descriptions of South African Archaean stromatolites are available in the literature (Altermann, 2001; Buick, 2001; and Schopf, 2006). The Malmani stromatolites literature includes articles by Truswell and Eriksson (1972, 1973, 1975), Eriksson and MacGregor (1981), Eriksson and Altermann (1998), Sumner (2000), Schopf (2006).

The Malmani Subgroup succession is about 2 km-thick and consists of a series of formations of oolitic and stromatolitic carbonates (limestones and dolomites), black carbonaceous shales and minor secondary cherts. The Malmani Dolomites also consist of historic lime mines, and palaeocave fossil deposits. Dolomite (limestone rock) forms in warm, shallow seas from slow gathering remainders of

marine microorganisms and fine-grained sediment. Dolomites of the Malmani Subgroup has a higher magnesium content than other limestones. These materials contain high levels of calcium carbonate and are often referred to as *carbonates*.

Currently very few palaeontologists study stromatolites but geologists find the stromatolites interesting because they reveal the change from a reducing environment (that is an oxygen-poor) to an oxidizing environment (oxygen--rich). This transition is known as the Great Oxygen Event (Eroglu et al., 2017).

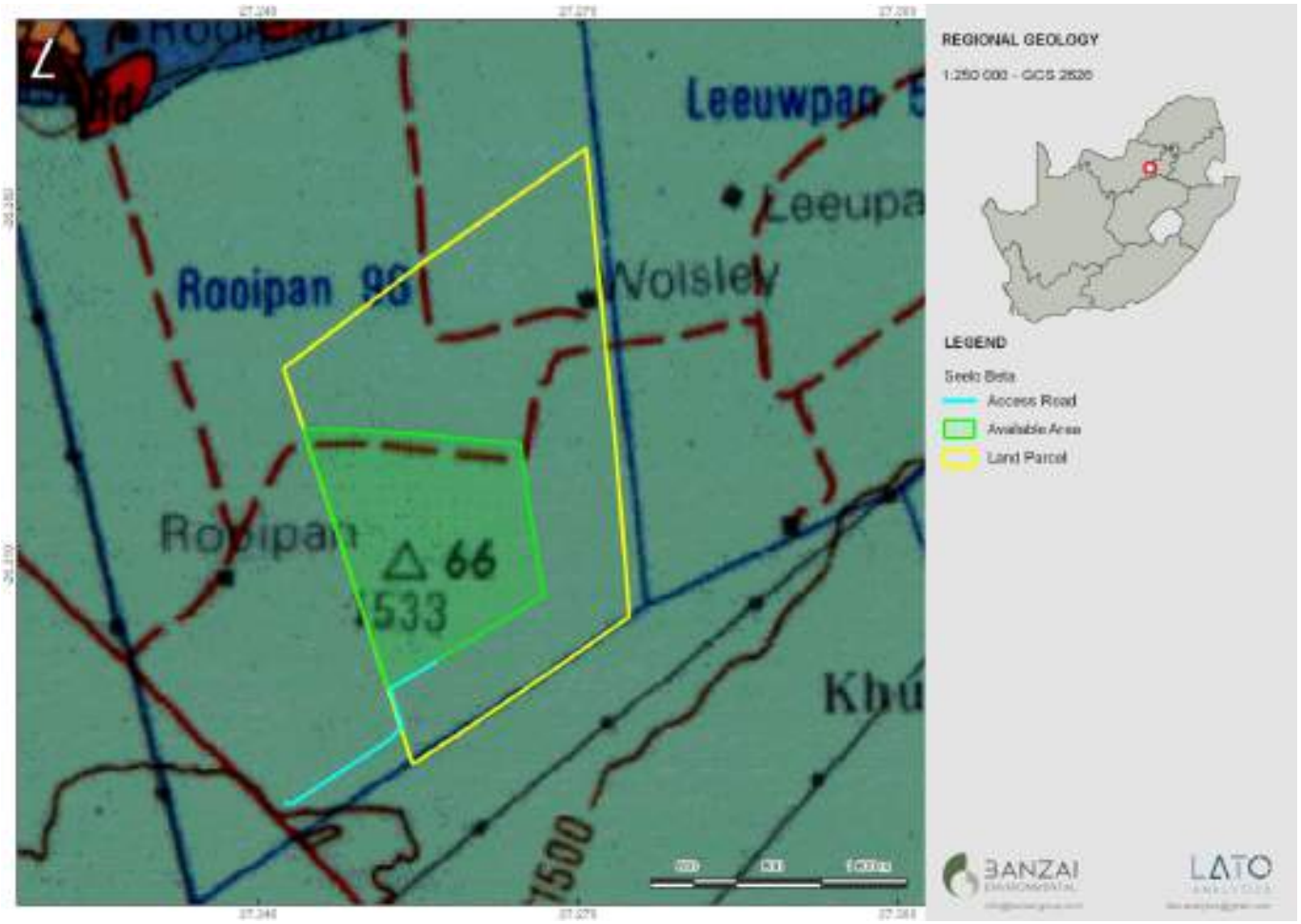


***Figure 3**: Extract of the 1:250 000 West Rand 2626 (1986) Geological Map (Council of Geoscience, Pretoria) indicating that the Seelo Beta Solar PV development is underlain by the Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup).*

Table 3: Legend of the 2626 West-Rand (1986) Geological Map (Council for Geoscience, Pretoria). Relevant sediments are indicated in a red square.

Table 4: Extract of the Palaeotechnical Report of North West Province (Groenewald, et al., 2014) indicating the Superficial sediments.

TRANSVAAL	PRETORIA		Magaliesberg (Vmg)(Vlm)		Coastal sandstones with mudrocks	Microbial mat structures (Desiccated mats sometimes resemble trace fossils)	Pretoria Group subunits with stromatolites probably also contain microfossils. This may also apply to carbonaceous mudrocks. ALERT FOR POTENTIALLY FOSSILIFEROUS LATE CAENOZOIC CAVE BRECCIAS WITHIN OUTCROP AREA OF CARBONATE SUBUNITS – i.e. LIMESTONES & DOLOMITES (breccias not individually mapped) Rooiberg Group was previously included within top of Transvaal Supergroup but now regarded as separate succession
			Silverton (Vsi)		Marine mudrocks with minor carbonates, volcanic rocks (= Machadodorp Member)	Stromatolites	
			Igneous intrusions (Vdi)		Igneous intrusions	No fossils recorded	
			Daspoort (Vda, Vhd, Vdq; Vdp)		Alluvial, fluvial and deltaic sandstones and mudrocks, marine sediments in east	Stromatolites	
			Strubenkop (Vs, Vst; Vhd)		Lacustrine mudrocks with minor sandstone	No fossils recorded	
			Dwaalheuwel (Vdw, Vhd)		Alluvial sandstones, conglomerates and mudrocks	No fossils recorded	
			Hekpoort (Vh, Vhd, Vha)		Volcanics (basalts, pyroclastics) with minor lacustrine shales	No fossils recorded	
			Boshoek (Vb)		Sandstones, conglomerats, diamictite (alluvial fans, slumps)	No fossils recorded	
			Timeball Hill (Vt; Vti)	Klapperkop (Vkp)	Lacustrine and fluvio-deltaic mudrocks with diamictite, conglomerates, quartzite, minor lavas. Shale, siltstone, conglomerate, quartzite	Stromatolites	
			Rooihoogte (Vt)		Basal breccio-conglomerates, quartzites, mudrocks, carbonates (alluvial fan, lakes, karst infill)	No fossils recorded	
	CHUNIESPOORT		Duitschland (Vd)		Conglomerate	No fossils recorded	Good examples of stromatolites in Cradle of Humankind region ALERT FOR POTENTIALLY FOSSILIFEROUS LATE CAENOZOIC CAVE BRECCIAS WITHIN "TRANSVAAL DOLOMITE" OUTCROP AREA (breccias not individually mapped)
			Penge (Vp)		Iron-rich shale	Stromatolites	
		Malmani (Vm; Vmd; Vma)			Stromatolitic carbonates (limestones / dolomites), minor secondary cherts, mudrocks including carbonaceous shales	Range of shallow marine to intertidal stromatolites (domes, columns etc), organic-walled microfossils	
			Black Reef (Vbr)		Siliciclastic sediments (mature sandstones plus minor mudrocks, conglomerates) deposited during a fluvial to shallow marine transition	Possible equivalent of Black Reef Fm in N. Cape (Vryburg Formation) contains stromatolitic carbonates	

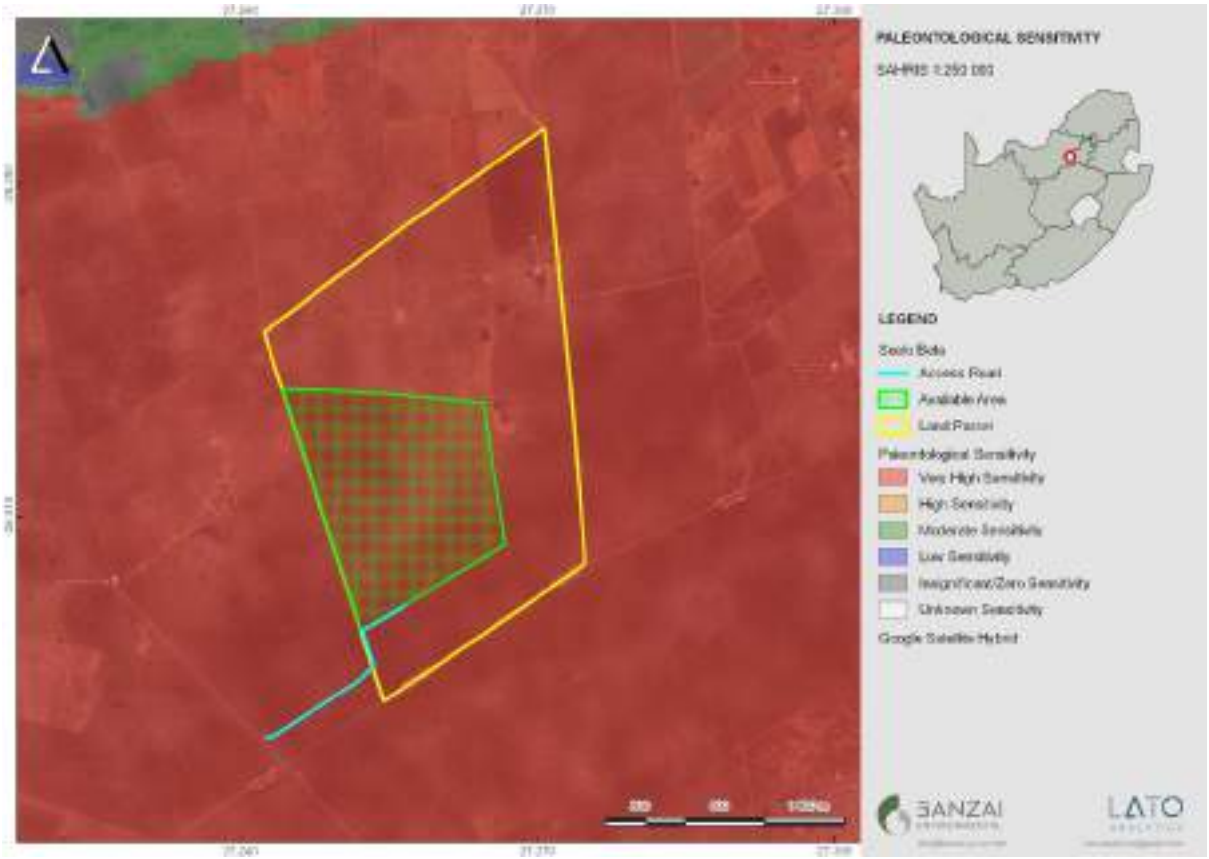


***Figure 4**: Extract of the 1: 250 000 SAHRIS PalaeoMap map (Council of Geosciences) indicating the proposed Seelo Beta Solar PV development.*

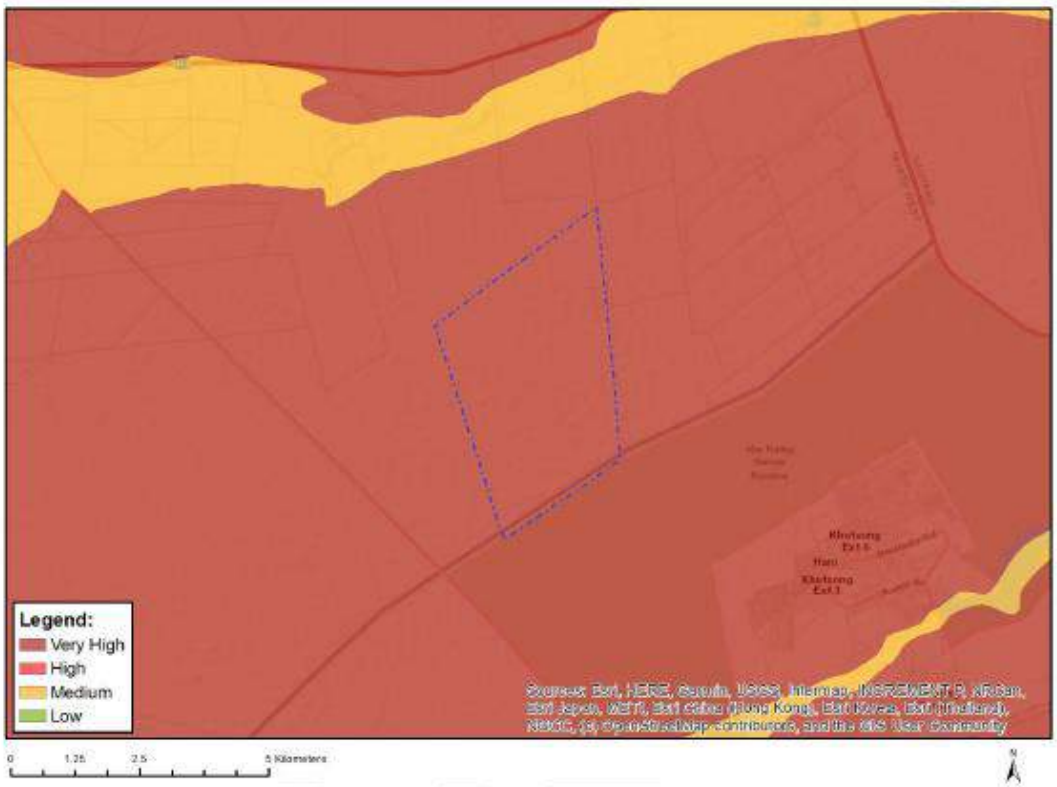
Table 5: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website).

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

The PalaeoMap of the South African Heritage Resources Information System (**Figure 4, Table 5**) indicates that the Palaeontological Sensitivity of the Seelo Beta Solar PV development is Very High (red) (Almond and Pether, 2009; Almond *et al*., 2013).

***Figure 5**: Updated Geology (Council of Geosciences) indicates that the proposed Seelo Beta Solar PV development and associated infrastructure is underlain by the Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup).*

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

***Figure 6**: Palaeontological Sensitivity of the Seelo Beta Solar PV by the National Environmental Web-bases Screening Tool.*

The National Environmental Web-based Screening Tool indicates that the Palaeontological Sensitivity of the development is Very High (dark red).

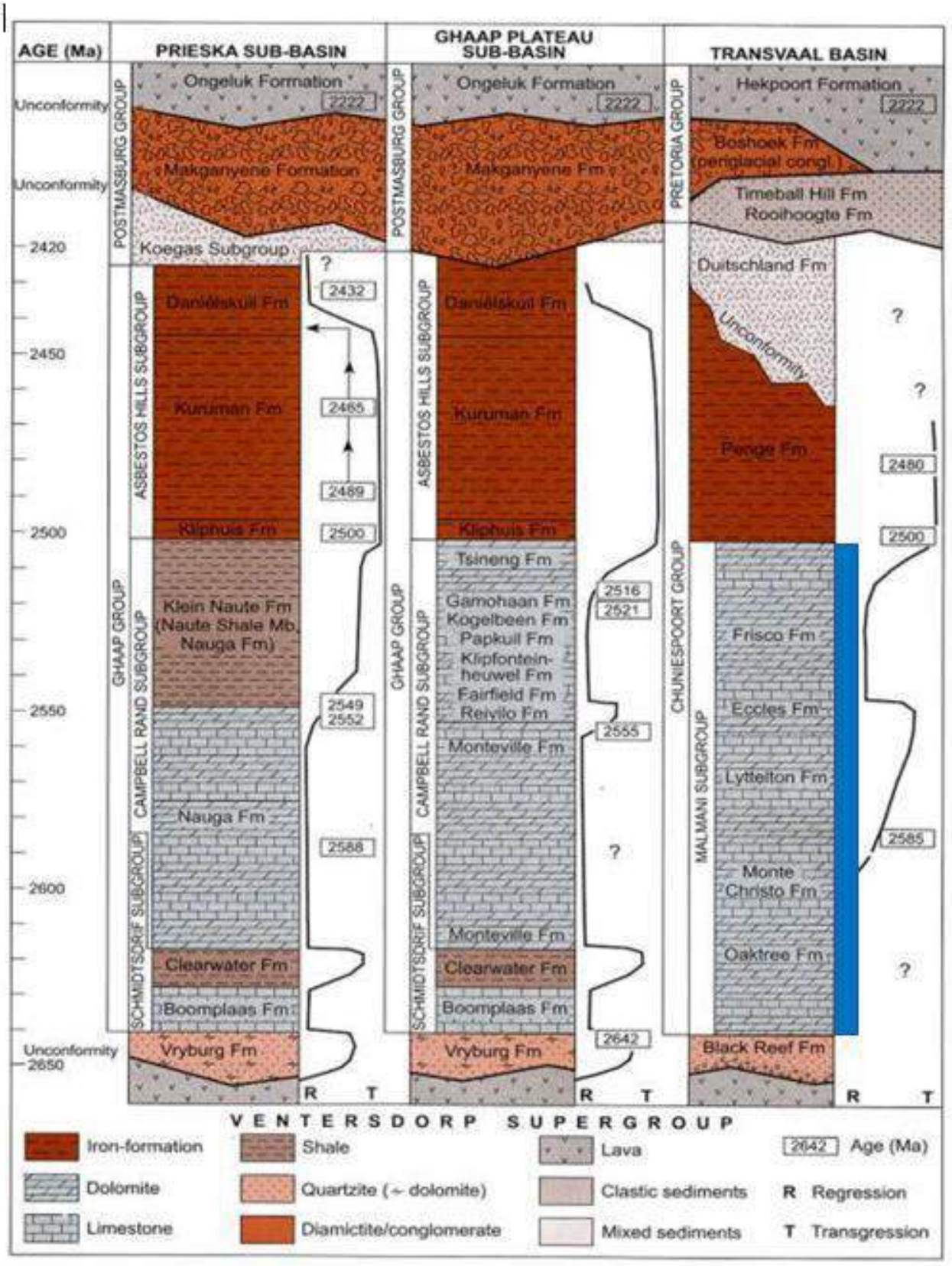


Figure 7: *Stratigraphy of the Transvaal Supergroup of the Transvaal Basin. The proposed sediments underlying the development is indicated in blue (Eriksson, et al. 2006).*

The general Palaeontological Sensitivity of the area is Low to Very High (see SAHRIS Palaeomap (**Figure 4)**. However, it is important to note that the quality of preservation of these different sites will most probably vary and it is thus difficult to allocate a Cumulative Sensitivity to the projects. If all the mitigation measures are carried out, a conservative estimate of the Cumulative impacts on fossil Heritage will vary between Low and Medium.

7 GEOGRAPHICAL LOCATION OF THE SITE

The proposed development is located at the boundary between North West and Gauteng Province and falls within the Dr Kenneth Kaunda District Municipality (DKKDM) and the JB Marks Local Municipality (JBMLM). The site is located approximately 13km to the north-west of the town of Carletonville. The D331 road bisects the site **(Figure 1-2**).

8 ADDITIONAL INFORMATION CONSULTED

In compiling this report the following sources were consulted:

- The site sensitivity is established through the National Environmental Web-Based Screening Tool
- The Site is mapped on the relevant Geological Map to determine the underlying geology of the development
- Then the site is mapped on the South African Heritage Resources Information System (SAHRIS) PalaeoMap, and the Sensitivity of the proposed development established.
- Other information is obtained by using satellite imagery and
- Palaeontological Impact Assessments and Desktop Assessments of projects in the same area are studied.
- A comprehensive site-specific field survey of the development footprint for the combined projects was conducted on foot and motor vehicle by Banzai Environmental in March 2023.
- Geological map 1:100 000, Geology of the Republic of South Africa (Visser 1984)
- A Google Earth map with polygons of the proposed development was obtained from Nemai Environmental.
- 1: 250 000 West-Rand 2626 (1986) Geological Map (Council for Geosciences, Pretoria).

9 SITE VISIT

A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on 13 March 2023. No fossiliferous outcrops were identified in the development site.

***Figure 8**: General view overlooking the development depicts open plains with grassy vegetation.*

***Figure 9**: Surface dolomites on the south western margin of the development.*

10 IMPACT ASSESSMENT METHODOLOGY

10.1 Method of Environmental Assessment

The environmental assessment aims to identify the various possible environmental impacts that could results from the proposed activity. Different impacts need to be evaluated in terms of its significance and in doing so highlight the most critical issues to be addressed.

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e., site, local, national, or global whereas intensity is defined by the severity of the impact e.g., the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table below.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

10.2 Impact Rating System

Impact assessment must take account of the nature, scale, and duration of impacts on the environment whether such impacts are positive or negative. Each impact is also assessed according to the project phases:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance should also be included. The rating system is applied to the potential impacts on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact, the following criteria is used:

Table 6: The rating system

NATURE		
The Nature of the Impact is the possible destruction of fossil heritage		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact.		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
DURATION		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	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).
2	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).

3	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).
4	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.
INTENSITY/ MAGNITUDE		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	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).
3	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.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
REVERSIBILITY		
This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.

3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible, and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.
4	High cumulative impact	The impact would result in significant cumulative effects
SIGNIFICANCE		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: (**Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity = X.** The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	Impact significance rating	Description

6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive

Table 7:Summary of Impact ratings

(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.

	Extent	Duration	Magnitude	Reversibility	Irreplicable loss	Cumulative effect	Impact Significance
Pre-Mitigation	1	4	3	4	4	2	45
Post-Mitigation	1	4	1	4	4	2	15

11 FINDINGS AND RECOMMENDATIONS

The Seelo Beta 240 MW Solar PV and Battery Energy Storage Systems (BESS) Project is entirely underlain by 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 (Almond *et al*, 2013; SAHRIS website). The Very High Palaeontological Sensitivity of the development triggered a site investigation. Updated Geology refined the geology of the original geological maps and also indicate that the proposed development is entirely underlain by the Malmani Subgroup.

A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on the weekend of the 13 March 2023. No fossiliferous outcrops were detected during the site visit. Based on the site investigation as well as desktop research it is concluded that fossil heritage of scientific and conservational interest in the development footprint is rare. This is in contrast with the High Sensitivity allocated to the development area by the SAHRIS Palaeosensitivity Map and DFFE Screening Tool. **A medium Palaeontological Significance has been allocated for the construction phase of the PV development pre-mitigation and a low significance post mitigation**. The construction phase will be the only development phase impacting Palaeontological Heritage and **no significant impacts are expected to impact the Operational and Decommissioning phases**. As the No-Go Alternative considers the option of 'do nothing' and maintaining the status quo, it will have a Neutral impact on the Palaeontological Heritage of the development. The **Cumulative impacts of the development near Carletonville 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. **The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.** It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

If significant fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the **Chance Find Protocol** must be implemented by the ECO/site manager in charge of these developments. These discoveries ought to be protected (if possible, *in situ*) and the ECO/site manager must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carry out by a paleontologist.

Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies suggested by SAHRA.

12 CHANCE FINDS PROTOCOL

The following procedure will only be followed if fossils are uncovered during the excavation phase of the development.

Legislation

Cultural Heritage in South Africa (includes all heritage resources) is protected by the **National Heritage Resources Act (Act No 25 of 1999) (NHRA).** According to Section 3 of the Act, all Heritage resources include **"all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens**".

Palaeontological heritage is unique and non-renewable and is protected by the NHRA and are the property of the State. It is thus the responsibility of the State to manage and conserve fossils on behalf of the citizens of South Africa. Palaeontological resources may not be excavated, broken, moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

A fossil is the naturally preserved remains (or traces thereof) of plants or animals embedded in rock. These organisms lived millions of years ago. Fossils are extremely rare and irreplaceable. By studying fossils, it is possible to determine the environmental conditions that existed in a specific geographical area millions of years ago.

This informational document is intended for workmen and foremen on construction sites. It describes the actions to be taken when mining or construction activities accidentally uncovers fossil material.

It is the responsibility of the Environmental Site Officer (ESO) or site manager of the project to train the workmen and foremen in the procedure to follow when a fossil is accidentally uncovered. In the absence of the ESO, a member of the staff must be appointed to be responsible for the proper implementation of the chance find protocol as not to compromise the conservation of fossil material.

Chance Find Procedure

- If a chance find is made the person responsible for the find must immediately **stop working** and all work that could impact that finding must cease in the immediate vicinity of the find.
- The person who made the find must immediately **report** the find to his/her direct supervisor which in turn must report the find to his/her manager and the ESO or site manager. The ESO or site manager must report the find to the relevant Heritage Agency (South African Heritage Research Agency, SAHRA). (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates.
- A preliminary report must be submitted to the Heritage Agency within **24 hours** of the find and must include the following: 1) date of the find; 2) a description of the discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates.
- Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found.
- Upon receipt of the preliminary report, the Heritage Agency will inform the ESO (or site manager) whether a rescue excavation or rescue collection by a palaeontologist is necessary.
- The site must be secured to protect it from any further damage. **No attempt** should be made to remove material from their environment. The exposed finds must be stabilized and covered by a plastic sheet or sand bags. The Heritage agency will also be able to advise on the most suitable method of protection of the find.
- If the fossil cannot be stabilized the fossil may be collected with extreme care by the ESO. Fossils finds must be stored in tissue paper and in an appropriate box while due care must be taken to remove all fossil material from the rescue site.
- Once the Heritage Agency has issued the written authorization, the developer may continue with the development on the affected area.

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APPENDIX A

CURRICULUM VITAE

ELIZE BUTLER

PROFESSION:	Palaeontologist
YEARS' EXPERIENCE:	30 years in Palaeontology
EDUCATION:	B.Sc Botany and Zoology, 1988
	University of the Orange Free State
	B. Sc (Hons) Zoology, 1991
	University of the Orange Free State
	Management Course, 1991
	University of the Orange Free State
	M. Sc. *Cum laude* (Zoology), 2009 University of the Free State

Dissertation title: The postcranial skeleton of the Early Triassic non-mammalian Cynodont *Galesaurus planiceps*: implications for biology and lifestyle

MEMBERSHIP

Palaeontological Society of South Africa (PSSA)	2006-currently

EMPLOYMENT HISTORY

Part time Laboratory assistant	Department of Zoology & Entomology University of the Free State Zoology 1989-1992
Part time laboratory assistant	Department of Virology University of the Free State Zoology 1992
Research Assistant	National Museum, Bloemfontein 1993 – 1997
Principal Research Assistant and Collection Manager	National Museum, Bloemfontein 1998–2022

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PALAEONTOLOGICAL SITE VERIVICATION REPORT

Seelo Beta Solar PV

(Part of the Seelo Solar PV Cluster)

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1. INTRODUCTION

Seelo Beta Solar PV (RF) (Pty) Ltd (the Applicant) has proposed the development of the Seelo Beta 240MW Solar PV and Battery Energy Storage Systems (BESS) Project near the town of Carletonville, in the North West Province (the "Project"). The electricity generated by the Project will be injected into the existing Eskom 132 kV distribution system. The Applicant intends to bid for the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows.

The Project is located in the most eastern part of the North West Province (at the boundary between North West and Gauteng) and falls within the Dr Kenneth Kaunda District Municipality (DKKDM) and the JB Marks Local Municipality (JBMLM). The site is located approximately 13km to the north-west of the town of Carletonville (**Figure S1-S2).**

The property earmarked for the Project covers a combined area of approximately 1130 ha, of which the buildable area determined by the engineering team is approximately 355 ha.

Table S1: Details of the affected properties

Farm Name	**21-digit Surveyor General (SG) Code**
Portion 1 of Farm 96 (Rooipan)	T0IQ00000000009600001

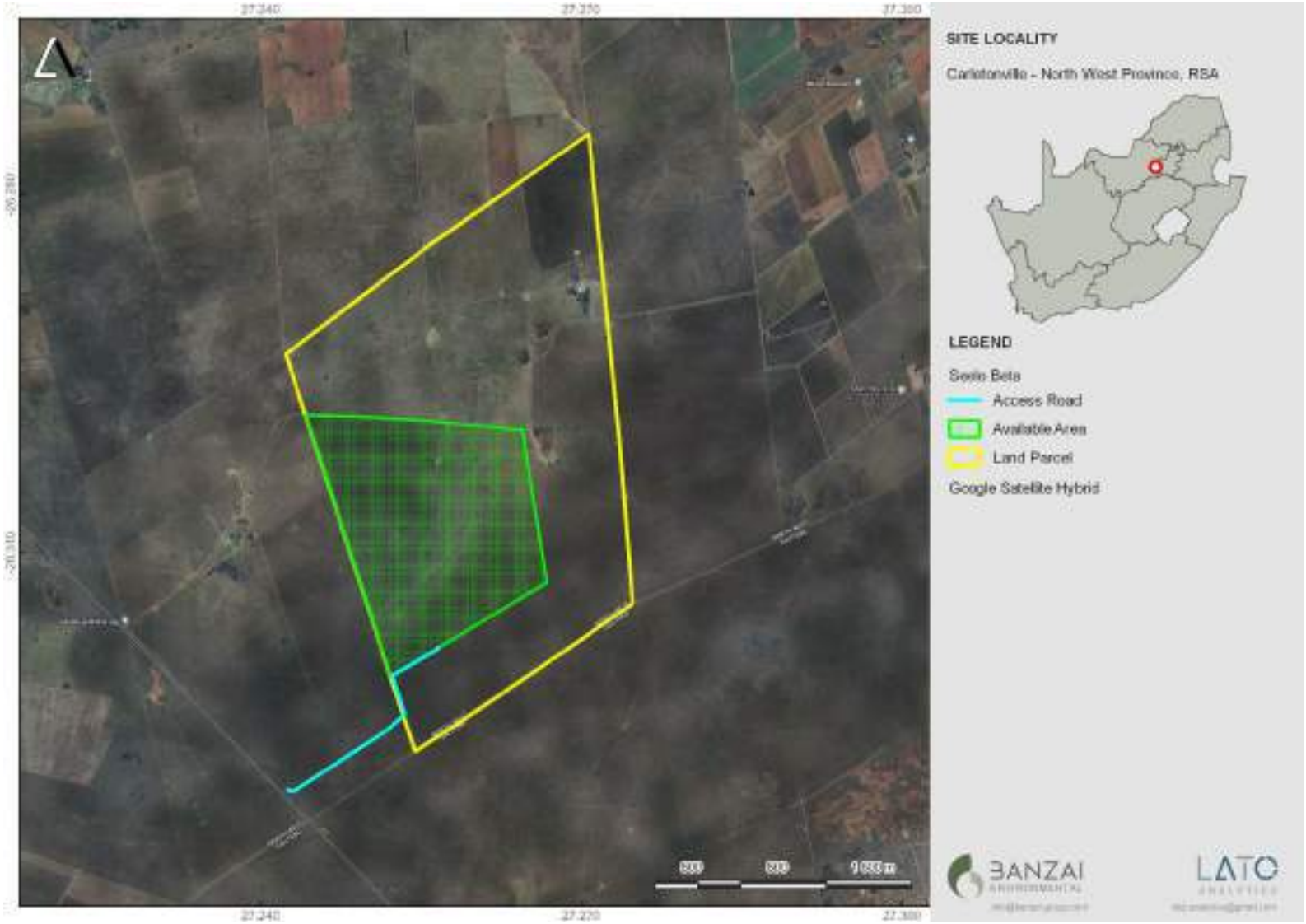


Figure S1: *Regional context of the Seelo Beta Solar PV development.*

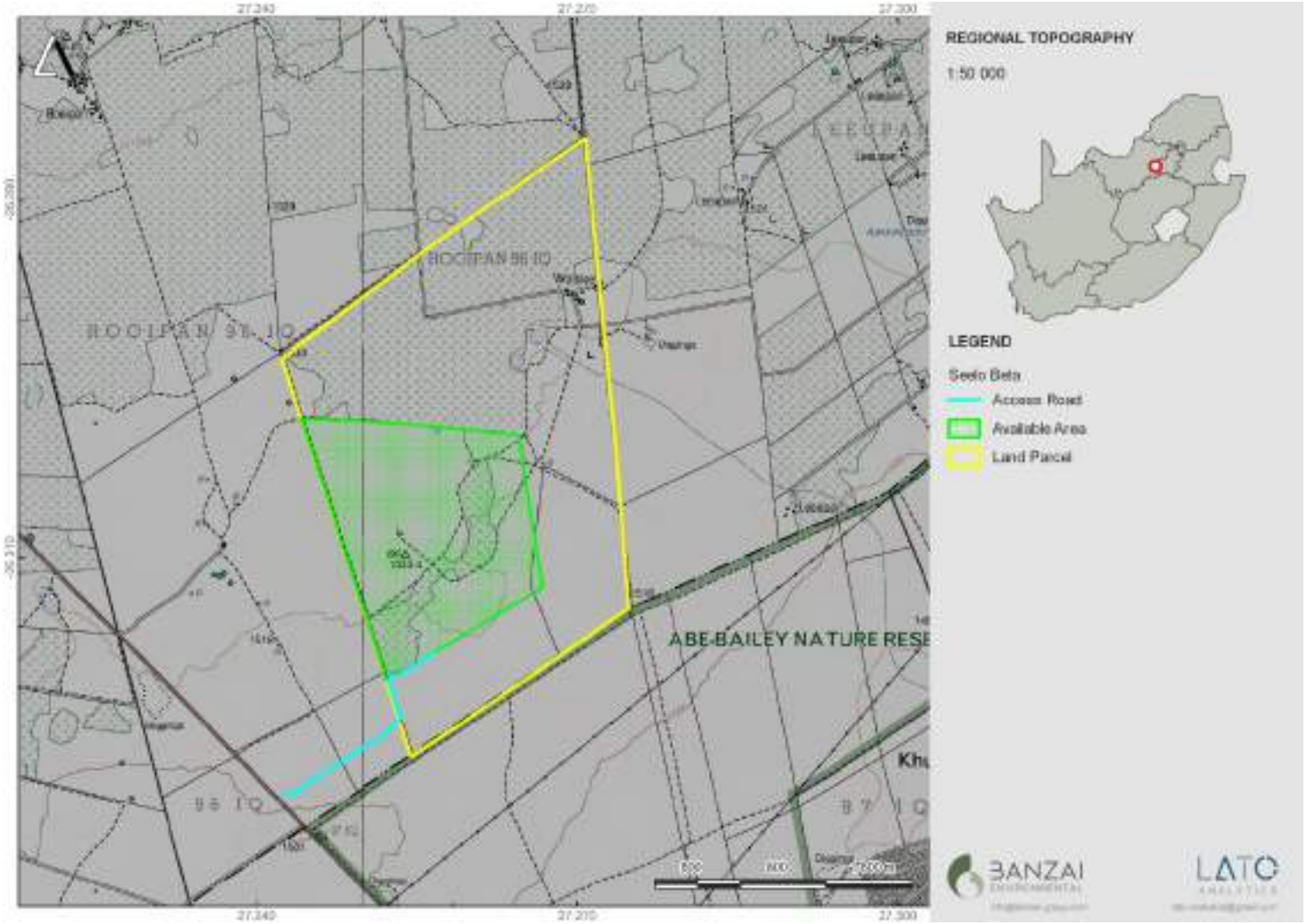


Figure S2: *Local setting map of the proposed Seelo Beta Solar PV development.*

2. TECHNICAL DETAILS FOR THE PROPOSED DEVELOPMENT

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

- PV panel arrays, which are the subsystems which convert incoming sunlight into electrical energy;
- Mounting structures to support the PV panels;
- On-site inverters to convert DC to facilitate AC connection between the solar energy facility and electricity grid;
- BESS);
- IPP substation;
- Eskom switching substation[2];
- Cabling between the Project's components, to be laid underground (where practical);
- Administration Buildings (Offices);
- Workshop areas for maintenance and storage;
- Temporary and permanent laydown areas;
- Internal access roads and perimeter fencing of the footprint;
- High Voltage (HV) Transformers; and
- Security Infrastructure.

In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations [4 December 2014, Government Notice (GN) R982, R983, R984 and R985, as amended), various aspects of the proposed development may have an impact on the environment and are considered to be listed activities. These activities require environmental authorisation (EA) from the Competent Authority (CA), namely the Department of Small Business Development, Tourism and Environmental Affairs (DESTEA), prior to the commencement thereof.

In accordance with GN 320 of 20 March 2020 and GN 1150 of 30 October 2020[3] (i.e., "the Protocols") of the NEMA EIA Regulations of 2014 (as amended), prior to commencing with a specialist assessment, a site sensitivity verification must be undertaken to confirm the current land use and environmental sensitivity of the proposed project area as identified by the National Web-Based Environmental Screening Tool (i.e., Screening Tool). Elize Butler as Palaeontology Specialist have been commissioned to verify the sensitivity of the Seelo Beta Solar PV Cluster and associated infrastructure site under these specialist protocols.

[2] The dedicated grid connection for the proposed Project which includes a 132/33 kV switching substation which does not form part of the current application for EA.

[3] GN 320 (20 March 2020): Procedures for The Assessment and Minimum Criteria for Reporting on 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

3. SITE SENSITIVITY VERIFICATION METHODOLOGY

The Palaeontology Sensitivity Verification was undertaken by the following methodology:

- The site sensitivity is established through the National Environmental Web-Based Screening Tool
- The Site is mapped on the relevant Geological Map to determine the underlying geology of the development
- Then the site is mapped on the South African Heritage Resources Information System (SAHRIS) PalaeoMap, and the Sensitivity of the proposed development established.
- Other information is obtained by using satellite imagery and
- Palaeontological Impact Assessments and Desktop Assessments of projects in the same area are studied.
- A comprehensive site-specific field survey of the development footprint for the combined projects was conducted on foot and motor vehicle by Banzai Environmental in March 2023.

4. OUTCOME OF SITE SENSITIVITY VERIFICATION

The Seelo Beta Solar PV (as part of the Seelo Solar PV Cluster), near Carletonville in the North West Province State is depicted on the 1: 250 000 West-Rand 2626 (1986) Geological Map (Council for Geosciences, Pretoria) (**Figure S3, Table S1**). This map indicates that the proposed development is completely underlain by the Precambrian dolomites and associated marine sedimentary rocks of the of the Malmani Subgroup (Vmd, light blue; Chuniespoort Group, Transvaal Supergroup).

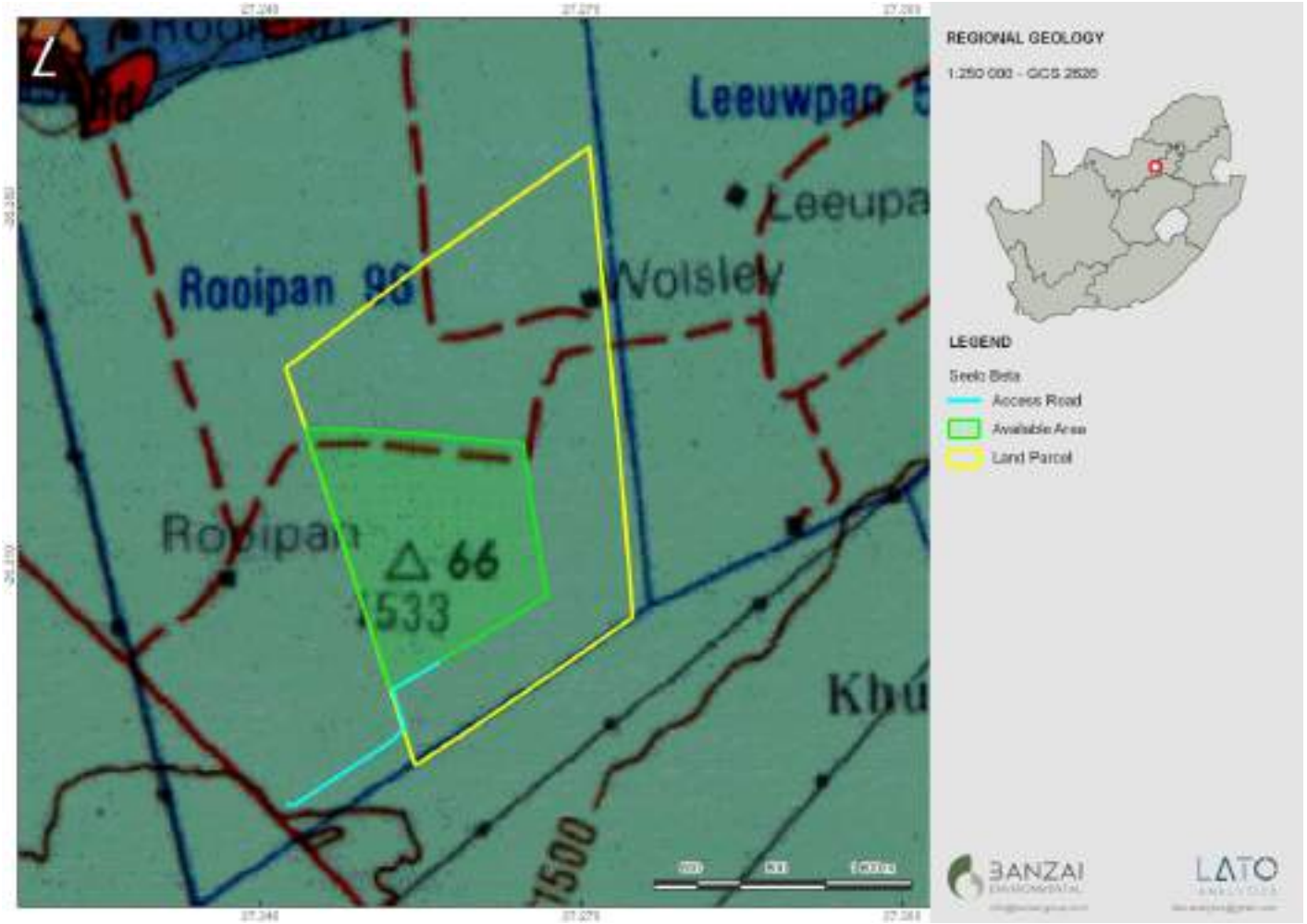
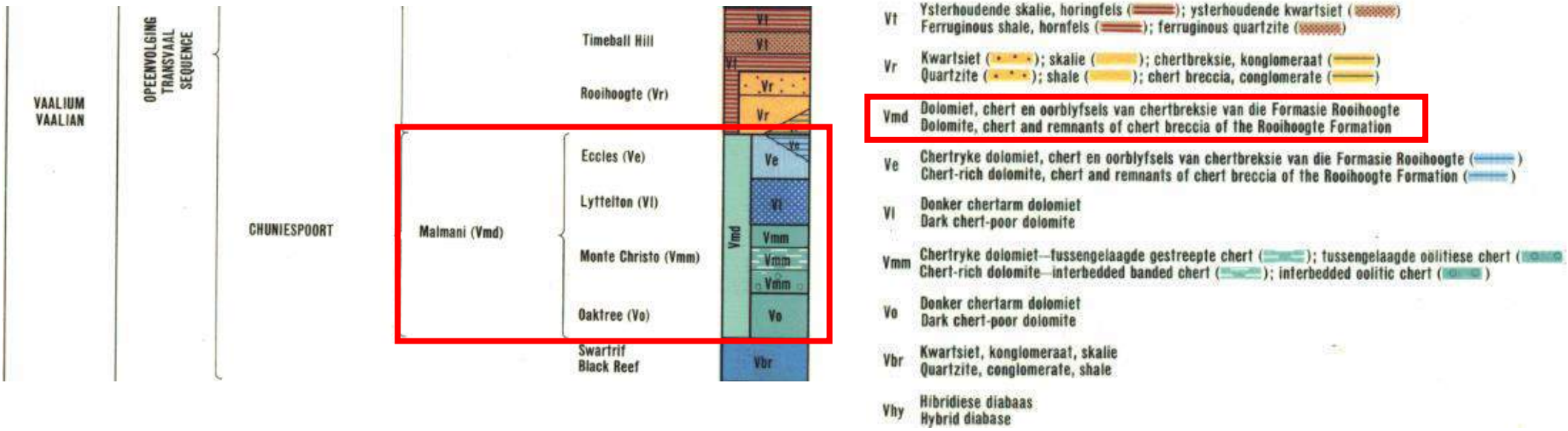


Figure S3: *Extract of the 1:250 000 West Rand 2626 (1986) Geological Map (Council of Geoscience, Pretoria) indicating that the Seelo Beta Solar PV development is underlain by the Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup).*

Table S2 Legend of the 2626 West-Rand (1986) Geological Map (Council for Geoscience, Pretoria).

Relevant sediments are indicated in a red square



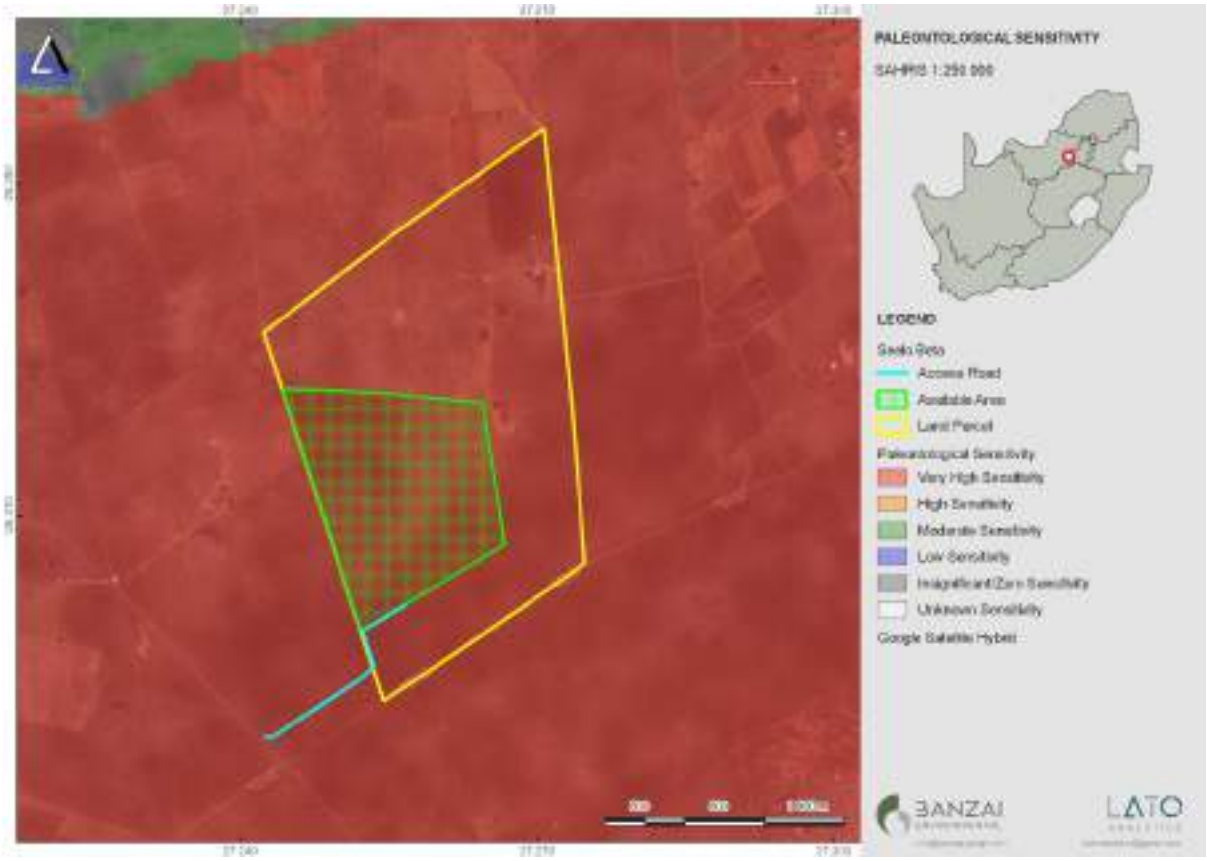


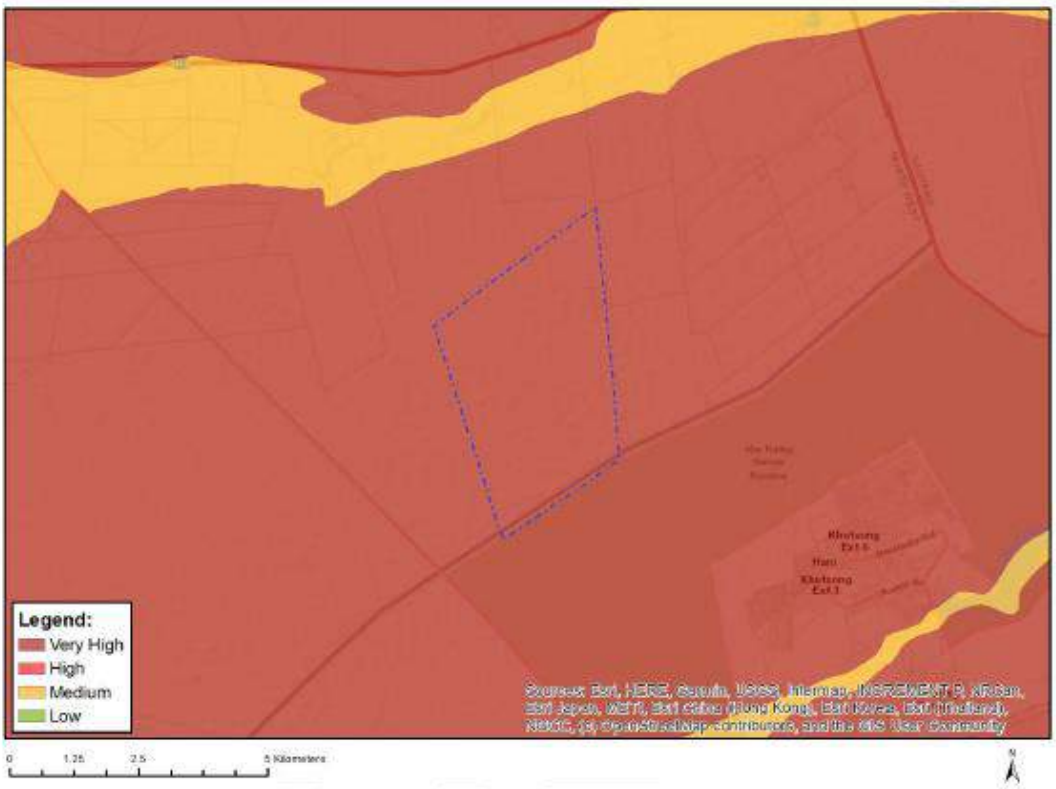
Figure S4: Extract of the 1: 250 000 SAHRIS PalaeoMap map (Council of Geosciences) indicating the proposed Seelo Beta Solar PV development.

The SAHRIS Palaeomap indicates that the Palaeontological Sensitivity of the proposed development is underlain by sediments with a Very High (red) Palaeontological Sensitivity.

Table S3: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website).		
Colour	**Sensitivity**	**Required Action**
RED	**VERY HIGH**	**field assessment and protocol for finds is required**
ORANGE/YELLOW	HIGH	desktop study is required and based on the outcome of the desktop study; a field assessment is likely
GREEN	**MODERATE**	**desktop study is required**
BLUE	LOW	no palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	no palaeontological studies are required
WHITE/CLEAR	UNKNOWN	these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

The PalaeoMap of the South African Heritage Resources Information System (**Figure S3, Table S3**) indicates that the Palaeontological Sensitivity of the Seelo Beta Solar PV development is Very High (red) (Almond and Pether, 2009; Almond *et al*., 2013).

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

Figure S5: Palaeontological Sensitivity of the Seelo Beta Solar PV by the National Environmental Web-bases Screening Tool.

The National Environmental Web-based Screening Tool indicates that the Palaeontological Sensitivity of the development is Very High (dark red).

5. CONCLUSION

The Site Sensitivities of the proposed Seelo Beta Solar PV has been verified and it was found that:

The SAHRIS Palaeosensitivity map indicates that the Palaeontological Sensitivity of the development is Very High.

and

The National Environmental Web-based Screening Tool indicates that the Palaeontological Sensitivity of the development is Very High (dark red).

These maps indicate that the proposed Seelo Beta Solar PV development is highly Sensitive from a Palaeontological point of view. However, a site investigation in March of 2023 did not detect any fossiliferous outcrops. This classification is as far as the impact of the Seelo Beta Solar PV development is concerned is thus contested (National Environmental Web-bases Screening Tool and SAHRIS), based on actual conditions recorded on the ground during the site visit in March 2023. A Low Palaeontological Significance has thus been allocated to the development footprint.

APPENDIX E8: Visual Impact Assessment

SPECIALIST VISUAL IMPACT ASSESSMENT

ENVIRONMENTAL VISUAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED SEELO BETA SOLAR PV PROJECT, NEAR CARLETONVILLE, NORTHWEST PROVINCE, SOUTH AFRICA.

NEMAI CONSULTING

ENVASS GROUP OF COMPANIES

PREPARED FOR:	NEMAI CONSULTING (PTY) LTD
PREPARED BY:	ENVIRONMENTAL ASSURANCE (PTY) LTD.
SUBMITTED TO:	NEIL BRINK
MONTH:	JUNE 2023
REPORT NUMBER:	SPS-VIA-162-23_24
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FINAL REVISION:	15 AUGUST 2023

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Signature			
Date	29-06-2023	04-07-2023	05-07-2023
Final Revision Date	15 August 2023		

DISCLAIMER

DECLARATION OF INDEPENDENCE

I, **Andre Buys**, in my capacity as a specialist consultant, hereby declare that I: -

- Act as an independent consultant;
- Do not have any financial interest in the undertaking of this project, other than remuneration for the work performed in terms of the National Environmental Management Act 107 of 1998;
- Have and will not have vested interest in the proposed and/or existing activity nor will I engage myself in any conflicting interest associated with this project;
- I undertake to disclose and provide to the competent authority any material or information at my disposal regarding this project as required in terms of National Environmental Management Act 107 of 1998;
- Based on the information provided to me by the client and in addition to information obtained during the course of this study, I have presented the results and conclusion with regard to this project to the best of my professional ability;
- I reserve the right to modify aspects pertaining to this study should additional information become available through ongoing research and further work on this field;
- I undertake to have my work peer reviewed on a regular basis by a competent specialist in the field of study; and
- I am duly qualified and experienced to undertake the work at hand.

Andre Buys (Environmental Consultant)

Environmental Consultant	Relevant expertise
Andre Buys	Has completed a B.Sc. in Geography and Geology, followed by a B.Sc. (Hons) Geography and Geology. He has comprehensive experience and knowledge on compliance monitoring, geohydrological studies, project management and specialist reporting. As an environmental consultant, Andre has provided several environmental monitoring assessments, audits and specialist input services.

EXECUTIVE SUMMARY

This report has been prepared by Environmental Assurance (Pty) Ltd. (hereafter referred to as "ENVASS") as an independent environmental consultancy was appointed by Nemai Consultant (Pty) Ltd., to undertake a visual impact assessment for the proposed Seelo Beta 240 MW Solar Facility and Battery Energy Storage Systems (BESS) project northwest of Carletonville, Northwest Province, South Africa (referred to as the "Project"). The electricity generated by the Project will be injected into the existing Eskom 132 kV distribution system. The Applicant intends to bid for the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows. The Project is located in the most eastern part of the North West Province (at the boundary between North West and Gauteng) and falls within the Dr Kenneth Kaunda District Municipality (DKKDM) and the JB Marks Local Municipality (JBMLM). The site is located approximately 13km to the North West of the town of Carletonville. The D331 road bisects the site. The property earmarked for the Project is Portion 1 of Farm 96 (Rooipan) and covers a combined area of approximately 1130 ha, of which the buildable area determined by the engineering team is approximately 355 ha.

The assessment is required as part of an application for Environmental Authorisation (EA) in terms of the National Environmental Management Act (Act 107 of 1998), for the approval of the proposed project. The scope of the assessment focussed on the current visual baseline conditions of the study area and the possibility of the proposed project having a visual impact.

RESULTS AND IMPACT STATEMENT

From the results obtained in this study, it is expected that the construction of the proposed project will contribute to localised visual impacts, however, the visual impacts are expected to be **moderate** if proactively managed. Mitigation measures are recommended under Section 9 to reduce potential visual impacts.

The assessment found that the proposed project itself will have the greatest potential visual impact among those activities assessed. Secondary visual impacts are expected to include dust generation during construction, solar glint and glare, and night-time illumination. Several mitigation measures have been identified to address the anticipated impacts.

The Project could potentially have a moderate visual impact on surrounding land users located near the proposed solar facility and associated infrastructure. This impact may be mitigated to low. The visual impact on the users of roads and the residents and homesteads within the region (i.e., beyond the 5km radius) is expected to be low for the proposed solar energy facility, both before and after the implementation of mitigation measures. The potential visual impact of construction activities on sensitive visual receptors located near to the proposed solar energy facility is likely to be of **moderate** significance and may be mitigated to low. The potential visual impact associated with lighting at the facility at night and daytime glare is expected to be of moderate significance and may be mitigated to low.

The anticipated visual impacts are expected to be of low significance with the implementation of appropriate mitigation, and the project development is not considered to be fatally flawed from a visual perspective.

SPECIALIST'S RECOMMENDATION

Evaluating the assessment, it is the specialist's reasoned opinion that the proposed project be allowed, provided that the findings within this report are considered along with the recommendations made towards the management of the proposed project. All mitigation measures recommended herein should be considered and included in the Environmental Management Programme (EMPr) relevant to the proposed project.

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ACRONYMS

ACRONYM	EXPANSION
BESS	Battery Energy Storage System
DEM	Digital Elevation Model (*also* DTM or "Digital Terrain Model")
DFFE	Department of Forestry, Fisheries and Environment
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
ENVASS	Environmental Assurance (Pty) Ltd.
EMPr	Environmental Management Programme
ESA	Ecological Support Area
GIS	Geographic Information System
GPS	Global Positioning System
IDW	Inverse Distance Weighting
km	Kilometres
LiDAR	Light Detection and Ranging
NEMA	National Environmental Management Act
PV	Photovoltaic
SLR	Single Lens Reflex
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment
VP	Viewpoint
VT	Vegetation Type

GLOSSARY

TERM	DEFINITION
Cumulative impact	Cumulative impacts can result from individually minor but collectively significant activities taking place over a period.
Critical viewpoints	Important points from where viewers will be able to view the proposed or actual development and from where the development impact may be significant.
Environmental Impact Assessment	A public process that is used to identify, predict, or cause the least damage to the environment at a cost acceptable to society, in the long term as well as in the short term.
Field of view	The field of view is the angular extent of the observable world that is seen at any given moment. Humans have an almost 180º forward-facing field of view. Note that human stereoscopic (binocular) vision only covers 140º of the field of view in humans; the remaining peripheral 40º have no binocular vision due to the lack of overlap of the images of the eyes. The lower the focal length of a lens (see below), the wider the field of view.
Focal length	The focal length of a lens is a measure of how strongly the lens converges (focuses) or diverges (defocuses) light. Focal length refers to the "strength" of a lens, in other words how many times the lens magnifies an image (brings it closer) or widens an image (makes it look further away). The standard lens on most Single-Lens Reflex (SLR) cameras have a focal length of 50 mm. Using a 50 mm lens as a start, a 200 mm lens will magnify an image four times (i.e,. 4 x magnification). The focal length of an average human eye is 22 mm.
Impact (Visual)	A description of the effect of an aspect of the development on a specified component of the visual, aesthetic, or scenic environment within a defined time and space.
Land cover	The surface cover of the land usually expressed in terms of vegetation cover or the lack of it. Related to but not the same as Land use.
Land use	What land is used for based on broad categories of functional land cover, such as urban and industrial use and the different types of agriculture and forestry.
Landform	The shape and form of the land surface which has resulted from combinations of geology, geomorphology, slope, elevation, and physical processes.
Landscape	An area, as perceived by people, the character of which is the result of the action and interaction, of natural and/ or human factors.
Landscape character	These are distinct types of landscape that are relatively homogeneous in character. They are generic in nature in that they may occur in different areas in different parts of the country, but wherever they occur, they share broadly similar combinations of geology, topography, drainage patterns, vegetation and historical land use and settlement pattern, and perceptual and aesthetic attributes.
Landscape quality	A measure of the physical state of the landscape. It may include the extent to which typical landscape character is represented in individual areas, the intactness of the landscape and the condition of individual elements.
Landscape value	The relative value that is attached to different landscapes by society. A landscape may be valued by different stakeholders for a variety of reasons.

TERM	DEFINITION
Mitigation	Any action taken or not taken in order to avoid, minimise, rectify, reduce, eliminate, or compensate for actual or potential adverse visual impacts.
Scenic value	Degree of visual quality resulting from the level of variety, harmony and contrast among the basic visual elements.
Sense of place	The character of a place, whether natural, rural or urban. It is allocated to a place or area through cognitive experience by the user.
Viewshed	The theoretical area within which an observer is likely to see a specific structure or area in the landscape. It is generated from a digital terrain model (DTM) made up of 3D contour lines of the landform. Intervening objects, structures or vegetation will modify the view shed at ground level.
Visual absorption capacity (VAC)	The ability of elements of the landscape to "absorb" or mitigate the visibility of an element in the landscape. Visual absorption capacity is based on factors such as vegetation height (the greater the height of vegetation, the higher the absorption capacity), structures (the larger and higher the intervening structures, the higher the absorption capacity) and topographical variation (rolling topography presents opportunities to hide an element in the landscape and therefore increases the absorption capacity).
Visual character	The overall impression of a landscape created by the order of the patterns composing it; the visual elements of these patterns are the form, line, colour and texture of the landscape's components. Their interrelationships are described in terms of dominance, scale, diversity and continuity. This characteristic is also associated with land use.
Visual exposure	Visual exposure is based on distance from the project to selected viewpoints. Visual exposure or visual impact tends to diminish exponentially with distance.
Visual quality	Subjective evaluation of the visible components of the environment by viewers.
Visually sensitive	Areas in the landscape from where the visual impact is readily or excessively encountered.

1. INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

This report has been prepared by Environmental Assurance (Pty) Ltd. (hereafter referred to as "ENVASS") as an independent environmental consultancy that was appointed by Nemai Consultant (Pty) Ltd., to undertake a visual impact assessment for the proposed Seelo Beta 240 MW Solar Facility and Battery Energy Storage Systems (BESS) project northwest of Carletonville, Northwest Province, South Africa (referred to as the "Project"). The electricity generated by the Project will be injected into the existing Eskom 132 kV distribution system. The Applicant intends to bid for the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows.

The assessment is required as part of an application for Environmental Authorisation (EA) in terms of the National Environmental Management Act (Act 107 of 1998), for the approval of the proposed project. The scope of the assessment focussed on the current visual baseline conditions of the study area and the possibility of the proposed project having a visual impact.

1.2 LOCALITY

The Project is located in the most eastern part of the North West Province (at the boundary between North West and Gauteng) and falls within the Dr Kenneth Kaunda District Municipality (DKKDM) and the JB Marks Local Municipality (JBMLM). The site is located approximately 13km to the North West of the town of Carletonville. The D331 road bisects the site. The property earmarked for the Project is Portion 1 of Farm 96 (Rooipan) IQ and covers a combined area of approximately 1130 ha, of which the buildable area determined by the engineering team is approximately 355 ha (Figure 1).

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, one (1) renewable energy application have been made for properties that are located within a 30km radius of the PV Site. The closest renewable energy application, which is located approximately 30km east of the proposed site, is the 200MW PV facility for Sibanye Gold Limited on Portion 1, 2, 4, 5 and 6 of the Farm Uitval 280 within the Westonaria Local Municipality in the Gauteng Province (Application 14/12/16/3/3/2/919), (status: Approved) (Nemai Consulting).

The proposed site ranges from approximately 1530 to 1510 metres above mean sea level (mamsl), with a relatively steep slope (decrease in elevation slope) towards the south-southeast and south southwest (Figure 3 and 4). Figure three depicts details of the site by assessing a general east to west cross section. The elevation gain/loss: 4.95 meters, - 18.3 meters. The maximum slope is 2.4 %, - 3.7 % with an average slope of 0.5 %; - 0.8 % (distance of 3.34 km). Figure four depicts

details of the site by assessing a general north to south cross section. The elevation gain/loss: 10.6 meters, - 22.70 meters. The maximum slope is 2.7 %, - 3.1 % with an average slope of 0.5 %; - 0.9 % (distance of 4.43 km).

The vegetation in the area consists mainly of grasses (natural grassland), shrubs, trees, rain fed commercial crops, open woodlands and fallow lands / old fields. The study area is surrounded by agricultural activities whilst the majority of the study area is currently utilized for grazing of livestock and game. The surrounding area includes several reserves and game farms, which are home to a variety of wildlife species. Overall, the landscape and terrain around study area typical of the Highveld region of South Africa, consisting of dominant Carletonville Dolomite Grassland type vegetation.

1.3 ACTIVITY DESCRIPTION

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

- PV panel arrays, which are the subsystems which convert incoming sunlight into electrical energy;
- Mounting structures to support the PV panels;
- On-site inverters to convert DC to facilitate AC connection between the solar energy facility and electricity grid;
- BESS;
- IPP substation;
- Eskom switching substation;
- Cabling between the Project's components, to be laid underground (where practical);
- Administration Buildings (Offices);
- Workshop areas for maintenance and storage;
- Temporary and permanent laydown areas;
- Internal access roads and perimeter fencing of the footprint;
- High Voltage (HV) Transformers; and
- Security Infrastructure.

The project can be separated into three (3) phases namely the construction, operational and decommissioning phases. Per phase the following activities can conceivably occur and not limited.

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

Table 1: Technical details of the proposed PV Plant (Nemai Consulting CC Scope Report)

No.	Component	Description / Dimensions
1.	Height of PV panels	± 1 – 6 m
2.	Area of Project	± 355 ha
3.	Area of PV arrays only	Total area of ± 345 ha
4.	Number of PV modules	± 525 000
5.	Number of inverters required	Approximately 70
6.	Area occupied by inverter / transformer stations / substations	Area occupied by inverter stations (± 70 inverter stations) = ± 0.5 ha Area occupied by the facility transformer stations = ± 0.5 ha Area occupied by facility (step-up/switching) substation = ± 3ha
7.	Capacity of on-site substation	132 kV/33kV
8.	Area occupied by both permanent and construction laydown areas	Construction laydown areas = ± 2 ha Operation & Maintenance infrastructure = ± 1 ha Total combined = ± 3 ha
9.	BESS Footprint	BESS = ± 3 ha
10.	Buildings	± 3 ha Including Operational Control Centre, Operation and Maintenance Area / Warehouse / Workshop and Office, Ablution Facilities and Substation Building
11.	Length of internal roads	± 18 km
12.	Width of roads	The internal roads = 12 m reserve and road width of 6 m Access roads = 14 m reserve and road width of 8 m
13.	Proximity to grid connection	Approximately 12.5 km 132 kV transmission line from PV site to existing Eskom's Carmel Main Transmission Substation
14.	Height of fencing	± 3.5 m
15.	Type of fencing	Type will vary (e.g., welded mesh, palisade and electric fencing)

Figure 3 below is a representation of the study area, including the proposed infrastructure layout.

Figure 1: Project locality and layout map

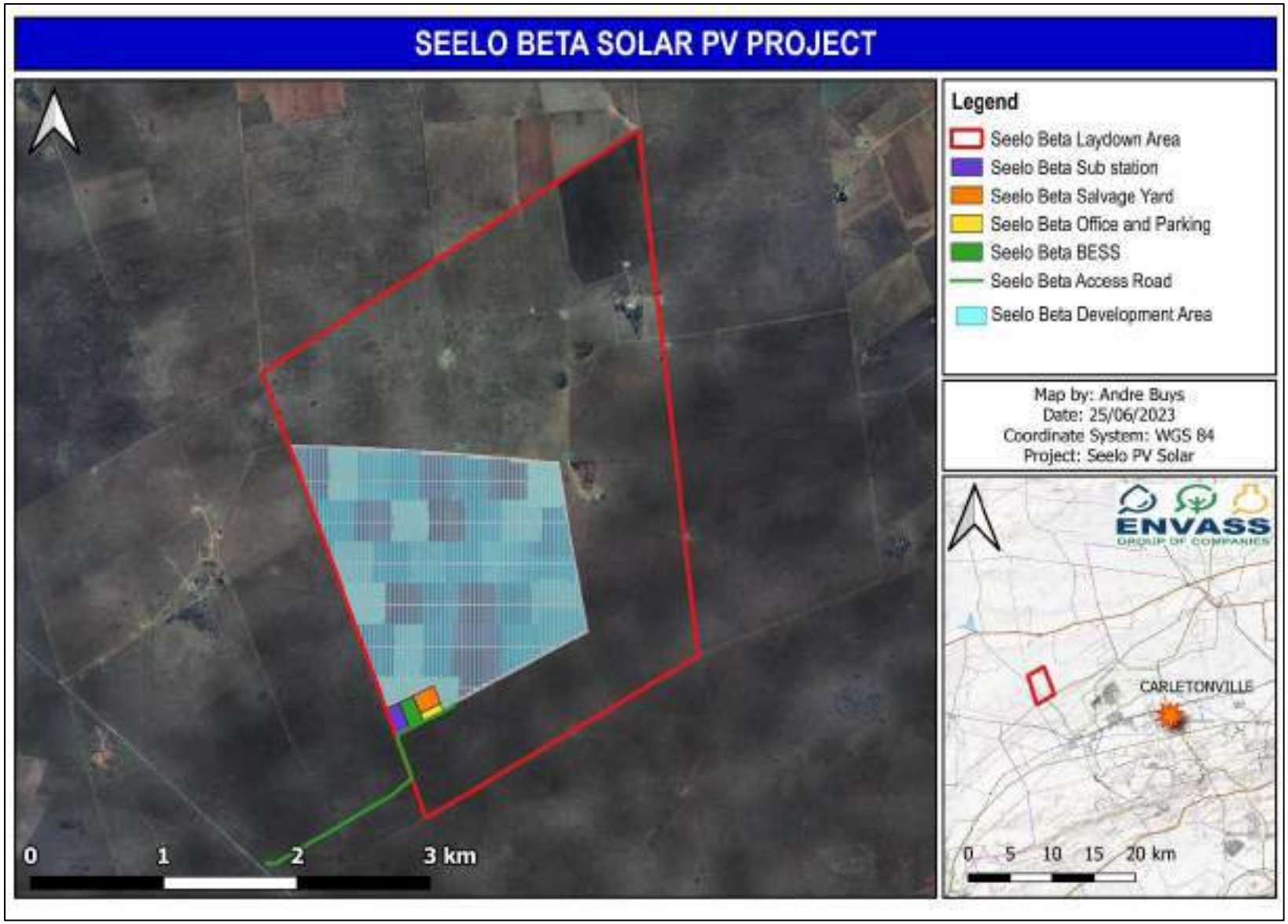

Figure 2: Infrastructure Map

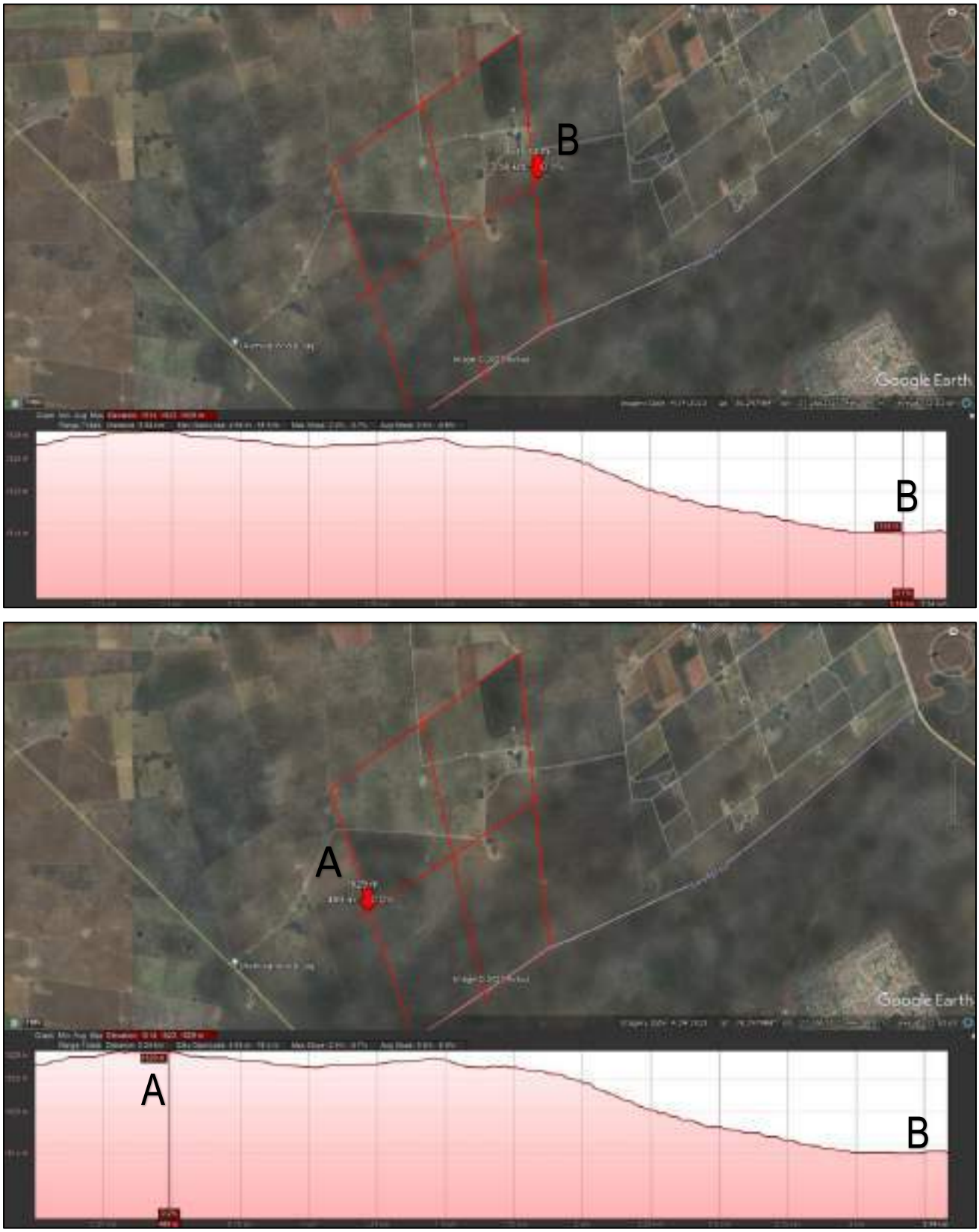

Figure 3: Elevation Profile (maximum elevation at point A and minimum at point B)

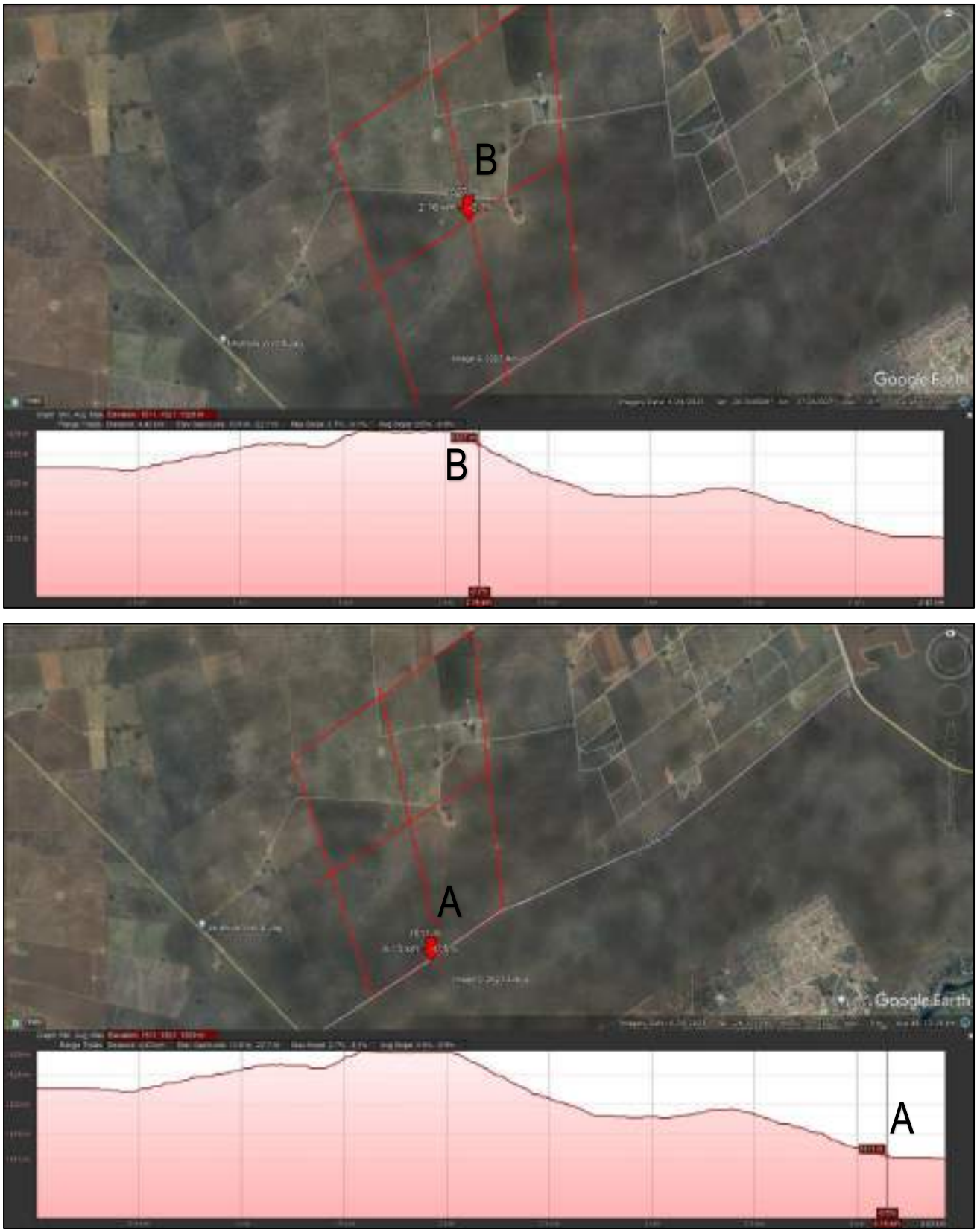

Figure 4: Elevation Profile (maximum elevation at point B and minimum at point A)

1.4 DELINEATION OF THE VISUAL STUDY AREA

The study area for the VIA comprises of the spatial extent of the project footprint and related activities, as well as an associated buffer area. For the purposes of this VIA, the study area was defined as a ten (10) km radius around the physical footprint of all surface components of the project. The distance of ten (10) km was selected based on the location of sensitive receptors, topography, and the elevation of the proposed area. For the purposes of this VIA, the term 'site' refers to the area that will be physically affected by the proposed activities. Similarly, the term 'study area' refers to the area that will potentially be visually affected by the project and represents the ten (10) km radius buffer around the visible components of the proposed infrastructure.

2. LEGISLATIVE CONTEXT AND REFERENCES

Section 28 of the National Environmental Management Act (NEMA, Act 107 of 1998) places a duty of care on any person causing, has caused or may cause significant pollution or degradation of the environment to take reasonable measures to prevent such pollution or degradation from occurring, continuing, or, insofar as such harm to the environment is authorised by law or cannot be reasonably avoided or stopped and rectify such pollution of the environment. The measures required in terms of subsection (1) may include measures to:

- Investigate, assess, and evaluate the impact on the environment.
- Inform and educate employees on the environmental risk of their work and the way tasks must be performed in order to avoid causing significant pollution or degradation of the environment.
- Cease, modify or control any activity or processes causing pollution or degradation.
- Contain or prevent the movement of pollutants or the cause of degradation.
- Eliminate any source of the pollution or degradation; or
- Remedy the effects of pollution or degradation.

In addition to this, the Protected Areas Act (57 of 2003) Section 17 is intended to protect natural landscapes and the National Heritage Resources Act (25 of 1999) provides legislated protection for listed proclaimed sites such as urban conservation areas, natural reserves and proclaimed scenic routes. This legislation is applicable to the study and will be used in the determination of the possible visual impact of the proposed development.

Requirements of Appendix 6 of the NEMA: EIA Regulations (2014, as amended). The following is an extract of the requirements:

Specialist reports

1. (1) A specialist report prepared in terms of these Regulations must contain—

(a) details of—

(i) the specialist who prepared the report; and

(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;

(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;

(c) an indication of the scope of, and the purpose for which, the report was prepared;

(cA) an indication of the quality and age of base data used for the specialist report;

(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;

(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;

(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;

(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;

(g) an identification of any areas to be avoided, including buffers;

(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;

(i) a description of any assumptions made and any uncertainties or gaps in knowledge;

(j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;

(k) any mitigation measures for inclusion in the EMPr;

(l) any conditions for inclusion in the environmental authorisation;

(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;

(n) a reasoned opinion—

(i) whether the proposed activity, activities or portions thereof should be authorised;

(iA) regarding the acceptability of the proposed activity or activities; and

(ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;

(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;

(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and

(q) any other information requested by the competent authority.

(2) Where a government notice *gazetted* by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.

3. PURPOSE AND SCOPE

3.1 PURPOSE

The purpose of this assessment is to determine the visual impact of the proposed activity. The visual impact assessment will describe the existing visual characteristics of the proposed site and surrounding environment to establish the baseline characteristics of the receiving environment. If it is found that the possibility exists for visual impacts to pose a problem, recommendations will be made as to prevent and/or mitigate the possible impacts. This will be done to prevent disturbances to the receiving environment. This report also aims to give effect to the requirements and legislation as promulgated in South Africa. Please refer to Section 2 for detailed legislative requirements for the study. Key aspects for the purpose of this document are to:

- Description of the existing visual characteristics of the proposed site and its surroundings.
- Determining areas from which the proposed development will be visible.
- Visual Impact Assessment (VIA) in order to assess the significance of the visual impacts determined to be caused by the proposed development; and
- Recommendation of possible mitigation measures.

3.2 SCOPE

The scope includes the visual impact assessment of the proposed project (refer to Figure 1). This document reports on the visual impact assessment conducted, and outlines findings made supported by recommendations to the authorisation of the proposed project. The Project is located in the most eastern part of the North West Province (at the boundary between North West and Gauteng) and falls within the Dr Kenneth Kaunda District Municipality (DKKDM) and the JB Marks Local Municipality (JBMLM). The site is located approximately 13km to the North West of the town of Carletonville. The D331 road bisects the site.

4. METHODOLOGY AND UNDERTAKING

4.1 SITE ESTABLISHMENT

An initial desktop site assessment was conducted to determine suitable locations regarding the visual impact assessment. The result of the desktop study is the identification of areas or activities, which could possibly contribute to the deterioration of the visual characteristics of the area.

Site baseline characterisation (and subsequent fieldwork) occurred on the 21st of June 2023 for the visual assessment. The site baseline characterisation was conducted to undertake the visual assessment of the current characteristics of the receiving environment. The field survey included photographic evidence at the various viewpoints, which were used as a basis for determining the potential visual ability and visual impacts of the proposed development. Various viewpoints were identified based on the sensitivity and visual impact of the area.

The VIA was conducted following the methodology:

- Site visit and orientation.
- Describing the landscape character or visual baseline based on:
    - Photographs of the project site and larger study area were taken during a field visit conducted on the 21st of June 2023.
- A review of available aerial photography and topographical maps, in relation to:
    - Natural elements; and
    - Human-made elements.
- Determining the area/s where the project will be visible from.
- Determining the visual resource value of the landscape in terms of:
    - The topographical character of the site and its surroundings and potential occurrence of landform features of interest;
    - The presence of water bodies within the study area;
    - The general nature and level of disturbance of existing vegetation cover within the study area; and
    - The nature and level of human disturbance and transformation evident.
- Determine the visual absorption capacity of the receiving visual landscape.
- Determining the receptor sensitivity to the proposed project.
- Determine the magnitude of the impact, by considering the proposed project in terms of aspects of VIA, namely:
    - Visibility.
    - Visual intrusion; and
    - Visual exposure.
- Assessing the impact significance by relating the magnitude of the visual impact to its:
    - Duration.
    - Severity; and
    - Geographical extent.
- To recommend mitigation measures to reduce the potential visual impacts of the project.

4.2 ASSUMPTIONS AND LIMITATIONS

The following is relevant to the field of VIA and the findings of this study:

- 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.
- 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.

4.3 BASELINE VISUAL ENVIRONMENT

The visual baseline assessment was informed by a field visit, assessment of on-site photographs and Google Earth imagery. To determine the visual resource value of the study area, specific attention was given to the following aspects:

- The nature of existing vegetation cover, in terms of its overall appearance, density and height, and level of disturbance.
- The general topographical character of the study area, including prominent or appealing landforms, and their spatial orientation in terms of the project sites.
- The nature and level of human transformation or disturbance of the study area.
- The location, physical extent, and appearance of water bodies within the study area if present; and
- The perceived level of compatibility of existing land uses in terms of the study area and each other.

4.4 DESCRIPTION OF AFFECTED AREA AND ENVIRONMENT

This section provides a brief overview of the visual baseline environment and context in which the proposed project will take place.

The Project is located approximately 13km to the northwest of the town Carletonville. 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 and grazing purposes. Currently, Grazing is the dominant land use in the Project area. The proposed project is accessed via a gravel road with the D331 (11th avenue) bisecting the site.

According to the SA REEA Database, there is one (1) renewable energy application that have been made for properties located in a thirty (30) km radius of the study area. The closest renewable energy application is located approximately 30 km east of the proposed site.

Table 2: Desktop study attributes and descriptions relevant to the study area.

Hydrological Setting (DWS, 2012)	
Water Management Area (WMA)	Vaal Water Management Area
Sub-WMA	Upper Vaal Sub-Catchment Area
Quaternary Catchment Area	C23G
Sub-Quaternary Reach (SQR)	C23G – 01406 1406 PES: Class E (Moderately modified)
Ecoregion (Kleynhans *et al.*, 2005) (bold indicates most dominate attributes)	
ATTRIBUTES	**Highveld (11)**
Terrain Morphology: Broad division (dominant types in bold) (Primary)	**Plains; Low Relief;** **Plains; Moderate Relief;** Lowlands; Hills and Mountains; Moderate and High Relief; Open Hills; Lowlands; Mountains; Moderate to high Relief Closed Hills. Mountains; Moderate and High Relief
Vegetation types (dominant types in bold) (Primary)	Mixed Bushveld (limited); Rocky Highveld Grassland; **Dry Sandy Highveld Grassland;** Dry Clay Highveld Grassland; **Moist Cool Highveld Grassland;** Moist Cold Highveld Grassland; North Eastern Mountain Grassland; Moist Sandy Highveld Grassland; Wet Cold Highveld Grassland (limited); Moist Clay Highveld Grassland; Patches Afromontane Forest (very limited) Carletonville Dolomite Grassland. It has a complex mosaic pattern of grasses as *Aristida congesta, Brachiaria, Eragrostis chloromelas and Alloteropsis semialata* (Mucina and Rutherford, 2006).
Altitude (m a.m.s.l) (secondary)	1100-2100, 2100-2300 (very limited)
MAP (mm) (modifying)	400 – 1000
Coefficient of Variation (% of annual precipitation)	< 20 to 35
Rainfall concentration index	45 - 65
Rainfall seasonality	Early to late summer
Mean annual temp. (°C)	12 - 20
Mean daily max. temp. (°C): February	20 - 32
Mean daily max. temp. (°C): July	14 - 22
Mean daily min. temp. (°C): February	10 - 18
Mean daily min temp. (°C): July	-2 - 4
Median annual simulated runoff (mm) for quaternary catchment	5 - >250
Landcover within the study area (DEA, 2020)	

Landcover Category (DEA, 2020)	
Desktop Delineation	**Site Conditions**
Grassland	The onsite conditions for the most part mimic the presumed desktop landcover classes.
Rain fed commercial crops	
Fallow lands / old fields.	
Natural Grassland	
National Wetland Map Version 5 (NWM5), National Freshwater Ecosystem Priority Areas (NFEPA's) (Driver *et al.*, 2011) and Strategic Water Source Areas (SWSA) (Le Maitre *et al.*, 2017)	
NWM5	No wetlands occur within the project area.
Fish sanctuary	The project area does not fall within a catchment that has been flagged as a fish sanctuary.
NFEPA Rivers	No rivers fall within the study area.
NFEPA Wetlands	The project area does consist of some artificial wetlands. Additionally, wetlands are also found in close proximity of the eastern and northern borders.
WetVeg	The project area falls over one (WetVeg) unit namely the Dry Highveld Grassland Group 5 (Poorly protected – low concern).
SWSA	The project area does not fall within a SWSA.
Geology and Soils (Council for Geosciences 2008; Schultze *et al.*, 1992; MacFarlane & Bredin, 2016)	
Geology and Soil	The Project Area for the Solar site are underlain by the Transvaal Supergroup, consisting of the Chunies Group and lithostatic unit being Malmani sub-group. The Geology consists of Dolomite, subordinate chert, minor carbonaceous shale, quartzite and limestone. The soils are mostly shallow Mispah and Glenrosa soil forms.
Conservation Attributes (SANBI, 2018; SANBI, 2006-18; DFFE, 2021)	
CBA	• CBAs are areas that are important for conserving biodiversity. • The study area does not occur within a CBA at a desktop level.
ESA	ESAs are areas that are important to ensure the long-term persistence of species or functioning of other important ecosystems. • The study area does not occur within an ESA.
Threatened Ecosystems	The project area does not fall within a threatened ecosystem.
Protected Areas	These are areas that are considered protected and imperative for conservation purposes: A slight portion of the project area does fall within a protected area (Southeastern corner). According to the South Africa Protected Areas Database (SAPAD_OR_2021_Q4), the nearest formally protected area is the Vaal Grasslands.
Vegetation Types	The primary or reference vegetation unit of the study area is the Carletonville Dolomite Grassland. It falls within the Grassland Biome and the Highveld Ecoregion and Dry Highveld Grassland Bioregion. This vegetation unit is classified as 'Poorly Protected' (Skowno *et al*, 2019), however of low concern. During the infield assessment, the general vegetation structure was observed to be minimally transformed by linear activities and agricultural activities.

Sensitive Receptors	The main sensitive receptors were identified as farm houses and agricultural setups. The Abe Bailey Reserve is directly south-east the site layout area. The sensitivity is however deemed low due to the Khutsong village that exists directly south-east of the Reserve and no activities taking place were evident on the reserve.

Key:

CBA – Critical Biodiversity Area

EI: Ecological Importance

ES: Ecological Sensitivity

ESA – Ecological Support Area

m a m s l: Metres Above Mean Sea Level

NFEPA: National Freshwater Ecosystem Priority Area

NWM5: National Wetland Map Version 5;

PA – Protected Areas

PES: Present Ecological State

REC: Recommended Ecological Class

SWSA: Strategic Water Source Area

Refer to Section 5.1 for figures that illustrate various views from and of the site from different angles. These provide a visual indication of the current state and possible areas of importance for the determination of the possible impact.

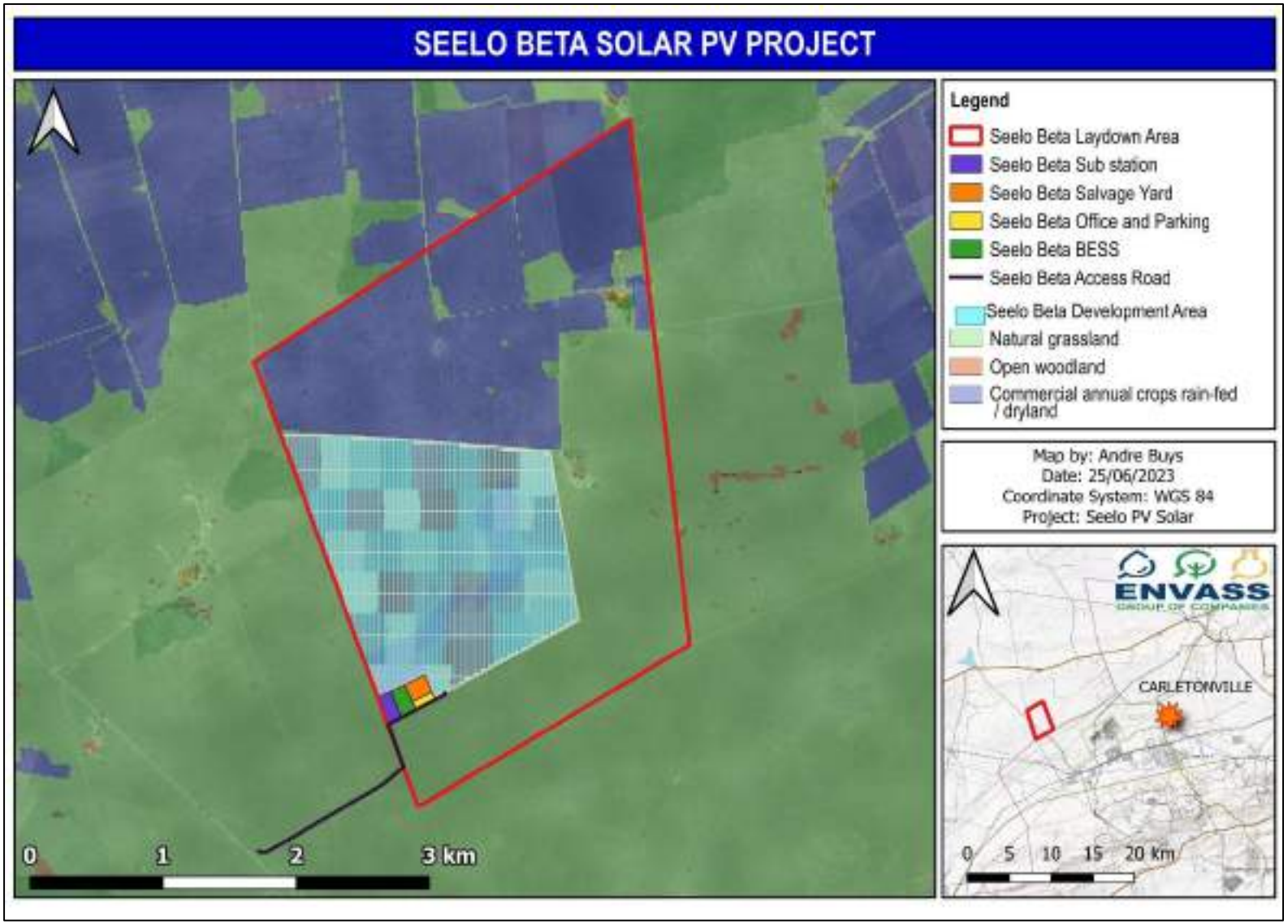

Figure 5: Proposed Seelo Beta Solar Landcover

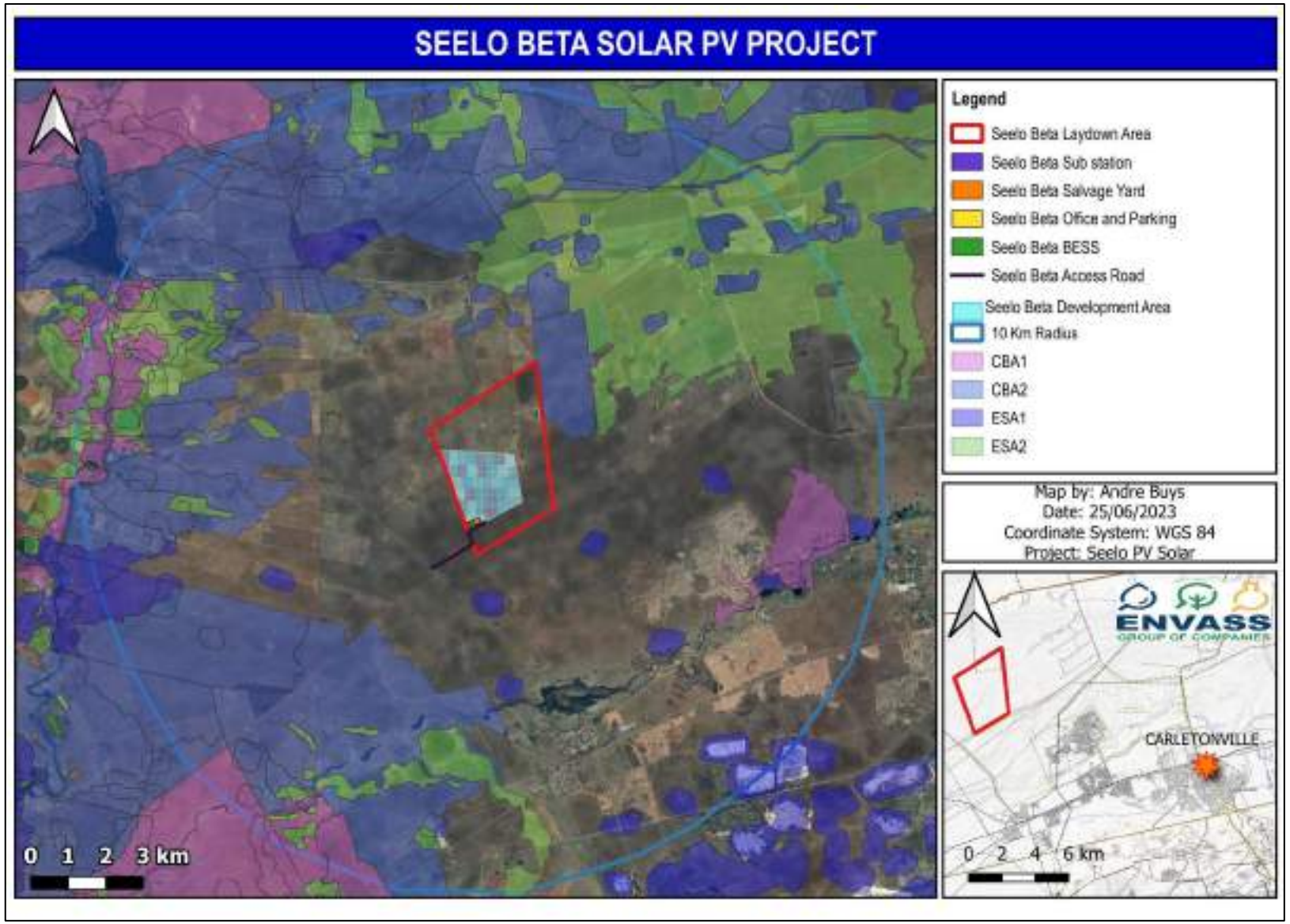

Figure 6: Proposed Seelo Beta Solar CBA and ESA

Figure 7: Proposed Seelo Beta Solar Watercourses

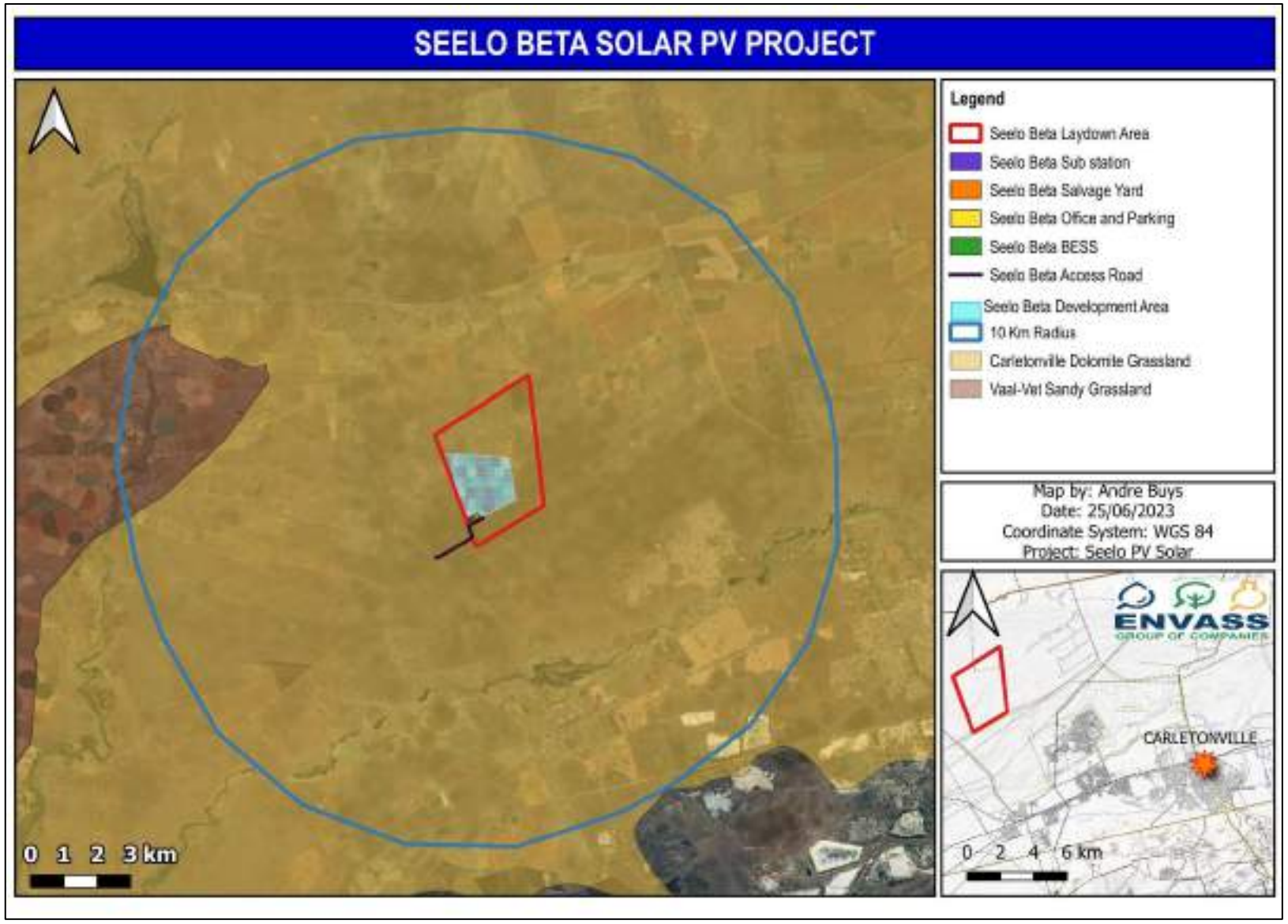

Figure 8: Proposed Seelo Beta Solar Vegetation Cover

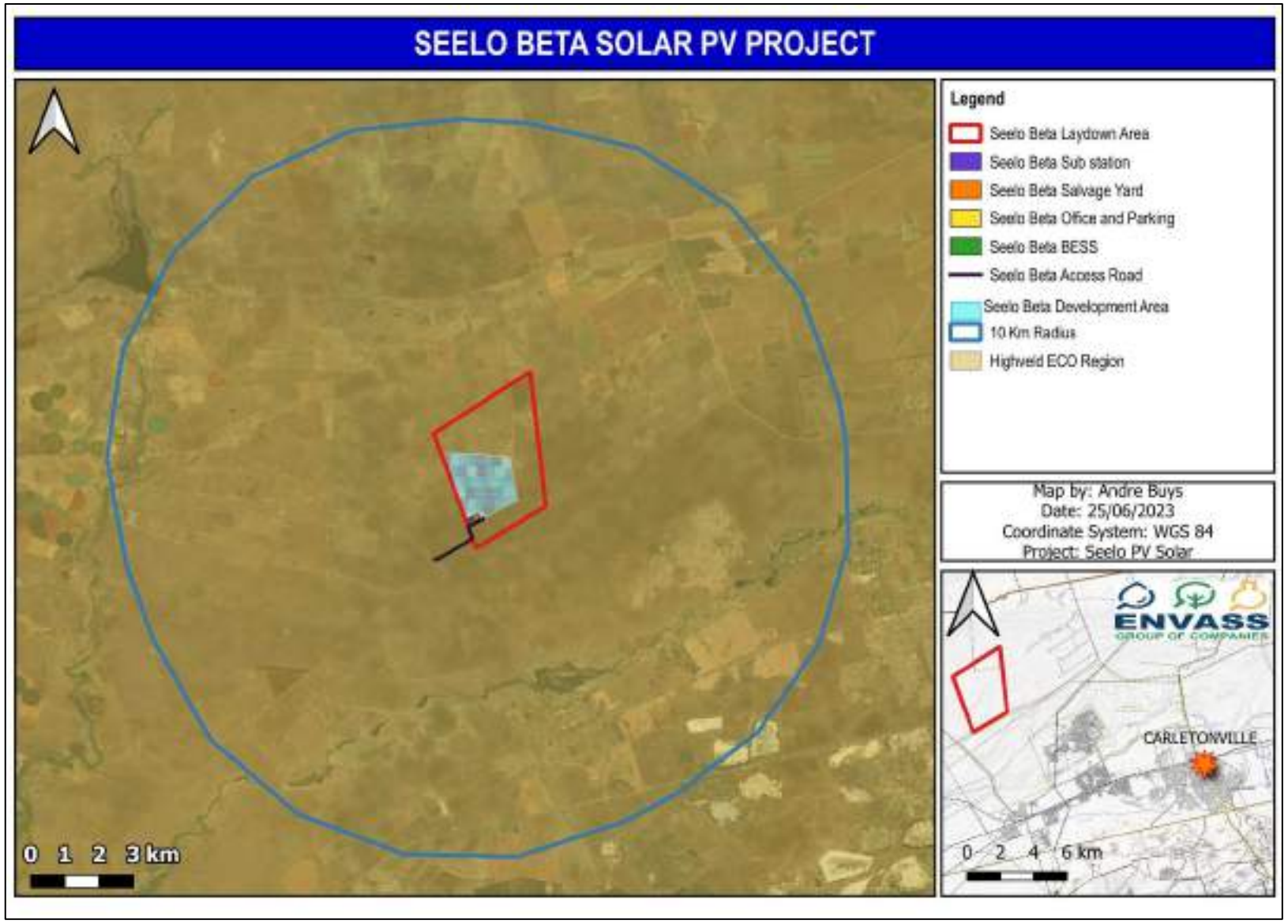

Figure 9: Proposed Seelo Beta Solar Ecoregion

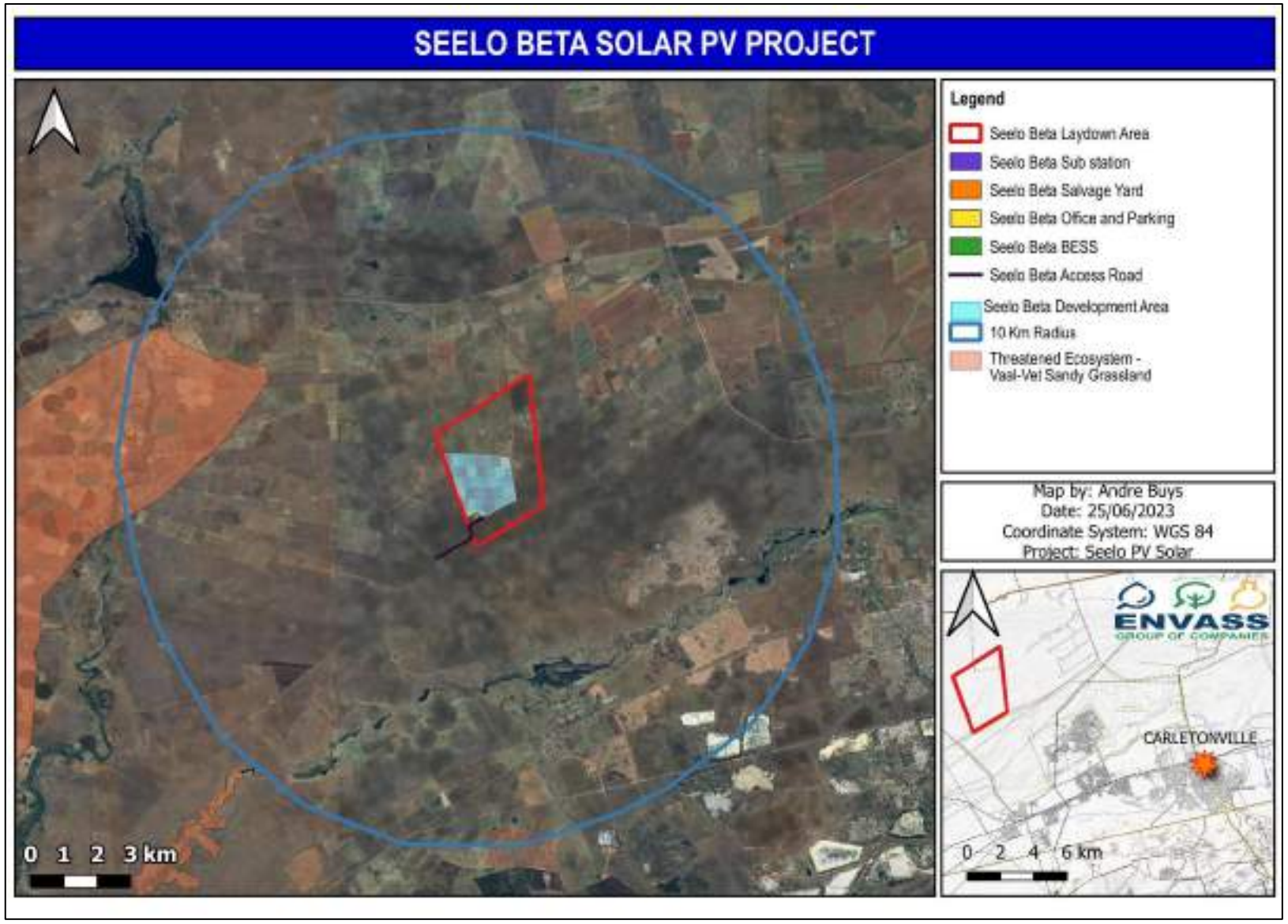

Figure 10: Seelo Beta Solar Threatened Ecosystems

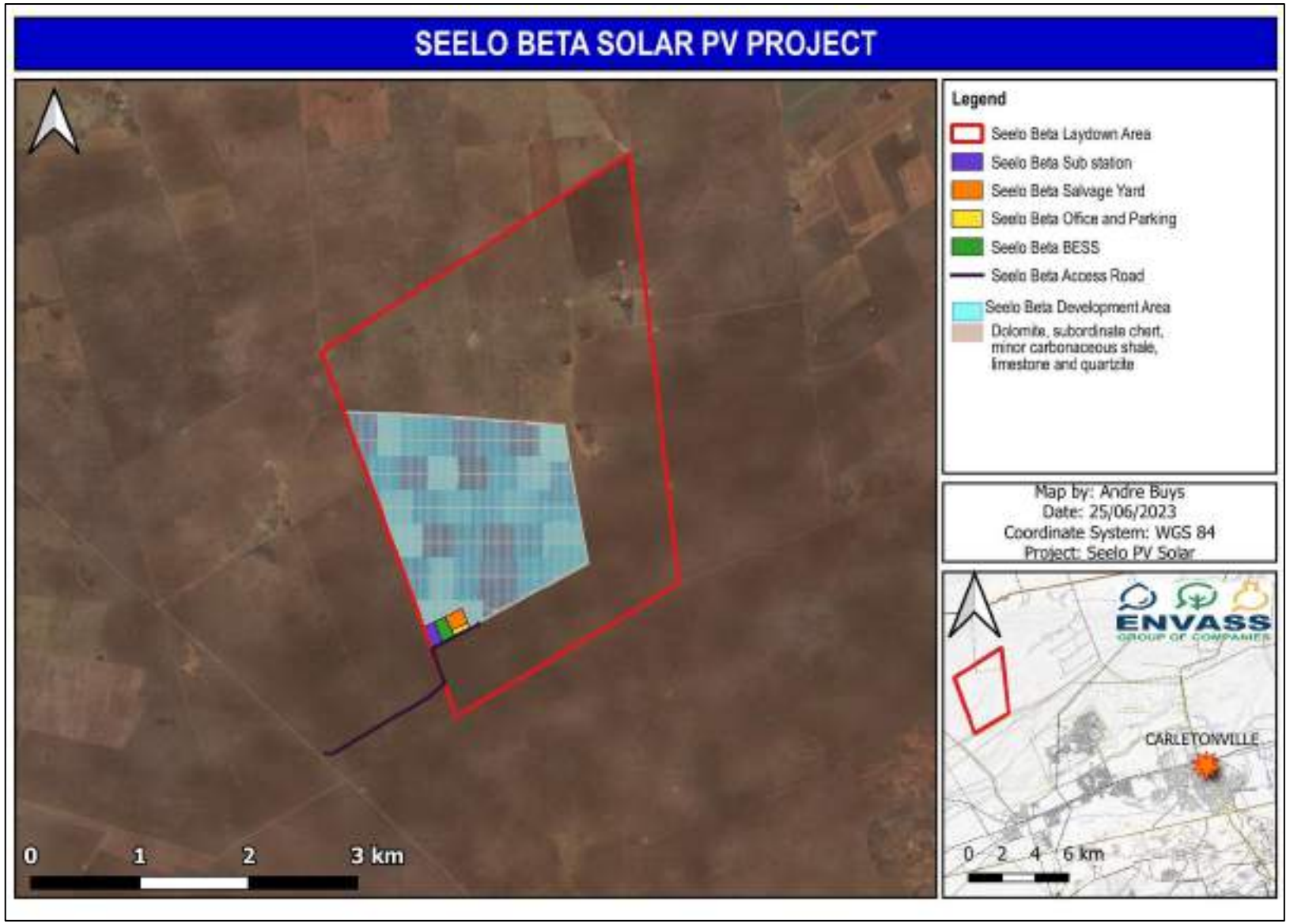

Figure 11: Proposed Seelo Beta Solar Geology

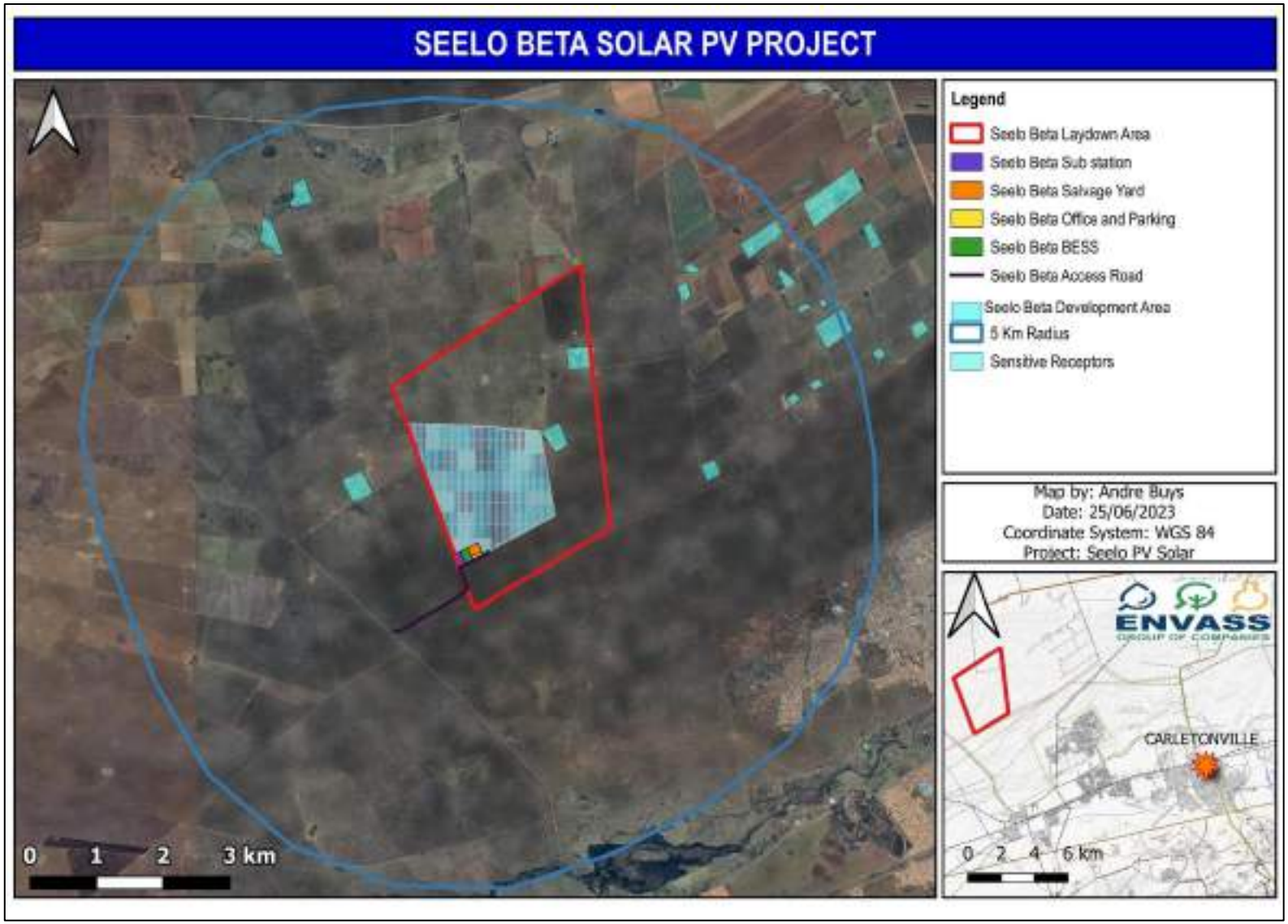

Figure 12: Seelo Beta Solar Sensitive Receptors - Desktop

4.5 SENSE OF PLACE

The below information was obtained from the N12 Treasure Route Association (Electronic source - http://www.carletonville.co.za/history_carletonville). Sense of place is a unique collection of qualities and characteristics that include visual, cultural, social, and environmental. Sense of place is what makes one city or town different from another and what makes our physical surroundings unique. The proposed site is located near a small-town Carletonville.

Carletonville is a small gold mining town in Western Gauteng, South Africa. The town has a rich history in the mining sector and is one of the major gold producing areas in the world. At mining depths of up to 3749 meters below ground level, the Western Deep Levels is one of the world's deepest mines. The sense of place of Carletonville is shaped by its history, location, culture, and natural surroundings.

History:

The town started as an unplanned settlement established between 1937 and 1957 as various companies developed gold mining claims and operations. During 1959, Carletonville was officially designated a town, being named for Mr. Guy Carleton Jones, a local mining director. By 1979 Western Deep Levels Ltd. operated the world's deepest gold mine (extending to 3,777 meters below the Earth's surface) in the locality. The towns success is heavily dependent on the continued production of gold. Additionally, Uranium is often recovered as a byproduct of gold production, and the town contains some light industrial development. Situated in a dolomite area, the surroundings of the town have deteriorated due to sinkhole formation possibly due to localised dewatering by the mining activities as well as poor infrastructure maintenance.

Location:

Carletonville is located approximately 70 km east of Ventersdorp as well as 50 km northeast of Potchefstroom. Krugersdorp is located 55 km north-east of Carletonville. Carletonville falls within Ward 18 of the Merafong City Local Municipality, in the West Rand, Gauteng Province. The area is surrounded by fertile farmland, grazing fields and rolling hills, with various mining activities as from where the local town originated from. Additionally, Klerkskraal dam is located approximately 30 km east of Carletonville, which is a favourable fishing and camping destination. One of the largest economic hubs of South-Africa is just over 80 kilometres away known as Johannesburg. Tranquillity and serenity, peace and quiet, fresh open fields and Game reserves bring an immediate calm and languor to the predominantly outdoor experience that is this part of area in the Gauteng province.

Culture:

The Carletonville community is a predominantly Zulu, Sotho English and Afrikaans speaking town, with a rich cultural heritage. The mining activities has created various job opportunities allowing for numerous different cultures to come together. Additionally, attractions in and around Carletonville includes Abe Bailey Nature Reserve that lies just outside Carletonville, consisting of a sanctuary of grassland and wetlands, where bird detection and watching is well rewarded with the prospect of seeing at least sixty (60) species on any given time. The greater and lesser flamingo specie, use the wetland as do crakes, swamp hens, herons, the African fish eagle and korhaans. There are also some beautiful picnic spots for daily visitors. Furthermore, the Losberg hiking trail wends its way through the Tlokwe ruins, an Iron Age settlement, whilst there

is a skydiving club based in the town for kicks, or you can visit Lepalong on Kleinfontein farm just outside town where you can explore a system of caves occupied by the Kwena people in the early 1800s (SA-venues - https://www.sa-venues.com/attractionsga/carletonville.php).

In summary, the sense of place of Carletonville is shaped by its rich history, located in the heart of various surrounding mines, farmers and farming communities in the Gauteng province, cultural heritage, and natural surroundings. The town offers visitors a chance to experience the beauty of the South African heritage, as well as a glimpse into its past, as well as enjoying the best of some of the tourist attractions South Africa can offer.

5. VISUAL CHARACTERISATION

5.1 VIEWPOINTS

Since topography and visual landscape modification has already occurred to a slight extent as a result of various activities in the area, the viewshed is only a theoretical study. For this VIA to be more accurate, viewpoints have been identified and a visual inspection was conducted from these points to identify the current state of the environment and to provide information that can assist in determining the severity of the visual impact of the proposed activity. As indicated in Figure 13, seventeen (17) viewpoints were identified from where characterisation were conducted, and corresponding visual influence and characteristics have been defined.

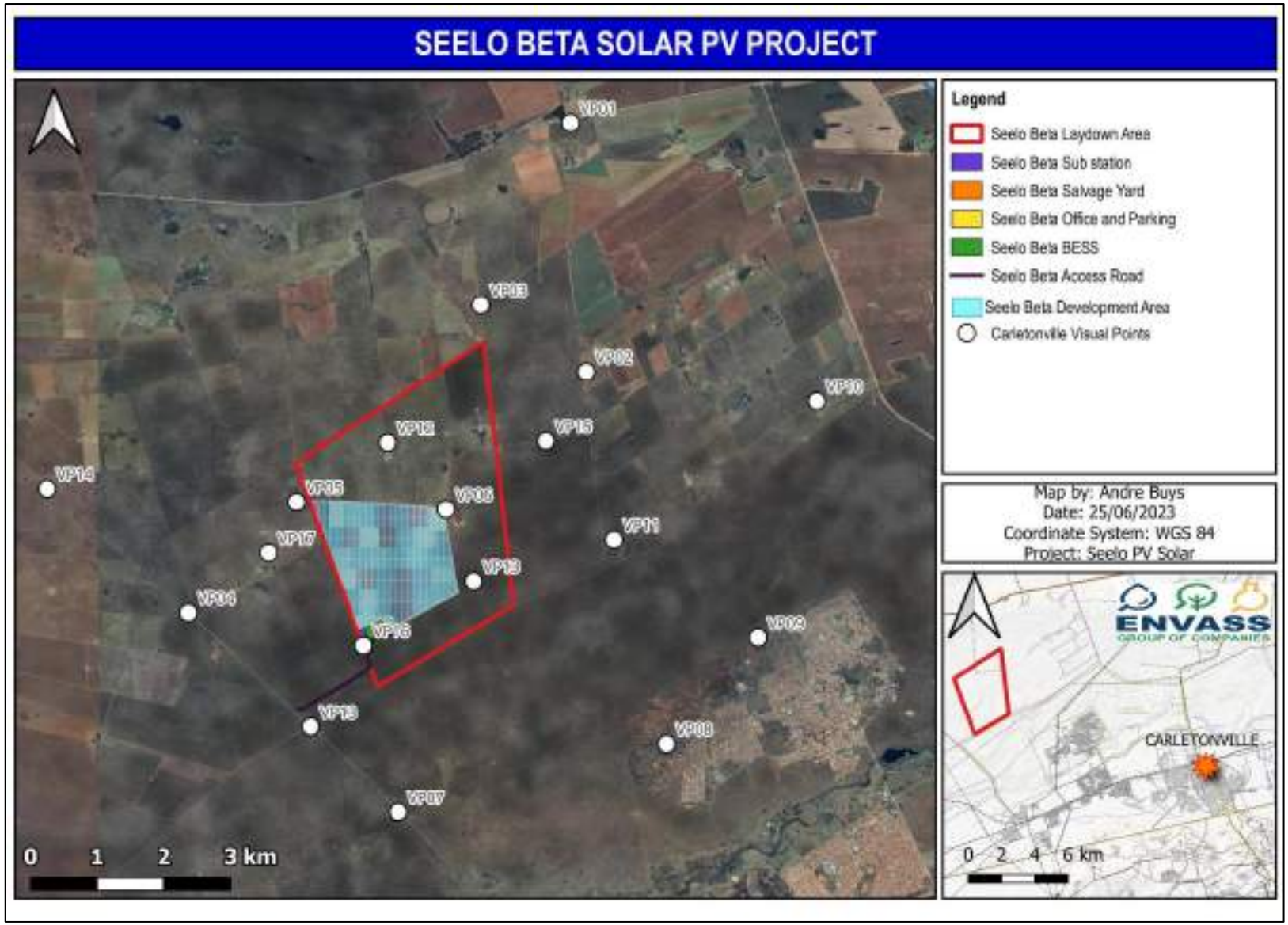

Figure 13: Viewpoints of the proposed Seelo Beta Solar Facility

5.1.1 Viewpoint 1 (VP1):

Viewpoint 1 is located along the N14 Road towards the north-east of the proposed layout area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation, as far as can be observed. High trees and plantations can be seen in the distance especially in view 1 (north). The study area is located to the south-west. In addition, powerlines arere visible along the N14 public road, as well towards the south towards a farm.

Figure 14: View 1 (North)

Figure 15: View 2 (East)

Figure 16: View 3 (South)

Figure 17: View 4 (West)

5.1.2 Viewpoint 2 (VP2):

Viewpoint 2 is located along a Gravel Road directly south of Viewpoint 1. It is directly east of the North-eastern boundary of the layout area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation, as far as can be observed. Slight high trees can be seen in the distance especially towards the east where a farmer residence is observed. The study area is located to the east. View 4 (West) is taken towards the layout area.

Figure 18: View 1 (North)

Figure 19: View 2 (East)

Figure 20: View 3 (South)

Figure 21: View 4 (West)

5.1.3 Viewpoint 3 (VP3):

Viewpoint 3 is located along a Gravel Road within a private farm, north-east of the north-eastern boundary of the layout area. Directly to the east, an existing sub-station is evident. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation and shrubs, as far as can be observed. Existing Powerlines is observed at view 1 (north) in a north to south orientation. The study area is located to the South-west.

Figure 22: View 1 (North)

Figure 23: View 2 (East)

Figure 24: View 3 (South)

Figure 25: View 4 (West)

5.1.4 Viewpoint 4 (VP4):

Viewpoint 4 is located on the public road (11th avenue), which passes by the western part of the layout are. It is situated at the western centre point of the study area. View 2 (East) and View 3 (South) have been taken towards the proposed project area, as the road intersect a slight portion of the layout area. The area comprises predominately grassland vegetation as well as agricultural land, as far as can be observed. From the viewpoint, the visual character comprises of a predominantly flat terrain. In addition, powerlines and tall trees are visible in the distance.

Figure 26: View 1 (North)

Figure 27: View 2 (East)

Figure 28: View 3 (South)

Figure 29: View 4 (West)

5.1.5 Viewpoint 5 (VP5):

Viewpoint 5 is located on a Gravel Road, which passes through the study area at the north-western corner. It is situated in proximity of the North-western boundary of the layout area. View 3 (South) and View 2 (East) have been taken towards the proposed project area. The area comprises predominately grassland vegetation, as far as can be observed. From the viewpoint, the visual character comprises of a predominantly flat terrain. In addition, some trees are visible in the distance.

Figure 30: View 1 (North)

Figure 31: View 2 (East)

Figure 32: View 3 (South)

Figure 33: View 4 (West)

5.1.6 Viewpoint 6 (VP6):

Viewpoint 6 is located to the centre of the layout area. All views have been taken towards parts of the proposed project area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately of natural grasslands. In addition, scattered trees of various heights are visible in the distance. The area can be seen to be used for grazing and livestock farming.

Figure 34: View 1 (North)

Figure 35: View 2 (East)

Figure 36: View 3 (South)

Figure 37: View 4 (West)

5.1.7 Viewpoint 7 (VP7):

Viewpoint 7 is located to the south of the south-western boundary of the project area. View 1 (North) have been taken towards the proposed project area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately of natural grassland and is currently utilized as grazing fields.

Figure 38: View 1 (North)

Figure 39: View 2 (East)

Figure 40: View 3 (South)

Figure 41: View 4 (West)

5.1.8 Viewpoint 8 (VP8):

Viewpoint 8 is the furthest point from the southern and eastern boundary of the layout area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately of natural grassland and old fallow lands. In addition, trees of various heights and current power line infrastructure are visible in the distance. The local community of Khutsong is evident directly east of the viewpoint.

Figure 42: View 1 (North)

Figure 43: View 2 (East)

Figure 44: View 3 (South)

Figure 45: View 4 (West)

5.1.9 Viewpoint 9 (VP9):

Viewpoint 9 is the furthest point from the eastern boundary of the layout area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately of natural grassland and old fallow lands. In addition, trees of various heights and current power line infrastructure are visible in the distance. The local community of Khutsong is evident directly south of the viewpoint.

Figure 46: View 1 (North)

Figure 47: View 2 (East)

Figure 48: View 3 (South)

Figure 49: View 4 (West)

5.1.10 Viewpoint 10 (VP10):

Viewpoint 10 is located to furthest point from the eastern boundary of the layout area. Various plots and farming setups were noted in the close vicinity of the viewpoint. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation. View 4 (West) have been taken towards the proposed study area. In addition, a farming residence can be observed in view 2 (East).

Figure 50: View 1 (North)

Figure 51: View 2 (East)

Figure 52: View 3 (South)

Figure 53: View 4 (West)

5.1.11 Viewpoint 11 (VP11):

Viewpoint 11 is located directly east of the central layout area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation and shrubs. Various dolomitic outcrops were observed at the specific point along with an old ruin as evident in view 2 (East), which a high coverage of grass plains. All viewpoints reflect the proposed study area.

Figure 54: View 1 (North)

Figure 55: View 2 (East)

Figure 56: View 3 (South)

Figure 57: View 4 (West)

5.1.12 Viewpoint 12 (VP12):

Viewpoint 12 is located directly within the northern centre of the layout area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation. View 4 (West) have been taken towards the majority of the proposed study area. The area is currently utilized for grazing purposes.

Figure 58: View 1 (North)

Figure 59: View 2 (East)

Figure 60: View 3 (South)

Figure 61: View 4 (West)

5.1.13 Viewpoint 13 (VP13):

Viewpoint 13 is located in the south-eastern corner of the layout area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation. View 1 (North) and View 4 (West) have been taken towards the proposed study area. In addition, shrubs and trees of various heights are visible in the distance.

Figure 62: View 1 (North)

Figure 63: View 2 (East)

Figure 64: View 3 (South)

Figure 65: View 4 (West)

5.1.14 Viewpoint 14 (VP14):

Viewpoint 14 is located directly north-west of the north-western corner of the layout area along the public tar road (11th avenue). From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation. View 2 (East) have been taken slightly towards the proposed study area. In addition, shrubs and trees of various heights are visible in the distance.

Figure 66: View 1 (North)

Figure 67: View 2 (East)

Figure 68: View 3 (South)

Figure 69: View 4 (West)

5.1.15 Viewpoint 15 (VP15):

Viewpoint 15 is located to the east of the central east boundary of the layout area. View 4 (West) have been taken towards the proposed project area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately of natural grasslands. In addition, scattered trees of various heights are visible in the distance. The area can be seen to be used for grazing and livestock farming.

Figure 70: View 1 (North)

Figure 71: View 2 (East)

Figure 72: View 3 (South)

Figure 73: View 4 (West)

5.1.16 Viewpoint 16 (VP16):

Viewpoint 16 is located towards the south-western corner of the layout area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation. View 2 (East) have been taken towards the proposed study area.

Figure 74: View 1 (North)

Figure 75: View 2 (East)

Figure 76: View 3 (South)

Figure 77: View 4 (West)

5.1.17 Viewpoint 17 (VP17):

Viewpoint 17 is located towards the north-western corner of the layout area. From the viewpoint, the visual character comprises of a predominantly flat terrain. The area comprises predominately grassland vegetation. View 2 (East) parts of the proposed layout area. In addition, shrubs and trees of various heights are visible in the distance.

Figure 78: View 1 (North)

Figure 79: View 2 (East)

Figure 80: View 3 (South)

Figure 81: View 4 (West)

5.2 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. According to Crawford (1994), 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 criteria incorporated for the visual resource assessment is highlighted in the Table 3 below. The landscape is rated either high, moderate or low depending on factors such as sense of place, current views and aesthetic appeal.

Table 3: Visual Resource Value Criteria

Visual Resource Value	Criteria
High (3)	Pristine or near-pristine condition/little to no visible human intervention visible/ characterised by highly scenic or attractive natural features, or cultural heritage sites with high historical or social value and visual appeal/characterised by highly scenic or attractive features/areas that exhibit a strong positive character with valued features that combine to give the experience of unity, richness and harmony. These are landscapes that may be considered to be of particular importance to conserve and which may be sensitive to change.
Moderate (2)	Partially transformed or disturbed landscape/human intervention visible but does not dominate view, or that is characterised by elements that have some socio-cultural or historic interest but that is not considered visually unique/scenic appeal of landscape partially compromised/noticeable presence of incongruous elements/areas that exhibit positive character, but which may have evidence of degradation/erosion of some features resulting in areas of more mixed character. These landscapes are less important to conserve but may include certain areas or features worthy of conservation.
Low (1)	Extensively transformed or disturbed landscape/human intervention is of visually intrusive nature and dominates available views/scenic appeal of landscape greatly compromised/visual prominence of widely disparate or incongruous land uses and activities/areas generally negative in character with few, if any, valued features. Scope for positive enhancement frequently occurs.

- **Topography –** The proposed site ranges from approximately 1530 to 1510 metres above mean sea level (mamsl), with a relatively steep slope (decrease in elevation slope) towards the south-southeast and south southwest. The topography or terrain morphology of the region is broadly described as plains with low to moderate relief. The main topographical character can be described as a flat plain, therefore, the topography is considered to have a **moderate** value.

- **Hydrology –** There are no visually prominent water drainage courses within the proposed project area. From a wetland perspective, there is a few NFEPA wetlands (artificial). Therefore, the aesthetic value of the hydrology is **moderate**.
- **Vegetation cover –** The landscape is primarily characterized by grassy plains and old fallow lands. The vegetation in the area consists mainly of grasses, shrubs, and trees. The visual resource value of the proposed site's vegetation cover is rated **moderate**.
- **Land use –** The main land use is agriculture and livestock grazing, while land use activities within the broader area are predominantly described as agricultural and formal residential areas. The visual resource value of the study area is therefore considered to be **moderate**.

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 4 below.

Table 4: Visual resource value determination

VISUAL BASELINE ATTRIBUTES	TOPOGRAPHY	HYDROLOGY	VEGETATION	LAND USES
Visual resource value score	2	2	2	2
			Total	**8**

Based on the above score ranges, the overall visual resource value of the study area is rated as **moderate** (8).

5.3 VISUAL ABSORPTION CAPACITY

According to Oberholzer (2008), Visual Absorption Capacity (VAC) can be defined as an '*estimation of the capacity of the landscape to absorb development without creating a significant change in visual character or producing a reduction in scenic quality*'. 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.

5.3.1 Visual Absorption Capacity Weighting Factor

To account for the fact that visual impacts are expected to be more intrusive in landscapes with a lower VAC than in those with a higher VAC (regardless of the visual quality of the landscape), a weighting factor is incorporated into the impact magnitude determination, as indicated in Table 5.

Table 5: Visual absorption capacity weighting factor

VISUAL RESOURCE VALUE OF RECEIVING LANDSCAPE	LOW VAC	MODERATE VAC	HIGH VAC
High resource value	High (1.2)	High (1.2)	Moderate (1.0)
Moderate resource value	High (1.2)	Moderate (1.0)	Low (0.8)
Low resource value	Moderate (1.0)	Low (0.8)	Low (0.8)

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. The visual resource value of the study area has been determined to be **moderate** and the VAC of the study area has been rated as **low**. Therefore, a **high** (1.2) weighting factor in terms of VAC is applied during the impact assessment.

5.4 VISUAL RECEPTOR SENSITIVITY AND INCIDENCES

Receptor sensitivity refers to the degree to which an activity will impact the receptors and depends on how many persons see the project, how frequently they are exposed to it and their perceptions regarding aesthetics. Receptors of the proposed project can be broadly categorised into two (2) main groups, namely:

- People who live or work in the area, and who will be frequently exposed to the project components (resident receptors); and
- People who travel through the area and are only temporarily exposed to the project components (transient receptors).

Resident receptors located outside the proposed site include:

- Resident receptors would include the employees of the agricultural activities, residents and the local farming communities that are present outside the proposed project area.

Transient receptors located outside the proposed site include:

- The internal gravel roads towards the different farms, the D331 (11th avenue) and N14 public road, is the only roads located near the proposed site. The roads situated near the proposed site are predominately used for access to the surrounding areas, tourism attractions, residential areas, and agricultural activities. The proposed project area may potentially be visible from the tar road, while the visibility may be reduced due to vegetation obstructing the view from the roads at certain points. The visual receptor sensitivity and incidence can be classified as high, moderate or low, as indicated in Table 6.

Table 6: Visual receptor and sensitivity criteria

NUMBER OF PEOPLE THAT WILL SEE THE PROJECT (INCIDENCE FACTOR)	
High	Towns and cities, along major national roads (e.g., thousands of people).
Moderate	Villages, typically less than 1 000 people.
Low	Less than 100 people (e.g., a few households).
RECEPTOR PERCEIVED LANDSCAPE VALUE (SENSITIVITY FACTOR)	
High	People attach a high value to aesthetics, such as in or around a game reserve or conservation area, and the project is perceived to impact significantly on this value of the landscape.
Moderate	People attach a moderate value to aesthetics, such as smaller towns, where natural character is still plentiful and in close range of residency.
Low	People attach a low value to aesthetics, when compared to employment opportunities, for instance. Environments have already been transformed, such as cities and towns.

The following ratings have therefore been applied to the identified visual receptor groups:

- **Resident Receptors:** Resident receptors comprise a high number of people (incidence factor) living around the proposed project area:
    - People living and working in the surrounding areas will rate a moderate value (sensitivity factor) to the project; and

- **Transient Receptors:** People travelling through and near the proposed site will be moderate as the proposed site is located in close proximity of frequently travelled roads, constituting a moderate number of people (incidence factor). It is expected that travellers will attach a moderate degree of value to the current setting and visual character of the proposed site (sensitivity factor) due to the activities already established in the area. Hence, this receptor group has also been given a moderate sensitivity rating.

To determine the magnitude of a visual impact, a weighting factor that accounts for receptor sensitivity is determined (Table 7), based on the number of people that are likely to be exposed to a visual impact (incidence factor) and their expected perception of the value of the visual landscape and project impact (sensitivity factor).

Table 7: Weighting factor for receptor sensitivity criteria

RECEPTOR SENSITIVITY	HIGH INCIDENCE	MODERATE INCIDENCE	LOW INCIDENCE
High Sensitivity	High (1.2)	High (1.2)	Moderate (1.0)
Moderate Sensitivity	High (1.2)	Moderate (1.0)	Low (0.8)
Low Sensitivity	Moderate (1.0)	Low (0.8)	Low (0.8)

Based on the receptor sensitivity assessment and the above criteria, a **moderate** weighting factor (1.0) in terms of this aspect is applied during the impact magnitude determination.

6. BASELINE VISUAL ASSESSMENT

6.1 IMPACT IDENTIFICATION

Solar PV facilities are considered long-term in nature and long-term structures will be constructed. The primary visual impacts associated with a change from the current state of the site (fallow lands, cultivated fields and grassland vegetation) to a solar PV facility will have the greatest visual impact due to the visibility of the site from sensitive receptors. The visual impacts will be assessed based on a synthesis of criteria (nature of impact, extent, duration, probability, intensity, status, degree of confidence, level of significance and significance after mitigation) as defined by the NEMA Environmental Impact Assessment (EIA) regulations (2014, as amended). The nature of the visual impacts will be the visual effect that the activity would have on the receiving environment. These visual impacts would be:

- The construction and operation of the proposed PV facility and its associated infrastructure may have a visual impact on the study area, especially within (but not restricted to) a 1 - 5km radius of the proposed facility. The visual impact will differ amongst places, depending on the distance from the facility.

- Visibility from sensitive receptors. The proposed development will be visible from receptors outside the proposed project area. These include:
    - Site personnel at the operation;
    - People travelling to work and commercial activities in the surrounding areas;
    - People travelling on the surrounding access routes to their place of residence;
    - Surrounding farming communities; and
    - Surrounding residential areas.

6.2 IMPACT MAGNITUDE CRITERIA

The magnitude of a visual impact is determined by considering the visual resource value and VAC of the landscape within which the project will take place, the receptors potentially affected by it, together with the level of visibility of the project components, their degree of visual intrusion and the potential visual exposure of receptors to the project, as further elaborated on in the sections below:

6.2.1 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 by Nemai Consulting (Nemai Consulting scoping report), 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.

Table 8: Rating of level of visibility

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

When considering the viewshed analysis, the visibility rating is **moderate.**

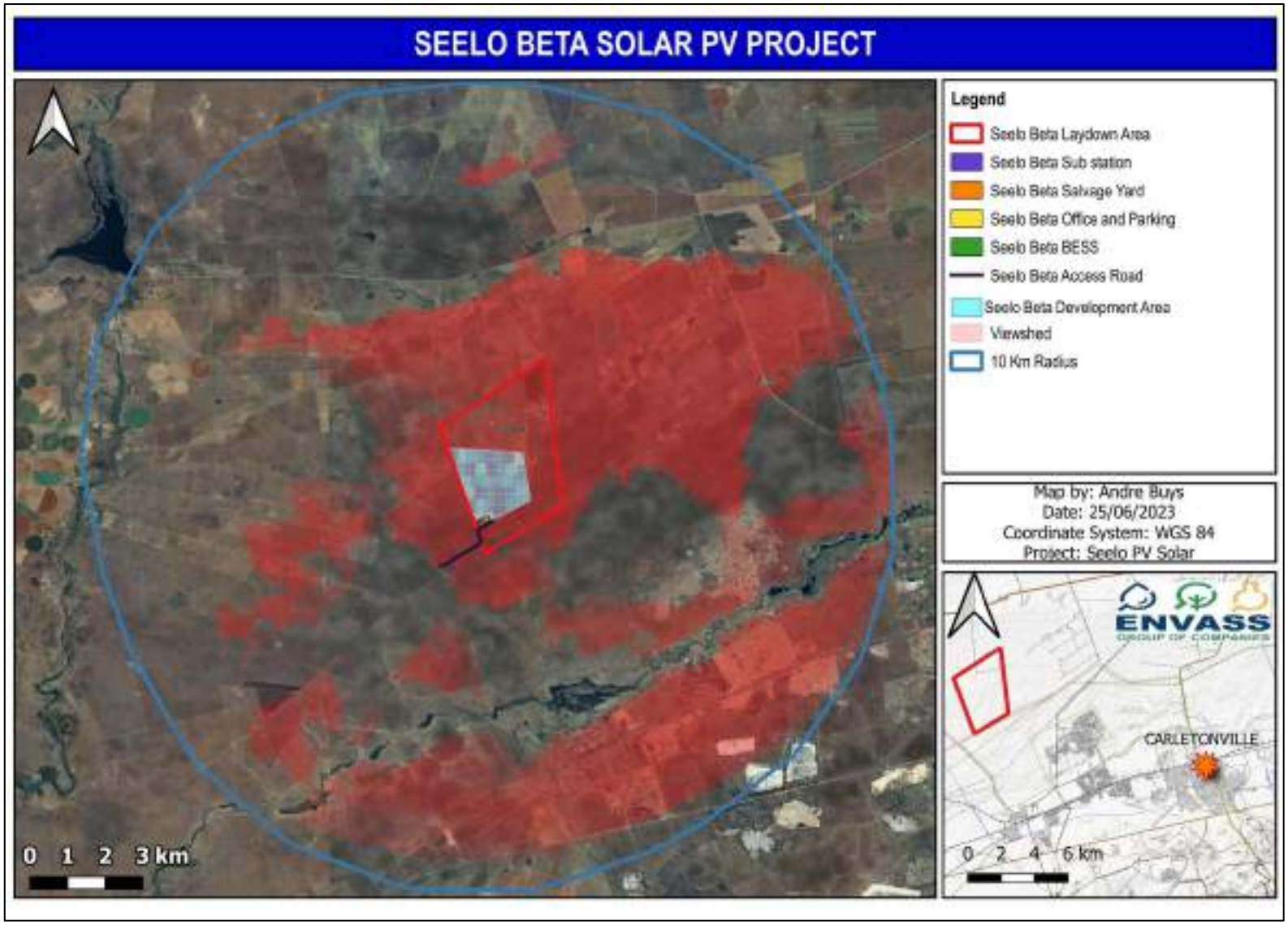

Figure 82: Viewshed analysis for the proposed Seelo Beta Solar (10 km Radius)

6.3 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 **moderate** 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.

6.4 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. The inverse relationship of distance and visual impact has been an important component in visual analysis literature (Hull and Bishop, 1998).

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.

6.5 IMPACT MAGNITUDE METHODOLOGY

The expected impact magnitude of the proposed project was rated, based on the above assessment of the visual resource value of the site, as well as level of visibility, visual intrusion, visual exposure and receptor sensitivity as visual impact criteria. The process is summarised below:

- *Magnitude = [(Visual quality of the site x VAC factor) x (Visibility + Visual Intrusion + Visual Exposure)] x Receptor sensitivity factor.*

Table 9: Magnitude Criteria

MAGNITUDE SCORE	MAGNITUDE RATING
20.1≤	High
13.1 - 20.0	Moderate
6.1 - 13.0	Low
≤6.0	Negligible

6.5.1 Impact Magnitude Determination

Based on the visual resource, VAC, receptor sensitivity and impact assessment criteria assessed in the preceding sections, the magnitude of the various impacts identified was determined for each phase of the project.

Table 10: Construction Phase – Impact Magnitude (Without Mitigation)

VISUAL	STUDY AREA VISUAL RESOURCE VALUE	VAC WEIGHTING FACTOR	LEVEL OF VISIBILITY	VISUAL INTRUSION	VISUAL EXPOSURE	RECEPTOR SENSITIVITY FACTOR	IMPACT MAGNITUDE POINT SCORE (WITHOUT MITIGATION)
Site establishment • This will involve the vegetation clearance, stripping and stockpiling of soil in areas designated for surface infrastructure. 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. Construction activities of infrastructure • Construction of the solar PV facility and associated infrastructure. Construction vehicle movement and increased human activity in and around project site. General and hazardous waste management Formation of dust plumes as a result of construction activities.	2	1.2	2	2	2	1.0	14.4 (Moderate)

VISUAL	STUDY AREA VISUAL RESOURCE VALUE	VAC WEIGHTING FACTOR	LEVEL OF VISIBILITY	VISUAL INTRUSION	VISUAL EXPOSURE	RECEPTOR SENSITIVITY FACTOR	IMPACT MAGNITUDE POINT SCORE (WITHOUT MITIGATION)
Use of security lighting. Topographical and vegetation alteration which will lead to increased visual intrusion and potential impact on sense of place.							
Where for: visual resource value, visibility, visual intrusion and visual exposure: high=3; moderate=2; low=1; VAC and receptor sensitivity: high = factor 1.2; moderate = factor 1; low = factor 0.8							

Table 11: Operational Phase – Impact Magnitude (Without Mitigation)

VISUAL	STUDY AREA VISUAL RESOURCE VALUE	VAC WEIGHTING FACTOR	LEVEL OF VISIBILITY	VISUAL INTRUSION	VISUAL EXPOSURE	RECEPTOR SENSITIVITY FACTOR	IMPACT MAGNITUDE POINT SCORE (WITHOUT MITIGATION)
Topographical alteration which will lead to increased visual intrusion and potential impact on sense of place. Solar PV facility and associated infrastructure being visible. Vehicles and increased human activity in and around the Solar PV facility. Solar glint and glare. Night-time illumination due to security lighting and lighting within the solar PV facility and associated infrastructure.	2	1.2	2	2	2	1.0	14.4 (Moderate)
Where for: visual resource value, visibility, visual intrusion and visual exposure: high=3; moderate=2; low=1; VAC and receptor sensitivity: high = factor 1.2; moderate = factor 1; low = factor 0.8							

Table 12: Decommission Phase – Impact Magnitude (Without Mitigation)

VISUAL	STUDY AREA VISUAL RESOURCE VALUE	VAC WEIGHTING FACTOR	LEVEL OF VISIBILITY	VISUAL INTRUSION	VISUAL EXPOSURE	RECEPTOR SENSITIVITY FACTOR	IMPACT MAGNITUDE POINT SCORE (WITHOUT MITIGATION)
Removal of all structures and recycling of the structure and cables. Removal of any foundations and filling of holes created and shaped to appear natural. Rehabilitation and restoration of the footprint.	2	1.2	2	2	2	1.0	14.4 (Moderate)
Where for: visual resource value, visibility, visual intrusion and visual exposure: high=3; moderate=2; low=1; VAC and receptor sensitivity: high = factor 1.2; moderate = factor 1; low = factor 0.8							

6.6 IMPACT ASSESSMENT RATING METHODOLOGY

The significance of the identified impacts will be determined using the approach outlined below (terminology from the Department of Environmental Affairs and Tourism Guideline document on EIA Regulations, April 1998). This approach incorporates two aspects for assessing the potential significance of impacts, namely occurrence and severity, which are further sub-divided as follows:

Table 13: Ranking scales for assessment of occurrence and severity of factors

INTENSITY (MAGNITUDE)		
The intensity of the impact is determined by examining whether the impact is destructive or benign, whether it has a significant, moderate or insignificant visual impact.		
Insignificant	0	The visual impact of the development will have no effect on the environment.
Minor	2	The visual impact of the development is minor and will not result in an impact on processes.
Low	4	The visual impact of the development is low and will cause a slight impact on processes.
Moderate	6	The visual impact of the development is moderate and will result in processes continuing but in a modified way.
High	8	The visual impact of the development is high, processes are altered to extent that they temporarily cease.
Very high	10	The visual impact of the development is very high and results in complete destruction of patterns and permanent cessation of processes.
DURATION		
The lifetime of the impact that is measured in relation to the lifetime of the proposed development.		
(T)emporary	1	The impact either will disappear with mitigation or will be mitigated through a natural process in a period shorter than that of the construction phase. (0-1.5 years).
(S)hort term	2	The impact will be relevant through to the end of a construction phase (2 – 5 years).
(M)edium term	3	The impact will last up to the end of the development phases, where after it will be entirely negated. (5 – 15 years).
(L)ong term	4	The impact will continue or last for the entire operational lifetime i.e. exceed 30 years of the development, but will be mitigated by direct human action or by natural processes thereafter. (>15 years).
(P)ermanent	5	This is the only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact is transient.
SPATIAL SCALE (EXTENT)		
Classified of the physical and spatial aspect of the impact		
(F)ootprint	0/1	The impacted area extends only as far as the activity, such as footprint occurring within the total site area.
(S)ite	2	The impact could affect the whole, or a significant portion of the site.
(R)egional	3	The impact could affect the area including the neighbouring settlements, the transport routes and the adjoining towns.

(N)ational	4	The impact could have an effect that expands throughout the country (South Africa).
(I)nternational	5	Where the impact has international ramifications that extend beyond the boundaries of South Africa.
PROBABILITY		
This describes the likelihood of the impact occurring. The impact may occur for any length of time during the life cycle of the activity. The classes are rated as follows:		
(I)mprobable	0/1	The possibility of the Visual Impact occurring is none, due to the circumstances, design. The chance of this Visual Impact occurring is zero (0%)
(P)ossible	2	The possibility of the Visual Impact occurring is very low, due either to the circumstances or design. The chance of this Visual Impact occurring is defined as 25% or less
(L)ikely	3	There is a possibility that the impact will occur to the extent that provisions must therefore be made. The chances of the Visual Impact occurring are defined as 50%
(H)ighly Likely	4	It is most likely that the Visual Impacts will occur at some stage of the development. Plans must be drawn up before carrying out the activity. The chances of this impact occurring is defined as 75 %.
(D)efinite	5	The Visual impact will take place regardless of any prevention plans, and only mitigation actions or contingency plans to contain the effect can be relied on. The chance of this impact occurring is defined as 100 %.

Table 15 below provides the ranking and score, which is used to determine the significance (with equation 1 below) and ranking of the possible impact on the proposed site. The score is then compared to Table 14 where the range of significance rating, with and without mitigation, is provided.

Table 14: Assessment Criteria and Ranking Scale

PROBABILITY (P)		MAGNITUDE (M)	
Description Meaning	Score	Description Meaning	Score
Definite / don't know	5	Very High	10
Highly likely	4	High	8
Likely	3	Moderate	6
Possible	2	Low	4
Improbable	1	Minor	2
Never	0	Insignificant	0

DURATION (D)		SPATIAL SCALE (S)	
Description Meaning	Score	Description /Meaning	Score
Permanent	5	International	5
Long Term	4	National	4
Medium	3	Regional	3
Short term	2	Local/Site	2
Temporary	1	Footprint	1/0

Equation 1: Significance Rating

SP (Significant Points) = Consequence (Extent + Duration + Severity) x Likelihood (Probability)

Table 15: Significance Rating Scale without mitigation and with mitigation

SR < 30	**LOW (L)**	Visual Impact with have little real effect and should not have an influence on or require modification of the project design or alternative mitigation. No mitigation is required.
30 > SR < 60	**MEDIUM (M)**	Where Visual Impact could have an influence on the decision unless it is mitigated. An impact or benefit, which is sufficiently important to require management. Of moderate significance - could influence the decisions about the project if left unmanaged.
SR > 60	**HIGH (H)**	Impact is significant, mitigation is critical to reduce impact and visual exposure. Resulting impact could influence the decision depending on the possible mitigation. An impact, which could influence the decision about whether or not to proceed with the project.

6.7 POTENTIAL VISUAL IMPACT OF THE PROPOSED PROJECT

Using the above criteria, the results of the impact significance assessment before and after mitigation, for the Construction, Operational and Decommissioning Phases are presented below.

Table 16: Impact assessment before and after mitigation

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**

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

Phase	Potential Visual Impacts	Visual Significance											
		Before Mitigation						After Mitigation					
		M	D	S	P	SP	RATING	M	D	S	P	SP	RATING
Decommissioning	General decommissioning and closure activities leading to visual intrusion on sensitive receptors.	6	1	3	2	20	Low	6	1	2	2	14	Low
	Dismantling and removal Solar PV facility and associated infrastructure.	6	1	3	1	10	Low	6	1	2	1	7	Low
	Cleaning, landscaping, and replacement of soils over the disturbed area.	6	1	3	1	10	Low	6	1	2	1	7	Low
	Waste generation and disposal	4	1	2	2	14	Low	4	1	2	1	7	Low

Phase	Potential Visual Impacts	Visual Significance											
		Before Mitigation						After Mitigation					
		M	D	S	P	SP	RATING	M	D	S	P	SP	RATING
	Ineffective rehabilitation leading to landscape scarring, permanent visual contrast and a permanent alteration of the landscape character and sense of place.	6	4	3	3	39	**Medium**	6	1	2	3	21	**Low**

7. RESULTS AND DISCUSSION

Results of the visual impact assessment indicated that from a visual perspective, the proposed project and related activities are the main project components that are expected to result in a visual impact. Receptors located within 2km of the proposed site will have the **moderate** (without mitigation) visual impact. Within a 5 km radius of the proposed project, residential areas and farming communities will have a **low** (without mitigation) visual impact. Beyond the 5 km study area, there are some areas where the development is discernible. However, the visual impacts are generally of **moderate to low** magnitude and impact. Local low and high-level vegetation will provide limited screening; however, the proposed solar PV facility and associated infrastructure can conceivably be visible to the sensitive receptors located near the proposed project boundary. The visual impacts associated with the Project and associated infrastructure will occur once construction has been completed and will be long term in nature.

In terms of the potential cumulative impacts, the proposed site is surrounded by various commercial and agricultural activities. In addition, according to the REEA Database, there are no (0) renewable energy applications have been made for properties located near the project site. Most of the proposed site currently grassland vegetation and the clearance and subsequent development of the site will result in the alteration of this space. Consequently, the development of this site will add cumulatively to the loss of sense of place. While the result in a change in the sense of place for those areas that look onto the project site, the magnitude of the impact is likely to be **low** as most of the sensitive receptors are located more than 5km from the project site.

Based on the results of the impact assessment, the majority of the potential visual impacts were considered to be **moderate** before mitigation and with the successful implementation this can be reduced to low. With regards to the proposed activities, due to the terrain of the proposed boundary, vegetation, VAC, and current land uses, the proposed activities are expected to result in a **moderate** visual impact on the receiving environment. The proposed activities will have a long-term temporal visual impact, due to the very nature of the Project and associated infrastructure. The activity will have a localised visual impact over a long-term duration. The activity will be able to continue with the implementation of appropriate mitigation strategies during the construction, operational and decommissioning phases.

8. FINDINGS

From the impact assessment results obtained, potential visual impacts may be present within the construction, operational and decommissioning phases. From the assessment, the proposed activities can conceivably have a **moderate** (without mitigation) visual impact on the surroundings and the natural and topographical environment.

Impacts are likely to be largely localised and within 5 km of the proposed project boundary, while significant visual impacts with regards to the proposed activities are expected at the sensitive receptors located within 2km of the proposed project boundary. It should be mentioned that an estimation of the impact distance is difficult to determine in terms of the visual

impact assessment as it does not incorporate distractive views in the form of vegetation or land use (infrastructure, buildings, etc.), however, with successful mitigating implementation the significance can be reduced.

Cumulative impacts can result from individually minor but collectively significant actions taking place over a period. 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.

9. MITIGATION MEASURES

As there are certain visual impacts from the proposed solar development project, mitigation measures have been developed and are provided within this section.

Visual mitigation can be divided into two (2) options. Typically using a combination of the two (2) options is most effective. The first option is an attempt to "hide" the source of the visual impact from view, by placing visually appealing elements between the viewer and the source of the visual impact. The second option aims to minimise the severity of the visual impact itself. This can be achieved in numerous ways for example limiting heights or by blending the infrastructure to match the surrounding environment.

During the construction phase, the following mitigation measures should be implemented to minimise the visual impact.

- 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;
    - 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.

During the operational phase the following mitigation measures should be implemented to minimise the visual impact.

- 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.
    - Eradicate invasive alien plant species.

During decommissioning and closure phase, the following mitigation measures should be implemented to minimise the visual impact.

- Eradicate invasive alien plant species;
- Remove all built infrastructure; and

- Re-shape all footprint areas to be as natural in appearance as possible and revegetate using locally occurring vegetation.

10. CONCLUSION AND RECOMMENDATIONS

The project site and surrounding area can be characterized by residential and agricultural activities. According to the REEA Database, no (0) renewable energy application have been made for properties located near the project site. The proposed site ranges from approximately 1535 to 1500 metres above mean sea level (mamsl), and is predominantly flat. The landscape is characterized a mix of natural grassland, open woodland, commercial annual crops (rain-fed / dry land) and Fallow land (old fields (bush), typically of the Highveld (11) region of South Africa. The surrounding areas comprises with a mix of residential activities and agricultural activities. The vegetation in the area consists mainly of grasses, shrubs, and scattered trees.

Several potential risks to the receiving aesthetic and visual environment as a result of the proposed activities have been identified, relating to impacts on the visual character and sense of place, visual intrusion and visual exposure and visibility. The significance of these impacts may be reduced should appropriate and effective mitigation measures be implemented. The proposed Project and associated infrastructure can conceivably have a **moderate impact** on the visual environment, while secondary impacts, such as dust emission, solar glint and glare and lighting at night, will also manifest as visual disturbances from project initiation. The study area comprises of residential activities, agricultural and commercial activities which have had a visual impact on the natural environment. Therefore, the proposed project has been predicted to have a **moderate** impact before mitigation on the visual environment. After appropriate and effective mitigation measures the impact is rated as **moderate to low**.

The proposed activities should therefore have a **moderate to low** visual impact on the receiving environment and is thus not fatally flawed from a visual impact perspective. 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. All recommendations should be included in the Environmental Management Programme (EMPr) relevant to the proposed project.

11. REFERENCES

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APPENDIX A – SPECIALIST CURRICULUM VITAE

ENVIRONMENTAL ASSURANCE (PTY) LTD

ANDRE BUYS

ENVIRONMENTAL CONSULTANT / BUSINESS UNIT HEAD

394 Tram Street, New Muckleneuk, Pretoria, 0181

T: 012 460 9768 ; M : 083 555 4354; F : 012 460 3071 ; E mail : andre@envass.co.za

Date of Birth : 18 November 1991; Place of Birth : South Africa

Ethnic Group and Gender: White Male ; Disabilities : None

AREAS OF EXPERTISE

- Compliance Monitoring
- Specialist Report (Visual and Noise assessments)
- Project Management
- Potable, Ground and Surface Water Quality
- Scientific Report Writing
- Data Analysis & Interpretation
- Hydrogeology
- Soil classification
- Ambient Air and Particulate Matter Quality
- Noise Monitoring
- Geophysics
- GIS, Surfer, Wish, QGIS, ARC GIS and WRPLOT software
- Customer Relationships

CAREER HISTORY

Employer
Period
Position
Responsibilities

ENVIRONMENTAL ASSURANCE (PTY) LTD

Andre holds a B.Sc. in Environmental Sciences, followed by a B.Sc. (Hons) specializing in Geology, Geography and Hydrology. He has comprehensive experience and knowledge on compliance monitoring, project management and specialist reporting. As an environmental consultant, Andre has provided several environmental monitoring and geohydrological assessments and specialist input services.

BUSINESS UNIT HEAD / ENVIRONMENTAL SPECIALIST
Environmental Specialist, Environmental Control Officer and Auditor
June 2022 – Current

Develop and maintain environmental compliance monitoring programmes in conjunction with site audits and assessments. Monitoring co-ordination and planning of all relevant projects. Maintaining data and results from monitoring programmes and databases. Determining financial provision of mine closures. Compile and overseeing reports on water-, soil-, air-quality and site findings, with interpretation of results and recommendations. Conduct and report on specialist assessments Maintain and build

customer relationships with guidance on environmental matters and updates on environmental legislation. Market to potential clients with site specific marketing material. Additionally, conducting Geohydrological studies including Groundwater resource development, Geophysical surveys, Conceptual modelling, Pump tests, Borehole siting, Borehole logging, Groundwater remediation programmes and hydrocensus'.

EDUCATION AND QUALIFICATIONS

North-West University; Honours BSc. Hydrogeology and Hydrology - 2014
North-West University; Degree BSc. Environmental Science Geology and Geography – 2013

PROFESSIONAL STATUS

Registration
Membership

Registered as a Professional Natural Scientist (119183) with the South African Council of Natural Scientific Professions (SACNASP)

PROJECT EXPERIENCE

PROJECT DESCRIPTION	CLIENT
Visual Impact Assessments	Nemai Consulting Grootvly Visual Assessment
	GIBB Environmental Rhino PV Visual Assessment
	GIBB Environmental Onderstepoort 1 PV Visual Assessment
	GIBB Environmental Onderstepoort 2 PV Visual Assessment
Environmental Compliance Monitoring	Assmang Dwarsrivier
	Tronox Namakwa Sands
	Tronox KZN
	Samancor Ferrometals
	CEMZA Cement
	Northam Platinum Zondereinde
	Northam Platinum Eland
	Northam Platinum Maroelabult
	Wescoal Mining Elandspruit
	Wescoal Mining Keaton
	Neosho Moabsvelden
	Wescoal Processing Plant
	Wescoal Khanyisa
	Exxaro Grootegeluk
	Exxaro Thabametsi
	Exxaro Grootegeluk Depot
	AECI Mining and Explosives
	Calodex Enstra Waste Disposal Facility
	Anglo American Whiskey Creek
	Keywest Shopping Centre
	Glencore Chrome Kroondal
	Glencore Chrome Rietvly
	Glencore Chrome Boshoek
	Kelvin Power Station
	Potchefstroom Dolomite Risk Project
Groundwater Resource Development and Geophysics	Ganyisa Groundwater Resource Development
	Moretele Groundwater Provision
	Polokwane Groundwater Resource Development
	Majakaneng Water Provision
	Steelpoort Pipeline Geophysical Investigation
	Swaziland Waste Disposal Site Investigation
	Moretele Road Construction Phase 2

Environmental Control Officer	Zululand Anthracite Colliery – Report Approval and Sign-off
Environmental Auditor	Makoya Blinkpan External EMPr Auditor
	Sephaku Cement External Water Use License Auditor
	Ocon Bricks External Water Use License Auditor
	Ocon Bricks External EMPr Auditor
Software Modelling and GIS	Ganyisa Groundwater Resource Development
	Moretele Groundwater Provision
	Polokwane Groundwater Resource Development
	Majakaneng Water Provision
	Steelpoort Pipeline Geophysical Investigation
	Swaziland Waste Disposal Site Investigation

CERTIFICATION

I, **ANDRE BUYS**

Declare that, to the best of my knowledge, all the information contained herein is true.

Signature: 

On the 29 day of May 2023.

APPENDIX E9: Transport Impact Assessment

iWink Consulting
Traffic & Transport Engineering
Road Safety

SEELO BETA SOLAR PV PROJECT
CARLTONVILLE
NORTH WEST PROVINCE

Transport Impact Assessment

July 2023
Final Issue

Prepared by:

iWink Consulting (Pty) Ltd

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SEELO BETA SOLAR ENERGY PV PROJECT
TRANSPORT IMPACT ASSESSMENT

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EXECUTIVE SUMMARY

This report serves as the Transport Impact Assessment aimed at determining the traffic impact of the proposed Seelo Beta Solar Energy PV Project near Carltonville in the North West Province. The proposed project is located approximately 13 km north-west of Carltonville.

The project site is located within the JB Marks Local Municipality in the Dr Kenneth Kaunda District Municipality. The site will accommodate a solar energy facility and associated support structures and facilities to allow for the generation and evacuation of electricity.

Feasible accessibility to the site was assessed considering sight lines, access spacing requirements and road safety aspects, which is discussed in this report. It is recommended to ensure that the access point onto the external road is kept clear of vegetation and any other obstructions to ensure sight lines are kept.

In general, non-motorised transportation (NMT) is a dominant mode of transportation in rural areas, with private cars and minibus/taxis being the second-most used mode of transport, followed by buses. Currently, there are no known future planned public transport facilities in the vicinity of the site. However, generally the developer or appointed contractor of a renewable energy project will provide shuttle busses for workers during the construction phase.

The highest trip generator for the project is expected during the construction phase. The actual construction stage peak hour trips are dependent on the construction period, construction programming, material availability, component delivery, abnormal load permitting etc. The decommissioning phase is expected to generate similar trips as the construction phase. The traffic impact during the operational phase is considered negligible.

For the construction and decommissioning phases, the impact expected to be generated by the vehicle trips is an increase in traffic and the associated noise, dust, and exhaust pollution. Based on the high-level screening of impacts and mitigation, the project is expected to have a negative low impact during the construction and decommissioning stages including the recommended mitigation measures.

SEELO BETA SOLAR ENERGY PV PROJECT

1 INTRODUCTION

1.1 Project Description

Seelo Beta Solar PV (RF) (Pty) Ltd. is proposing the development of a commercial solar energy generation facility, namely the Seelo Beta Solar Energy PV Project, and associated infrastructure including a BESS on a farm portion located near Carletonville in the North West Province. The proposed project will be located in a rural environment around 13 km north-west of Carletonville (see **Figure 1-1**) and comprise of a contracted capacity of up to 240 MW.

A development area has been identified and within this identified development area, the development footprint has been defined in a manner which has considered the environmental sensitivities present on the affected property and intentionally remains outside of highly sensitive areas. The site is ~1 130 ha in extent and the development area is ~355 ha. The affected farm property is Portion 1 of the Farm Rooipan No. 96.

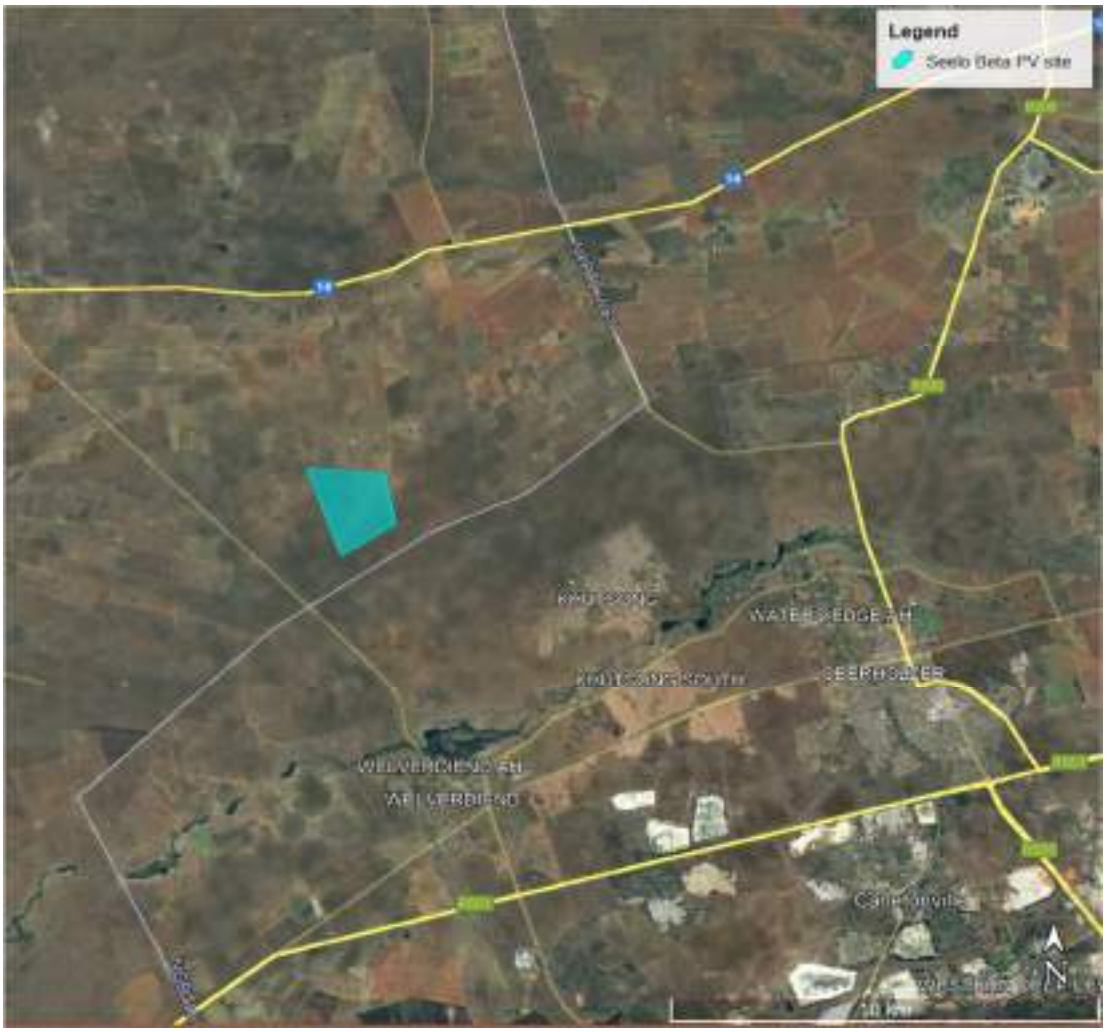

Figure 1-1: Aerial View of location of the Seelo Beta project site

The proposed project details are summarized in **Table 1-1.**

Table 1-1:Project information

Facility Name:	Seelo Beta Solar Energy PV Project
Applicant:	Seelo Beta Solar PV (RE) (Pty) Ltd.
Farm property:	Portion 1 of the Farm Rooipan No. 96
Municipality:	JB Marks Local Municipality Dr Kenneth Kaunda District Municipality
Province:	North West
Extent:	~355 ha development area
Capacity:	Up to 240 MW
Number of panels:	Estimated 525 000 panels
Height of Panels:	Up to 6 m height (installed)
Type of Technology:	Photovoltaic
Structure orientation:	It is expected that the panels will be fixed to either fixed-tilt, single-axis tracking and/or double-axis tracking structures with the orientation of the panel varying according to the time of the day, as the sun moves from east to west or tilted at a fixed angle towards North with the angle of tilt optimised for cost and system performance.
BESS:	Generally, either Lithium Battery (such as Lithium Iron Phosphate or Lithium Nickel Manganese Cobalt oxides) or Vanadium Redox technology is considered for a project of this nature. The main components of the BESS include the batteries, power conversion system and transformer which is assumed to be stored in various rows of containers. The footprint for the BESS will be ~3 ha.
Inverter:	Sections of the PV array will need to be wired to inverters. The inverter is generally a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency. Cabling comprises of communication, AC and DC cables. A total of 70 inverters will be required (footprint ~0.5 ha).
Operations and Maintenance (O&M) building footprint:	O&M area to be up to 3 ha (expected to be within the development area), will include security gate house, ablutions, workshops, storage and warehousing areas, site offices, Switch gear, control and relay room.
Laydown area:	The temporary construction laydown area to be ~2 ha. Permanent laydown area to be ~1 ha.

Internal Roads:	Internal roads need to be provided to the site and between project components inclusive of stormwater infrastructure. As far as possible, internal roads will follow existing gravel roads and paths, of which some may require widening/upgrading. Further internal roads may need to be constructed with a width of 6 m. The length of internal roads needs to be confirmed. The main site access roads are advised to be up to 8 m wide. Where/if required, turning circle/bypass areas will need to be constructed. Total length of internal road ~21 km.
Fencing:	Various type of fencing (i.e., welded mesh, palisade, electric). Height tbc.
Grid infrastructure / Substation:	The generated electricity will have to be evacuated from the on-site substation via 132 kV transmission line to the existing Eskom Carmel Main Transmission Substation.
Site access:	From D331

1.2 Scope and Objectives

The Transport Impact Assessment is aimed at determining the traffic impact of the proposed land development proposal and whether such development can be accommodated by the external transportation system.

The report deals with the items listed below and focuses on the surrounding road network in the vicinity of the site:

- The proposed development;
- The existing road network and any future road planning proposals;
- Trip generation for the proposed development during the construction, operation, and decommissioning phases of the facility;
- Anticipated traffic impact of the proposed development;
- Access requirements and feasibility of proposed access points;
- Determine a main route for the transportation of components to the proposed project site;
- Determine a preliminary transportation route for the transportation of materials, equipment and people to site;
- Recommend alternative or secondary routes, where possible and required;
- Assess Public Transport accessibility;
- Assess Non-motorised Transport availability; and
- Recommended high-level upgrades to the road network, if necessary.

1.3 Details of Specialist

Iris Sigrid Wink of iWink Consulting (Pty) Ltd. is the Traffic & Transportation Engineering Specialist appointed to provide a Transport Impact Assessment for the proposed Seelo Beta Solar Energy PV Project. Iris Wink is registered with the Engineering Council of South Africa (ECSA), with Registration Number 20110156. A curriculum vitae is included in **Appendix A** of this report.

A signed Specialist Statement of Independence is included in **Appendix B**.

1.4 Terms of Reference

There is no protocol relevant to traffic impact assessments and therefore the specialist study is undertaken according to Appendix 6 of the EIA Regulations (GNR 982, as amended). A transport specialist report should contain the following:

(a) details of-
  (i) the specialist who prepared the report; and
  (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;

(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;

(c) an indication of the scope of, and the purpose for which, the report was prepared;
  (cA) an indication of the quality and age of base data used for the specialist report
  (cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;

(d) the duration date and season of the site investigation and the relevance of the season to the outcome of the assessment;

(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;

(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;

(g) an identification of any areas to be avoided, including buffers;

(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;

(i) a description of any assumptions made and any uncertainties or gaps in knowledge;

(j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;

(k) any mitigation measures for inclusion in the EMPr;

(l) any conditions for inclusion in the environmental authorisation;

(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;

(n) a reasoned opinion-
  (i) whether the proposed activity, activities or portions thereof should be authorised; and (considering impacts and expected cumulative impacts).
  (iA) regarding the acceptability of the proposed activity or activities, and
  (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;

(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;

(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and

(q) any other information requested by the competent authority.

Specific:

- Extent of the transport study and study area;
- The proposed development;
- Trip generation for the facility during construction and operation;
- Traffic impact on external road network;
- Accessibility and turning requirements;
- National and local haulage routes;
- Assessment of internal roads and site access;
- Assessment of freight requirements and permitting needed for abnormal loads; and
- Traffic accommodation during construction**.**

2 APPROACH AND METHODOLOGY

The report deals with the traffic impact on the surrounding road network in the vicinity of the site during the:

- Construction phase;
- Operational phase; and
- Decommissioning phase.

This transport study includes the following tasks:

Project Assessment

- Communication with the project team to gain sound understanding of the projects.
- Overview of available project background information including, but not limited to, location maps, site development plans, anticipated vehicles to the site (vehicle type and volume), components to be transported and any resulting abnormal loads.
- Research of all available documentation and information relevant to the proposed facility.

Access and Internal Roads Assessment

- Assessment of the proposed access points including:
  - Feasible location of access points
  - Motorised and non-motorised access requirements
  - Queuing analysis and stacking requirements, if required
  - Access geometry
  - Sight distances and required access spacing
  - Comments on internal circulation requirements and observations

Haulage Route Assessment

- Determination of possible haulage routes to site regarding:
  - National routes
  - Local routes
  - Site access points
  - Road limitations due to abnormal loads

Traffic Estimation and Impact

- Construction, operational, and decommissioning phase vehicle trips
  - Generated vehicles trips
  - Abnormal load trips
  - Access requirements
- Investigation of the impact of the development traffic generated during construction, operation, and decommissioning.

Report (Documentation)

- Reporting on all findings and preparation of the report.

2.1 Information Sources

The following guidelines have been used to determine the extent of the traffic study:

- Project Information provided by the Client;
- Google Earth.kmz provided by the Client;
- Google Earth Pro Satellite Imagery;
- Road Traffic Act, 1996 (Act No. 93 of 1996)
- National Road Traffic Regulations, 2000
- SANS 10280/NRS 041-1:2008 - Overhead Power Lines for Conditions Prevailing in South Africa
- The Technical Recommendations for Highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads
- Manual for Traffic Impact Studies, Department of Transport, 1995;
- TRH26 South African Road Classification and Access Management Manual, COTO; and
- TMH 16 South African Traffic Impact and Site Traffic Assessment Manual (Vol 1/Vol2), COTO, August 2012.

2.2 Assumptions, Knowledge Gaps and Limitations

The following assumptions and limitations apply:

- This study is based on the project information provided by the client.
- According to the Eskom Specifications for Power Transformers (Eskom Power Series, Volume 5: Theory, Design, Maintenance and Life Management of Power Transformers), the following dimensional limitations need to be kept when transporting the transformer – total maximum height 5 000 mm, total maximum width 4 300 mm and total maximum length 10 500 mm.
  It is envisaged that for this project the inverter, transformer, and switchgear will be transported to site in containers on a low bed truck and trailer. The transport of a mobile crane and the transformer are the only abnormal loads envisaged. The crane will be utilised for offloading equipment, such as the transformer.
- Maximum vertical height clearances along the haulage route are 5.2 m for abnormal loads.
- If any elements are manufactured within South Africa, these will be transported from their respective manufacturing centres, which would be either in the greater Cape Town area, Johannesburg, or possibly in Pinetown/Durban.
- All haulage trips will occur on either surfaced national and provincial roads or existing gravel roads.
- Material for the construction of internal access roads will be sourced locally as far as possible.
- The final access points are to be determined during the detailed design stage. Only recommended access points at conceptual level can be given at this stage.
- Planned or approved projects in the vicinity of the site to be considered as part of the cumulative impacts.
- An 18 to 24-months construction period is assumed with some of the construction period dedicated to site prep and civil works.

2.3 Consultation Processes Undertaken

The Transport Impact Assessment is based on available project information and consultation with the developer.

3 LEGISLATIVE AND PERMIT REQUIREMENTS

Key legal requirements pertaining to the transport requirements for the proposed project are:

- Abnormal load permits, (Section 81 of the National Road Traffic Act 93 of 1996 and National Road Traffic Regulations, 2000),
- Port permit (Guidelines for Agreements, Licenses and Permits in terms of the National Ports Act No. 12 of 2005), and
- Authorisation from Road Authorities to modify the road reserve to accommodate turning movements of abnormal loads at intersections.

4 DESCRIPTION OF THE PROPOSED DEVELOPMENT

4.1 General Description

The proposed Seelo Beta PV site is located in a rural environment near Carletonville in the North West Province (see **Figure 4-1**). The affected farm portion is Portion 1 of the Farm Rooipan No. 96.

Figure 4-1: Aerial View of the proposed Seelo Beta PV site

The development footprint will contain the following infrastructure to enable the Seelo Beta Solar PV project to generate up to 240 MW:

- PV panel arrays, which are the subsystems which convert incoming sunlight into electrical energy;
- Mounting structures to support the PV panels;

- On-site inverters to convert DC to facilitate AC connection between the solar energy facility and electricity grid;
- BESS;
- IPP substation;
- Eskom switching substation;
- Cabling between the Project's components, to be laid underground (where practical);
- Administration Buildings (Offices);
- Workshop areas for maintenance and storage;
- Temporary and permanent laydown areas;
- Internal access roads and perimeter fencing of the footprint;
- High Voltage (HV) Transformers; and
- Security Infrastructure.

4.2 Alternatives

The Department of Environmental Affairs and Tourism (DEAT) 2006 guidelines on 'assessment of alternatives and impacts' proposes the consideration of four types of alternatives, namely, the no-go, location, activity, and design alternatives. It is, however, important to note that the regulation and guidelines specifically state that only 'feasible' and 'reasonable' alternatives should be explored. It also recognizes that the consideration of alternatives is an iterative process of feedback between the developer and EAP, which in some instances culminates in a single preferred project proposal. An initial site assessment was conducted by the developer and the farm portion was found favorable due to its proximity to grid connections, solar radiation, site access and relative flat terrain. The greater area was considered based on these factors. However, environmentally sensitive and "no-go" areas, as identified by the specialists, were considered and avoided as far as possible, where required.

The following alternatives were considered in relation to the proposed activity:

Location Alternatives

The site selection process for a PV facility is almost always underpinned by a good solar resource. Other key considerations include environmental and social constraints, proximity to various planning units and strategic areas, terrain and availability of grid connection infrastructure.

Based on the above site-specific attributes, the study area is considered to be highly preferred in terms of the development of a solar PV facility. As such, no property / location alternatives will be considered.

BESS

As technological advances within battery energy storage systems (BESS) are frequent, two BESS technology alternatives are considered: Solid state battery electrolytes and Redox-flow technology. Solid state battery electrolytes, such as lithium-ion (Li-ion), zinc hybrid cathode, sodium ion, flow (e.g., zinc iron or zinc bromine), sodium sulphur (NaS), zinc air and lead acid batteries, can be used for grid applications. Compared to other battery options, Li-ion batteries are highly efficient, have a high energy density and are lightweight. As a result of the declining costs, Li-ion technology now

accounts for more than 90% of battery storage additions globally (IRENA, 2019). Flow batteries use solid electrodes and liquid electrolytes. The most used flow battery is the Vanadium Redox Flow Battery (VRFB), which is a type of rechargeable flow battery that employs vanadium ions in different oxidative states to store chemical potential energy.

Design and layout alternatives

It is customary to develop the final/detailed construction layout of the solar PV facility only once an Independent Power Producer (IPP) is awarded a successful bid under the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) or an alternative programme, after which major contracts are negotiated and final equipment suppliers identified.

For the purpose of the application process, site layout alternatives will not be comparatively assessed, but rather a single layout will be refined as additional information becomes available throughout the BA process (e.g., specialist input, additional site surveys, ongoing stakeholder engagement).

The development area has been selected as a practicable option for the facility, considering technical preference and constraints, as well as initial No-Go layers informed by specialist site surveys. The layout presented in this report avoids all no-go-high-sensitivity areas identified by all the specialists.

Technology alternatives: Solar panels

There are several types of semiconductor technologies currently available and in use for PV solar panels. Two, however, have become the most widely adopted, namely crystalline silicon (Mono-facial and Bi-facial) and thin film. The technology that (at this stage) proves more feasible and reasonable with respect to the proposed solar facility is crystalline silicon panels, due to it being non-reflective, more efficient, and with a higher durability.

Due to the rapid technological advances being made in the field of solar technology the exact type of technology to be used, such as bifacial panels, will only be confirmed at the onset of the project.

No-go alternative

This alternative considers the option of 'do nothing' and maintaining the status quo. The site is currently zoned for agricultural land uses. Should the proposed activity not proceed, the site will remain unchanged and will continue to be used for agricultural purposes. The potential opportunity costs in terms of alternative land use income through rental for energy facility and the supporting social and economic development in the area would be lost if the status quo persist.

4.2.1 Specialist comment regarding alternatives

From a transport engineering perspective, the alternatives listed above (i.e., electrical infrastructure location alternatives and the technology options for the BESS) are equally acceptable as it does have a nominal impact on the traffic on the surrounding road network.

4.3 Proposed Access

The proposed access road for Seelo Beta PV will turn off the D331 towards the site as shown in green in **Figure 4-2**. This proposed access point on the D331 has been assessed in line with access spacing requirements, required sight lines and road safety considerations.

Figure 4-2 Aerial view of proposed access road for Seelo Beta

The site is currently undeveloped and used for agricultural and grazing purposes and a new access will need to be constructed (see **Figure 4-3**). The radii at the newly constructed site access need to be large enough to allow for all construction vehicles to turn safely.

Figure 4-3: View of Seelo Beta site at proposed access point

In accordance with *Figure 2.5.5(a) of the TRH17 Guidelines for the Geometric Design of Rural Roads* (see **Figure 4-4**), the shoulder sight distance for a stop-controlled condition on a road with a speed limit of 80 km/h, needs to be a minimum of 330 m for the largest vehicle (5m set back from the intersecting road).

The required minimum shoulder sight distances are met in both directions accessing the D331 from the proposed access point (see **Figure 4-5**). **Figure 4-6** and **Figure 4-7** show the respective view in each direction on the D331 from the access point.

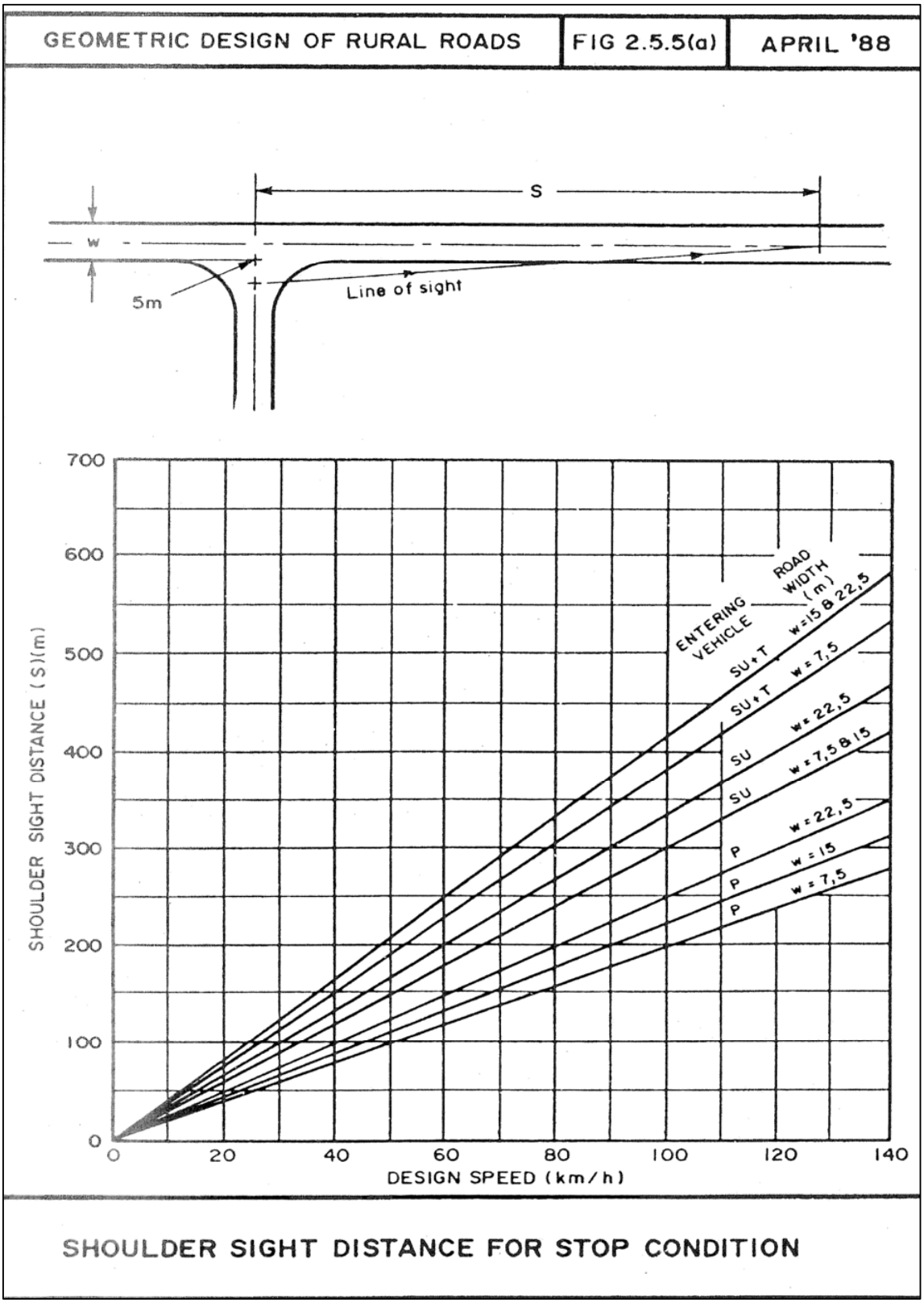

Figure 4-4: Shoulder sight distance (TRH17)

Figure 4-5: Required Sight distances at proposed access point on D331

Figure 4-6: View in northern direction on D331 at proposed access point

Figure 4-7: View in a southern direction on D331 at proposed access point

4.3.1 General

It is advised to allow for a minimum stacking space of 25 m between the road edge of the D331 and the site access control (i.e., the access boom) to ensure that least one large construction vehicle can stack in front of the security control without obstructing vehicles traveling on the D331 past the access point.

Any damage to the D331 road surface, caused by haulage vehicles of the proposed project, needs to be reinstated after construction.

During the construction phase, temporary road signage in line with *South African Road Signs Manual (SARTSM*) will need to be erected along the D331 in the vicinity of the access point to alert drivers that construction vehicles turn into and out of the site access.

4.4 Internal Roads

The geometric design and layout for the internal roads from the recommended access points need to be established at detailed design stage. Existing structures and services, such as drainage structures, signage and pipelines will need to be evaluated if impacting on the roads. It needs to be ensured that the gravel sections remain in good condition and will need to be maintained during the additional loading of the construction phase and then reinstated after construction is completed.

The geometric design constraints encountered due to the terrain should be taken into consideration by the geometric designer. Preferably, the internal roads need to be designed with smooth, relatively flat gradients (recommended to be no more than 8%) to allow a larger transport load vehicle to ascend to the respective laydown areas.

4.4.1 Transportation of Materials, Plant and People to the proposed site

It is assumed that the materials, plant, and workers will be sourced from the surrounding towns as far as possible, such as Welverdien or Khutsong.

4.4.2 Public Transport and Non-Motorised Transport

In terms of the National Land Transport Act (NLTA) (Act No.5 of 2009), the assessment of available public transport services is included in this report. The following comments are relevant in respect to the public transport availability for the proposed developments.

The closest public transport service (i.e., minibus taxis) is expected to be available along the N12 and R501, which are in 12 km and 9 km distance, respectively. However, in many cases, the developer or appointed contractor of a large-scale project, such as many renewable energy projects, provides shuttle buses or similar for workers during the construction phase.

5 DESCRIPTION OF THE TRANSPORT ROUTES TO SITE

5.1 Port of Entry

The proposed Seelo Beta Solar PV project will be located in fairly similar travel distances from the Port of Durban and the Port of Richards Bay (see **Figure 5-1**) and therefore both have been taken into consideration in this study.

Figure 5-1: Possible Ports of Entry

5.1.1 Port of Richards Bay

The Port of Richards Bay is situated on the coast of KwaZulu-Natal and is a deep-sea water port boasting 13 berths. The terminal handles dry bulk ores, minerals and break-bulk consignments with a draft that easily accommodates Cape size and Panamax vessels. The Port is operated by Transnet National Ports Authority. The Port of Richards Bay is located approximately 850 km from the proposed Seelo Beta Solar PV site traveling via the N3, N5 and R500 (see **Figure 5-2**). This route is not the shortest possible one, but preferred as it avoids traveling through Welverdien (sharp bends and limited road space would make it difficult for large construction vehicles to navigate).

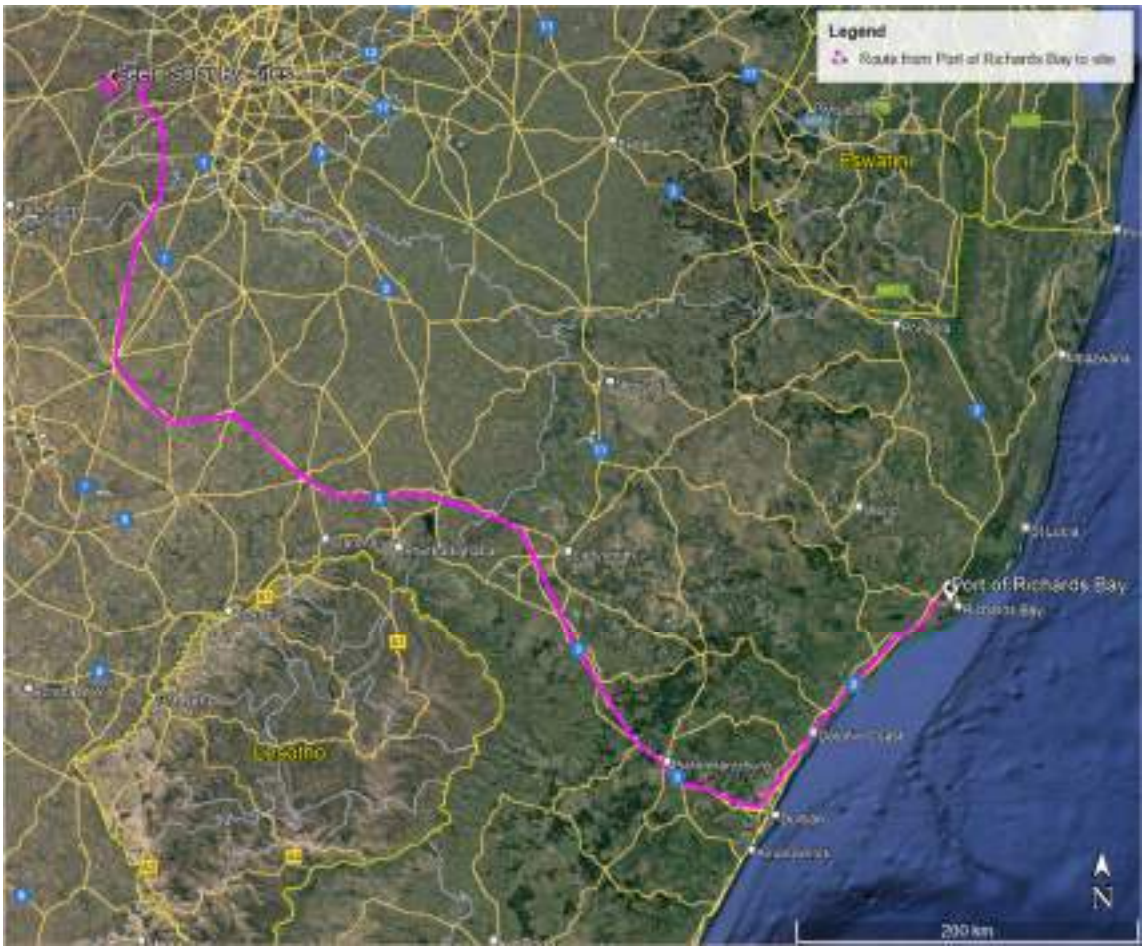

Figure 5-2: Route from Port of Richards Bay to project site

5.1.2 The Port of Durban

The Durban container terminal is one of the largest container terminals in the African continent and operates as two terminals Pier 1 and Pier 2. It is ideally located to serve as a hub for containerized cargo from the Indian Ocean Islands, Middle East, Far East and Australia. Various capacity creation projects are currently underway, including deepening of berths and operational optimization. The terminal currently handles 65% of South Africa's container volumes. (Transnet Port Terminals, n.d).

The Port of Durban is located approximately 700 km via the N3 and R76 from the proposed project site (**Figure 5-3**).

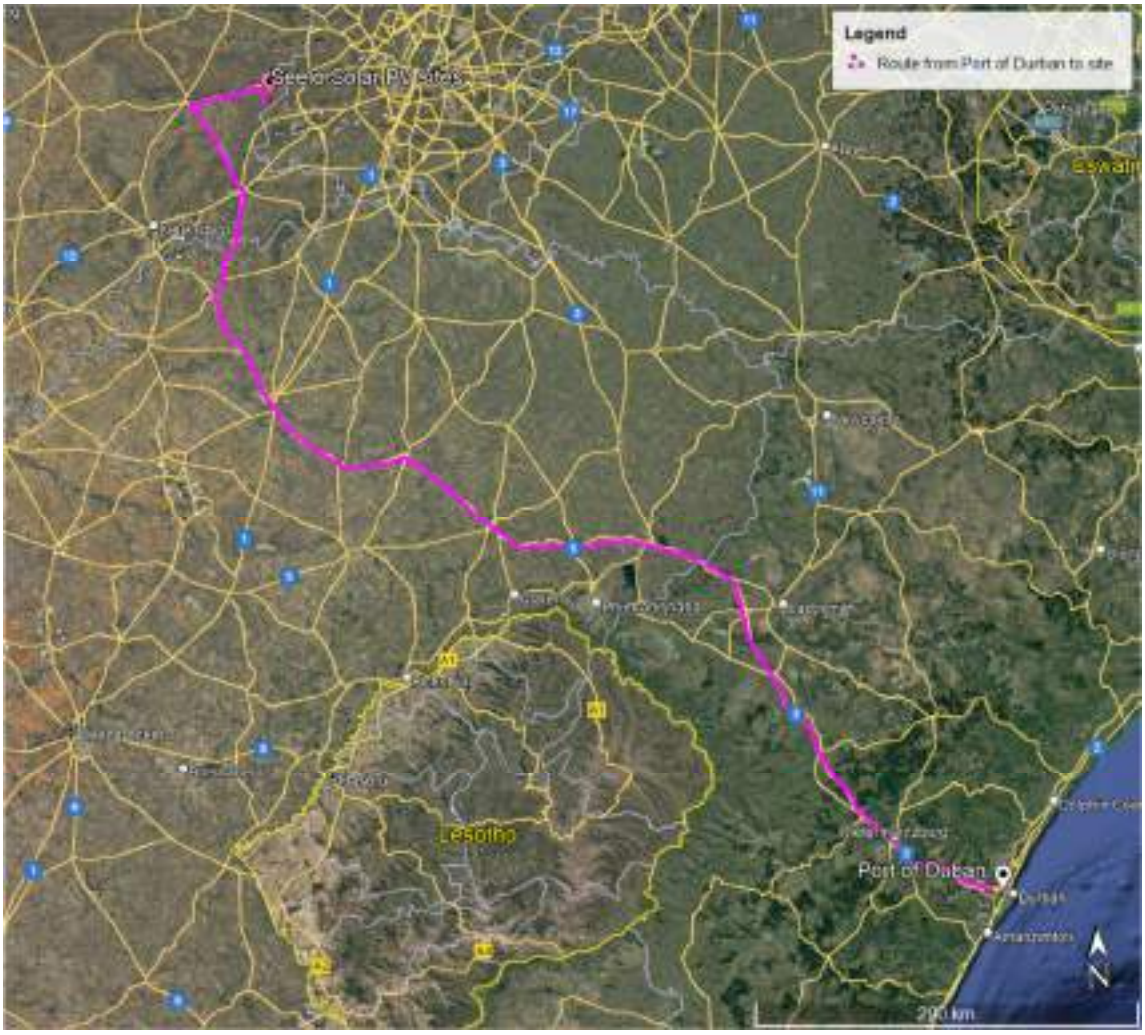

Figure 5-3: Route from Port of Durban to the project site

5.2 Transportation requirements

It is anticipated that the following vehicles will access the site during construction:

Solar PV:

- Conventional trucks within the freight limitations to transport building material to the site;
- 40ft container trucks transporting solar modules, frames, and the inverter, which are within freight limitations;
- Flatbed trucks transporting the solar modules and frames, which are within the freight limitations;
- Light Differential Vehicle (LDV) type vehicles transporting workers from surrounding areas to site;
- Drilling machines and other required construction machinery being transported by conventional trucks or via self-drive to site; and
- The transformer will be transported as abnormal load.

5.3 Abnormal Load Considerations

Abnormal permits are required for vehicles exceeding the following permissible maximum dimensions on road freight transport in terms of the Road Traffic Act (Act No. 93 of 1996) and the National Road Traffic Regulations, 2000:

- Length: 22 m for an interlink, 18.5 m for truck and trailer and 13.5 m for a single unit truck
- Width: 2.6 m Height: 4.3m measured from the ground. Possible height of load – 2.7 m.
- Weight: Gross vehicle mass of 56t resulting in a payload of approximately 30t
- Axle unit limitations: 18t for dual and 24t for triple-axle units
- Axle load limitation: 7.7t on the front axle and 9t on the single or rear axles

Any dimension / mass outside the above will be classified as an Abnormal Load and will necessitate an application to the Department of Transport and Public Works for a permit that will give authorisation for the conveyance of said load. A permit is required for each Province that the haulage route traverses.

In addition to the above, the preferred routes for abnormal load travel should be surveyed prior to construction to identify any problem areas, e.g., intersections with limited turning radii and sections of the road with sharp horizontal curves or steep gradients, which may require modification. After the road modifications have been implemented, it is recommended to undertake a “dry-run” with the largest abnormal load vehicle, to ensure that the vehicle can travel without disruptions. It needs to be ensured that gravel sections (if any) of the haulage routes remain in good condition and will need to be maintained during the additional loading of the construction phase and reinstated after construction is completed.

There are bridges and culverts along the National and Provincial routes, which need to be confirmed for load bearing capacity and height clearances. However, there are alternative routes which can be investigated if the selected route or sections of the route should not be feasible.

Any low hanging overhead lines (lower than 5.1 m), e.g., Eskom and Telkom lines, along the proposed routes will have to be moved to accommodate the abnormal load vehicles.

5.4 Further Guideline Documentation

The Technical Recommendations for Highways (TRH) 11: “Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads” outlines the rules and conditions that apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts.

The general conditions, limitations and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power / mass ratio, mass distribution and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the Road Traffic Act and the relevant regulations.

5.5 Permitting – General Rules

In general, the limits recommended in TRH 11 are intended to serve as a guide to the Permit Issuing Authorities. It must be noted that each Administration has the right to refuse a permit application or to modify the conditions under which a permit is granted. It is understood that:

a) A permit is issued at the sole discretion of the Issuing Authority. The permit may be refused because of the condition of the road, the culverts and bridges, the nature of other traffic on the road, abnormally heavy traffic during certain periods or for any other reason.
b) A permit can be withdrawn if the vehicle upon inspection is found in any way not fit to be operated.
c) During certain periods, such as school holidays or long weekends an embargo may be placed on the issuing of permits. Embargo lists are compiled annually and are obtainable from the Issuing Authorities.

5.6 Load Limitations

The maximum load that a road vehicle or combination of vehicles will be allowed to carry legally under permit on a public road is limited by:

- the capacity of the vehicles as rated by the manufacturer,
- the load which may be carried by the tyres,
- the damaging effect on pavements,
- the structural capacity on bridges and culverts,
- the power of the prime mover(s),
- the load imposed by the driving axles, and
- the load imposed by the steering axles.

5.7 Dimensional Limitations

A load of abnormal dimensions may cause an obstruction and danger to other traffic. For this reason, all loads must, as far as possible, conform to the legal dimensions. Permits will only be considered for indivisible loads, i.e., loads that cannot, without disproportionate effort, expense, or risk of damage, be divided into two or more loads for the purpose of transport on public roads. For each of the characteristics below there is a legally permissible limit and what is allowed under permit:

- Width,
- Height,
- Length,
- Front Overhang,
- Rear Overhang,
- Front Load Projection,
- Rear Load Projection,
- Wheelbase,
- Turning Radius, and
- Stability of Loaded Vehicles.

5.7.1 Route for Components manufactured within South Africa

In South Africa, more than half (52%) of the manufacturing industry's national workforce resides in three metros - Johannesburg, Cape Town, and eThekwini. It is therefore anticipated that elements ,that can be manufactured within South Africa, will be transported to the site from the Cape Town, Johannesburg, or Pinetown/Durban areas. Components will be transported to site using appropriate

National and Provincial routes. It is expected that the components will generally be transported to site with normal heavy load vehicles.

5.7.1.1 Route from Cape Town Area to Site – Locally sourced materials and equipment

Cape Town has a large manufacturing sector with twenty-six (26) industrial areas located throughout the metro. The proposed industrial hubs being considered to source the required materials and components is currently unknown. With quite an extensive and widespread industrial market, a specific route to the site cannot be considered at this point in time, but it is expected that a majority of the route lengths will be similar to the routes considered for the haulage of imported materials and equipment. No road limitations are envisaged along the route for normal load freight. The estimated a travel distance is around 1 380 kms via the N1, N12 and N14 (see **Figure 5-4**).

Figure 5-4: Route from Cape Town area to project site

5.7.1.2 Routes from Johannesburg Area to Site – Locally sourced materials and equipment

If components will be delivered from the Johannesburg area, normal loads can be transported via several routes to site as the project will be located close to the Johannesburg area. The exact route will be established by the appointed haulage company. No road limitations are envisaged along the route for normal load freight.

5.7.1.3 Route from Pinetown area to Site - Locally sourced materials and equipment

Normal loads can transport elements via two potential routes from Durban and Pinetown to the site. No road limitations are envisaged along the route for normal load freight. The travel distance from Pinetown to the site via the N3 and R76 is approximately 680 km (see **Figure 5-5**).

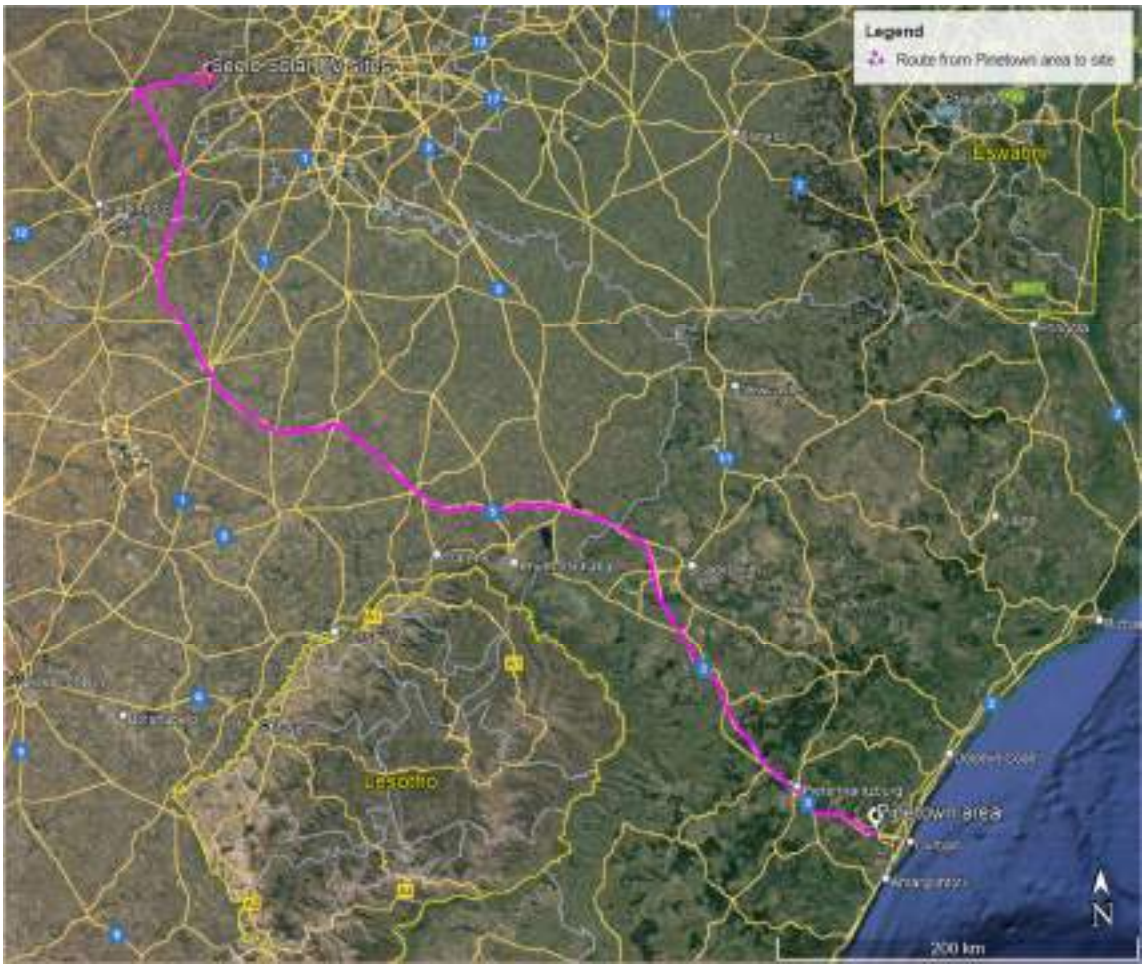

Figure 5-5: Route from Pinetown area to the project site

5.7.2 Surrounding road network

The construction vehicles for the proposed Seelo Beta Solar PV project will take access from an existing surfaced district road (D331) that connects with the N14 on its northern and Welverdien on its southern end with a length of approximately 19 km (see **Figure 5-6**). According to the road classification of the surrounding road network as per the *Road Infrastructure Strategic Framework for South Africa (RISFSA)* and *COTO's TRH26 South African Road Classification and Access Management Manual*, the D331 can be classified as **Class 3 rural minor arterial**, which typically carries inter-district traffic between:

- Small towns, villages and larger rural settlements (population typically less than about 25 000);
- Smaller commercial areas and transport nodes of local importance that generate relatively high volumes of freight and other traffic in the district (public transport and freight terminals, railway sidings, small seaports and landing strips);
- Other Class 1, 2 and 3 routes.
- Smaller centres than the above when travel distances are relatively long (longer than 50 to 100 km).

Figure 5-6: Aerial view of D331

6 ISSUES, RISKS AND IMPACTS

6.1 Identification of Potential Impacts/Risks

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 of. It must be noted that the significance of the impact is expected to be higher during the construction and decommissioning phases because these phases generate the highest development traffic.

6.2 Construction phase

This phase includes the transportation of people, construction materials and equipment to the site. This phase also includes the construction of the solar power facility and associated infrastructure, including grid connections, construction of footings, roads, excavations, trenching, and ancillary construction works. This phase will temporarily generate the most development traffic.

6.2.1 Nature of impact

The nature of the impact expected to be generated at this phase would be traffic congestion and delays on the surrounding road network as well as the associated noise, dust, and exhaust pollution due to the increase in traffic.

6.2.2 Significance of impact without mitigation measures

Traffic generated by the construction of the solar facility will have a notable impact on the surrounding road network. The exact number of trips generated during construction can only be determined later in the project when the contractor and the haulage company are appointed and once more detail is available regarding the staff requirements and where equipment is sourced from. In the interim, an estimate will be made as follows for the purpose of this report.

6.2.3 Estimated peak hour traffic for the solar panel components

At present, solar panels are locally produced in South Africa by only a few select firms. The largest of them is located in Pinetown, Kwa-Zulu Natal. Owing to their limited annual production capacity of approximately 325MW, the bulk of solar modules being deployed on South African PV projects are imported, primarily from East Asia. Where panels are sourced locally, these are typically delivered to site via flatbed trucks.

For the purpose of the Transport study and calculation of trips, it is assumed that all panels will be imported. Considering a loading capacity of around 600 solar panels per 40tf container, the total number of trips will result in approximately 875 trips for a 240 MW development. If these trips are distributed over a month (i.e., 22 work days), the **estimated daily trips are 40**. Looking at approximately 30% of these trips occurring during the peak traffic periods, the number of trips for the delivery of the panels during peak traffic is estimated to be around 12 trips, which can be accommodated by the external road network.

6.2.4 Estimated staff trips

From experience with similar projects, around 500 workers are estimated to be active on-site during construction and **the resulting daily staff trips are then 28** (shown in **Table 6-1**).

Table 6-1: Estimation of daily staff trips

Vehicle Type	Number of vehicles	Max. Number of Employees
Car	6	6 (assuming 1 occupant)
Bakkie	8	24 (assuming 3 occupants)
Taxi – 15 seats	10	150
Bus (80 pax)	4	320
Total	***28***	***500***

6.2.5 Estimated material trips

The exact number of vehicle trips for the transportation of materials during the construction phase depends on the type of vehicles, planning of the construction, source/location of construction material, etc. However, for the purpose of this study, it was estimated that at the peak of construction, **approximately 150 construction vehicle trips will access the site per day**.

The total estimated daily site trips, at the peak of construction, are shown in **Table 6-2** below.

Table 6-2: Estimation of daily site trips

Activity	Number of daily trips
Solar panel component delivery	40
Staff transport	28
Material delivery	150
Total	**218**

With the recommended mitigations in this report, the impact on the surrounding road network and the general traffic is deemed acceptable, as the 218 trips will be distributed over a 9-hour workday. It is expected that the majority of the trips will occur outside the peak hours.

It must also be noted that vehicle trips from material delivery vary depending on the construction task/program, fuel supply arrangements, as well as distance from the material source to the site. Project planning can be used to reduce material delivery during peak hours.

The development traffic impact during the construction phase can be assessed as manageable, considering that the construction phase is temporary in nature and mitigation measures, mentioned in this report, are adhered to and keep the impact level low.

6.3 Operational Phase

This phase includes the operation and maintenance of the Seelo Beta Solar PV project throughout its life span.

6.3.1 Nature of impact

The nature of the impact expected to be generated at this phase would be traffic and the associated noise, dust and exhaust pollution due to the operational traffic trips.

6.3.2 Estimated peak hour traffic generated during operation

The exact number of permanent staff expected for the operational phase is still unknown. Based on similar studies, it can be estimated that approximately 25 full-time employees will be stationed on site. Assuming a worst-case scenario of 30% of the trips occurring during peak traffic periods, approximately 8 peak hour trips are estimated for the operational phase, which will have a nominal impact on the external road network.

It is assumed that the solar modules would need to be cleaned twice a year. No further information on which cleaning method and technology will be used is available at this point in time. The following assumptions have been made to estimate the resulting trips generated from transporting water to the site:

- 5 000-liter water bowsers to be used for transporting the water (water bowsers between 5 000-litre and 20 000-litre are available in South Africa. However, for the purpose of this study, a smaller bowser was chosen);
- Approximately 5 litres of water needed per panel;
- Assuming that a maximum of 525 000 panels are used, this would amount to approximately 525 vehicle trips; and
- Solar modules will be cleaned twice a year.

To limit any traffic impact on the surrounding road network, it is recommended to schedule these trips outside of peak traffic periods and to clean the solar modules over the course of a work week (i.e., 5 days), which would reduce the daily trips to 105 and the peak hour trips to max 32 (i.e., max ~30%). Additionally, the provision of rainwater tanks on site or borehole water would decrease the number of trips.

6.3.3 Proposed general mitigation measures

The following are general mitigation measures to reduce the impact that the additional traffic will have on the road network and the environment:

- The delivery of components to the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.
- Dust suppression of gravel roads located within the site boundary, including the main access road to the site and the site access roads, during the construction phase, if required.
- Regular maintenance of gravel roads located within the site boundary, including the access roads to the site, by the Contractor during the construction phase and by the Owner/Facility Manager during the operational phase, if required.
- The use of quarries near the site would decrease the traffic impact on the surrounding road network, if available and feasible.
- Staff and general trips should occur outside of peak traffic periods as far as possible.
- The Contractor should ensure that all drivers, entering the site, adhere to the traffic laws.
- Vehicular movements within the site boundary are the responsibility of the respective Contractor and the Contractor must ensure that all construction road traffic signs and road markings (where applicable) are in place. It should be noted that traffic violations on public roads are the responsibility of Law Enforcement, and the public should report all transgressions to Law Enforcement and the Contractor.

- If required, low hanging overhead lines (lower than 5.1m) e.g., Eskom and Telkom lines, along the proposed routes will have to be moved (to be arranged by the haulage company and communicated beforehand with the service provider of the OHL) to accommodate the abnormal load vehicles. The Contractor and the Developer are to ensure that the haulage company is aware of this requirement.
- The haulage company is to provide evidence to the Contractor and the Developer that any affected overhead lines have been moved or raised.
- The preferred route should be surveyed by the developer to identify problem areas (e.g., intersections with limited turning radii and sections of the road with sharp horizontal curves or steep gradients, which may require modification). After the road modifications have been implemented, it is recommended to undertake a "dry-run" with the largest abnormal load vehicle, prior to the transportation of any components, to ensure that delivery will occur without disruptions. This process is to be undertaken by the haulage company transporting the components and the contractor, who will modify the road and intersections to accommodate abnormal vehicles. The "dry-run" should be undertaken within the same month that components are expected to arrive. The haulage company is to provide evidence that the route has been surveyed and deemed acceptable for the transportation of the abnormal load.
- The Contractor needs to ensure that the gravel sections of the haulage routes (i.e., the site access road and the main access road to the site) remain in good condition and will need to be maintained during the additional loading of the construction phase and reinstated after construction is completed.
- Design and maintenance of internal roads. The internal gravel roads will require grading with a grader to obtain a camber of between 3% and 4% (to facilitate drainage) and regular maintenance blading will also be required. The geometric design of these gravel roads needs to be confirmed at detailed design stage. This process is to be undertaken by a civil engineering consultant or a geometric design professional.

6.3.4 Significance of impact with mitigation measures

It should be noted that the construction phase is temporary and short term in nature and the associated impacts can be mitigated to an acceptable level.

The proposed mitigation measures for the construction traffic will result in a reduction of the impact on the surrounding road network and the impact on the local traffic will be low as the existing traffic volumes are deemed to be low. Dust suppression will result in significantly reducing the impact.

6.3.5 Decommissioning phase

This phase will have similar impacts and generated trips as the Construction Phase.

6.3.6 Cumulative Impacts

To assess a cumulative impact, it is generally assumed that all currently approved and authorized projects within a 30 km radius would be constructed at the same time.

According to the REEA Project Database, besides the Seelo Alpha and Seelo Charlie Solar Energy PV projects, one other authorized renewable energy project is located within a 30 km radius of the Seelo Beta PV site - i.e., the authorized 200MW solar energy facility for Sibanye Gold Limited (14/12/16/3/3/2/919) (see **Figure 6-1**).

It is a precautionary approach to evaluate all planned and authorized projects simultaneously as in reality, these projects would be subject to a highly competitive bidding process and not all the projects may be selected to enter into a Power Purchase Agreement. Even if all the facilities are constructed and/or decommissioned at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.

For the event that the Seelo Solar Energy and the Sibanye Solar Energy developments have similar construction periods, it is recommended to establish a delivery schedule between the three projects to reduce development trips and consequently the impact on the external road network.

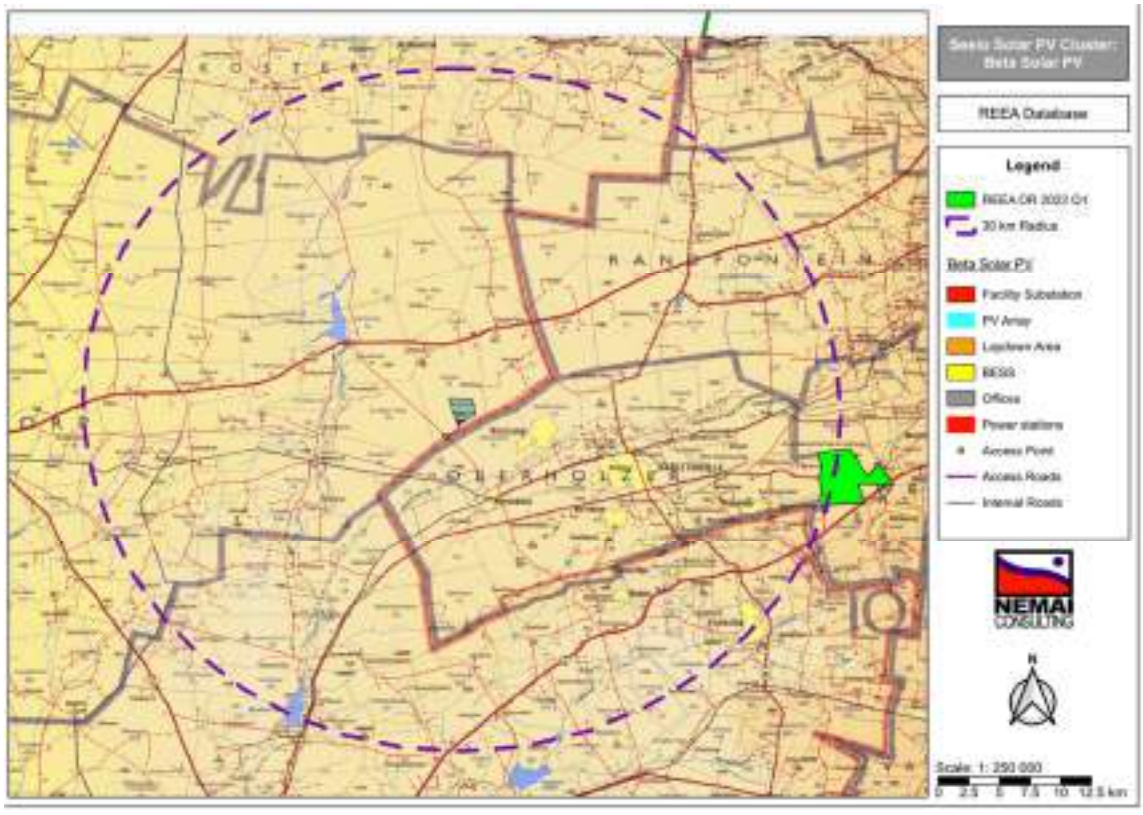

Figure 6-1: Projects within 30km radius from project site

7 IMPACT ASSESSMENT

7.1 Potential Impact during the Construction Phase

The construction phase will generate traffic including transportation of people, construction materials, water, and equipment (abnormal trucks transporting the transformers). The exact number of trips generated will be determined at a later stage. Based on the high-level screening of impacts, a negative low impact rating can be expected during the construction phase with mitigation measures (see **Table 7-1**).

Nature of the impact

- Temporary increase in traffic, noise and dust pollution associated with potential traffic.

The impact methodology as provided by the client was utilised (see **Annexure C**).

7.2 Potential Impact (Operational Phase)

Nature of the impact

- Noise and dust pollution associated with potential traffic.

The traffic generated during this phase will have a nominal impact on the surrounding road network. The impact evaluation is shown in **Table 7-3**.

7.3 Potential Impacts during the Decommissioning Phase

This phase will have a similar impact as the construction phase (i.e., traffic congestion, air pollution and noise pollution) as similar trips/movements and associated noise and pollution are expected (see **Table 7-2**).

7.4 Cumulative Impacts during the Construction Phase

For the cumulative impact during the construction phase, any planned or approved projects in a 30km radius are considered. At the time of preparing this report, there was one other authorised project besides the Seelo Alpha and Seelo Charlie Solar Energy PV projects. The resulting rating is shown in Error! Reference source not found..

7.5 Impact Assessment Summary

The overall impact significance findings, following the implementation of the proposed mitigation measures, are shown in **Table 7-1** below.

Table 7-1: Summary of overall Impact Significance

Seelo Beta PV	Overall Impact Rating
Construction (Pre-mitigation measures)	Negative Medium
Operational (Pre-mitigation measures)	Negative Low
Construction (Post-mitigation measures)	Negative Low
Operational (Post-mitigation measures)	Negative Low

Table 7-2: Impact Table – Construction Phase / Decommissioning Phase

Relevant Alternatives & Activities	All physical infrastructure that forms part of the Project
Project life-cycle	***Construction & Decommissioning Phases***
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 the construction period where possible. ▪ Stagger the construction Phase. ▪ The use of mobile batch 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	Negative	National	Medium	Short term	almost certain	2
After Mitigation	Negative	National	Low	Short term	almost certain	1

Table 7-3: Impact Table – Operational Phase

Relevant Alternatives & Activities	All physical infrastructure that forms part of the Project
Project life-cycle	***Operational Phase***
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 (water source to be clarified – borehole or transported to site / size of water tankers if water is to be delivered on site).	▪ 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	Negative	Local	Low	Short term	Likely	1
After Mitigation	Negative	Local	Low	Short term	Moderate	1

Table 7-4: Impact Table – Cumulative (Construction Phase)

Relevant Alternatives & Activities	All physical infrastructure that forms part of the Project
Project life-cycle	***Construction & Decommissioning Phases***
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
Further increase in development trips for the duration of the construction Phase, should the Seelo PV projects and the Sibanye Solar Energy project be constructed at the same time.	▪ Same as Table 2-2. • It is advised to agree in a delivery schedule between the three Seelo Solar Energy PV projects, should the construction periods overlap.

	+/- Impacts	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	Negative	National	High	Short term	almost certain	2
After Mitigation	Negative	National	Medium	Short term	Likely	2

8 NO-GO ALTERNATIVE

The no-go alternative implies that the proposed Seelo Beta Solar Energy PV project as well as the associated infrastructure do not proceed. This would mean that there will be no negative environmental impacts and no traffic impact on the surrounding network during the construction and decommissioning phases. However, this would also mean that there would be no socio-economic benefits to the surrounding communities, and it will not assist government in meeting its targets for renewable energy. Hence, the no-go alternative is not a preferred alternative.

9 CONCLUSION AND RECOMMENDATIONS

The potential traffic and transport related impacts for the construction, operation and decommissioning phases of the proposed Seelo Beta Solar PV project were identified and assessed.

- The main impact on the external road network will be during the construction phase. This phase is temporary in comparison to the operational period. The number of abnormal loads vehicles was estimated and to be found to be able to be accommodated by the road network including the recommended mitigation measures.
- During operation, it is expected that maintenance and security staff will periodically visit the facility and water be transported to site possibly twice a year for the cleaning of panels. The generated trips can be accommodated by the external road network and the impacts are rated **negative low** with mitigation measures.
- The traffic generated during the construction phase, although significant, will be temporary and impacts are considered to be of medium negative impact. However, *after mitigation* a rating of **negative low** impact can be given.
- The traffic generated during the decommissioning phase will be similar to or even less than the construction phase traffic and the impact on the surrounding road network will also be considered to be of **negative low** impact after mitigation.
- For the cumulative impact, a rating of a **negative medium** impact is given after mitigation.

The potential mitigation measures mentioned in the construction and decommissioning phases are:

- Dust suppression of internal gravel roads and the access roads.
- Component delivery to/ removal from the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.
- The use of mobile batching plants and quarries near the site would decrease the impact on the surrounding road network, if available and feasible.
- Staff and general trips should occur outside of peak traffic periods.
- A “dry run” of the preferred route by the haulage company. Should the haulage company be familiar with the route, evidence is to be provided to the Client and the Contractor.
- Design and maintenance of the internal gravel roads and maintenance of the access roads.
- If required, any low hanging overhead lines (lower than 5.1m) e.g., Eskom and Telkom lines, along the proposed routes will have to be moved (to be arranged by haulage company and

agreed on with the service provider of the OHL) or raised to accommodate the abnormal load vehicles.

The construction and decommissioning phases of a solar power facility are the only significant traffic generators and therefore noise and dust pollution will be higher during these phases. The duration of these phases is of temporary nature, i.e., the impact of the solar power facility on the external traffic on the surrounding road network is temporary and solar facilities, when operational, do not add any significant traffic to the road network.

The proposed development of the Seelo Beta Solar Energy PV projected is supported from a traffic engineering perspective provided that the recommended mitigation measures are adhere to.

10 REFERENCES

- Road Traffic Act, 1996 (Act No. 93 of 1996)
- National Road Traffic Regulations, 2000
- SANS 10280/NRS 041-1:2008 - Overhead Power Lines for Conditions Prevailing in South Africa
- Transnetportterminals.net. n.d. *Transnet Port Terminals*. [online] Available at: <https://www.transnetportterminals.net/Ports/Pages/default.aspx>
- The Technical Recommendations for Highways (TRH 11): “Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads

Annexure A: Specialist Expertise

SUMMARY OF EXPERIENCE

Iris is a Professional Engineer registered with ECSA (20110156) and obtained her Master of Science degree in Civil Engineering in Germany in 2003. She has more than 20 years of experience in a wide field of traffic and transport engineering projects.

Iris left Germany in 2003 and has gained work experience as a traffic and transport engineer in South Africa and Germany. She has technical and professional skills in traffic impact studies, public transport planning, non- motorised transport planning and design, design and development of transport systems, project planning and implementation for residential, commercial, and industrial projects.

Her passions are the renewable energies and road safety, and she is highly experiences in providing traffic and transport engineering advise.

Iris is registered with the International Road Federation as a Global Road Safety Audit Team Leader and is a regular speaker at conferences, seminars and similar.

PROFESSIONAL REGISTRATIONS & INSTITUTE MEMBERSHIPS

PrEng	Registered with the Engineering Council of South Africa No. 20110156 Registered Mentor with ECSA
MSAICE	Member of the South African Institution of Civil Engineers
ITSSA	Member of ITS SA (Intelligent Transport Systems South Africa)
SAWEA	Member of the South African Wind Energy Association
SARF	South African Road Federation: Committee Member of Council
SARF WR	South African Road Federation Western Region – Chair
SARF RSC	South African Road Federation National Road Safety Committee
IRF	Registered as International Road Safety Audit Team Leader

EDUCATION

1996 – Matric (Abitur)	Carl Friedrich Gauss Schule, Hemmingen, Germany
1998 - Diploma (Draughtsperson)	Lower Saxonian State Office for Road Engineering
2002 – BSc Eng (Civil)	Leibniz Technical University of Hannover, Germany
2003 - MSc Eng (Civil & Transpt)	Leibniz Technical University of Hanover, Germany

Master Thesis on the Investigation of the allocation of access rights *to the European rail network infrastructure - Research of the feasibility of the different bidding processes to allocate access rights of railway operators in the European railway market. Client: Technical University of Berlin and German Railway Company.*

SUMMARY OF EXPERIENCE

iWink Consulting (Pty) Ltd – Independent Consultant

2022 – present
Position: Independent Consultant – working as an independent Specialist in the field of Traffic & Transport Engineering, Renewable Energies and Road Safety.

JG Afrika (Pty) Ltd (Previously Jeffares & Green (Pty) Ltd)

2016 – 2022
Position: Associate / Division Head: Traffic & Transport Engineering

Jeffares & Green (Pty) Ltd

2012 – 2016
Position: Senior Traffic & Transport Engineer

Arup (Pty) Ltd

2010 - 2012
Position – Senior Traffic & Transport Engineer

Arup (Pty) Ltd

2004 - 2010
Position – Traffic & Transport Engineer

Schmidt Ingenieursbüro, Hannover, Germany

2000
Position – Engineering Assistant

Leibniz University of Hannover, Germany

2000 - 2003
Position – Engineering Researcher - Institute for Road & Railway Engineering

SELECTION OF PROJECTS

Please note: The below lists show only a *selection* of projects that Iris has been involved in over the last 20 years. More information and a complete Schedule of Experience can be made available on request.

RENEWABLE ENERGY PROJECTS

Transport Impact Assessments /Traffic Management Plans for:

- Mayogi Solar PV Project
- AGV Red Sands Solar Project
- Cradock – Kaladokhwe WEFs
- Britstown WEFs
- Highveld Solar Cluster
- Dealsville & Bloemfontein Solar PV
- Great Karroo Wind and Solar Cluster
- Ummbila Emoyeni Solar Project
- Poortjie Wind&Solar
- Hydra B Solar Cluster
- Choje Windfarm, Eastern Cape
- Richards Bay Gas to Power Project
- Oya Black Mountain Solar Project
- De Aar Solar Project
- Euronotus Wind & Solar Cluster
- Pienaarspoort Wind Energy Project
- Karreebosch Wind Energy Project
- Dyasonsklip Solar Project
- Kuruman Windfarm
- Bloemsmond Solar Farms
- Hendrina Wind Energy Project
- Orkney Solar Project
- Bulskop Solar Project
- Hyperion Solar & Thermal Project
- Gromis & Komas Wind Energy Projects
- Kudusberg & Rondekop Wind Energy Projects
- Bayview Windfarm
- Coega West Windfarm
- Suikerbekkie Solar Project
- Poortjie Solar Project
- Northam Solar Project

- Sibanye Solar Project
- Du Plessis Dam Solar Project
- Mercury Solar Project
- Aberdeen Wind Energy Project
- Saldanha Wind and Solar Projects
- Ummbila Emoyeni Wind Energy Project
- Springhaas Solar Project

Clients:

- G7 Energies
- ABO Wind Renewable Energies
- Atlantic Renewable Energy Partners
- Mulilo
- Acciona
- Enel
- Engie
- DNV GL
- Enertrag
- Scatec Solar
- Red Rocket Energies
- Windlab
- Mainstream
- Africoast
- Genesis

FURTHER PROJECTS

Traffic Impact Studies & Site Development Plan Input:

- Nooiensfontein Housing Development, City of Cape Town
- Belhar Housing Development, City of Cape Town
- Baredale Phase 7, City of Cape Town
- Beau Constantia Wine Farm
- Constantia Glen Wine Farm
- Eagles Nest Wine Farm
- Groenvallei Parking Audit, City of Cape Town
- Kosovo Housing Development, Western Cape Government
- Enkanini Housing Development, Stellenbosch
- Delft Housing Development, City of Cape Town
- Secunda Sasol, Free State
- Marula Platinum Mine
- InnerCity Transport Plan, City of Cape Town
- Stellenbosch Road Master Plan
- Nyanga Public Transport Interchange
- Crawford Campus Cape Town
- Durban RoRo Car Terminal, Transnet

- Durban Farewell Container Site
- Msunduzi Waterfront Housing Development
- Transnet Park Site – Traffic Management and Evacuation Plans
- UWC Bellville Medical Campus
- Bloekombos District Hospital
- Malabar Extension 3, Port Elizabeth

Traffic Engineering for Roads Projects:

- Ekhurhuleni Bus Stops and Intersection Safety Assessments
- Namibia Noordoewer to Rosh Pina, Road Agency Namibia
- N2 Section 19 Mthatha – NMT Studies
- R63 Alice to Fort Beaufort – NMT, Road Link and Intersection Studies
- N2 Kangela to Pongola Upgrade
- Cofimvaba Eastern Cape – NMT, Road and Intersection Upgrades
- Stellenbosch R44 Traffic Signals
- Secunda Traffic Signals
- Fezile Dabi District Gravel Roads Upgrade, Free State Province
- Zambia RD Rehabilitation Project
- R61 Eastern Cape – NMT Studies, SANRAL

CONTINUED PROFESSIONAL DEVELOPMENT (CPD)

*Last five years*full CPD list available*

2023 – International Traffic Safety Conference, Doha – Speaker

2022 – 7th Regional Conference for Africa & PIARC International Seminar on Rural Roads and Road Safety - Speaker

2022 – Non-motorised Transport Seminar (SARF) – Co-Organizer / Speaker

2021 – SARF KZN Road Safety Considerations (SARF) – Guest Speaker

2021 – Road Safety Audit Course (IRF) – Guest Speaker

2021 – Legal Obligations / Road Safety Act (SARF) – Presenter

2020 – Understanding Road Accidents (SARF)

2020 – Road Safety Auditor Course (SARF) – Co-Lecturer

2018 – African Road Conference (IRF/SARF/PIARC)

2018 – Road Safety in Engineering (SARF) – Presenter

2016 - SATC Road Safety Audit Workshop Pretoria (SARF)

2015 - Non-motorised Transport Planning (SARF

Annexure B: Specialist Statement of Independence

I, Iris Sigrid Wink, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations, and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan, or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist: _____

Name of Company: iWink Consulting (Pty) Ltd

Date: 25-07-2023

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Seelo Beta Solar Energy PV Project, North West Province

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

Specialist Company Name:	iWink Consulting (Pty) Ltd			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition	100
Specialist name:	Iris Wink			
Specialist Qualifications:	MSc Eng (Civil_			
Professional affiliation/registration:	PrEng 20110156			
Physical address:	44 Plattekloof Street, Plattekloof Glen			
Postal address:	Same			
Postal code:	7460	Cell:	082 691 9096	
Telephone:	n/a	Fax:	n/a	
E-mail:	iris@iwink.co.za			

2. DECLARATION BY THE SPECIALIST

I, IRIS WINK, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist

iWink Consulting (Pty) Ltd

Name of Company:

14/06/23

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, IRIS WINK, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

IWink

Signature of the Specialist

iWink Consulting

Name of Company

14/06/23

Date

HENDRIK TALJAARD
04540913 W/O

Signature of the Commissioner of Oaths

2023/06/14

Date

SUID-AFRIKAANSE POLISIEDIENS
COMMUNITY SERVICE CENTRE
BOTHASIG

2023 -06- 14

COMMUNITY SERVICE CENTRE
BOTHASIG
SOUTH AFRICAN POLICE SERVICE

Annexure C: Impact Rating Methodology

A. Impact Assessment Methodology

Impacts are to be managed by assigning suitable mitigation measures. The objectives of mitigation are to:

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

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

In order to establish best management practices and prescribe mitigation measures, the following project-related information needs to be adequately understood:

- **Activities** associated with the proposed project;
- **Environmental aspects** associated with the project activities;
- **Environmental impacts** resulting from the environmental aspects; and
- The nature of the surrounding **receiving environment**.

The impacts and the proposed management thereof are first discussed 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 1** 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 evaluated.

Table F1: Quantitative Impact Assessment Methodology

Nature	The project could have the following impacts to the environment: • **Positive**; • **Negative**; or • **Neutral**.
Extent	• **Local** - extend to the site and its immediate surroundings. • **Regional** - impact on the region but within the province. • **National** - impact on an interprovincial scale. • **International** - impact outside of South Africa.
Magnitude	Degree to which impact may cause irreplaceable loss of resources. • **Low** - natural and social functions and processes are not affected or minimally affected. • **Medium** - affected environment is notably altered; natural and social functions and processes continue albeit in a modified way. • **High** - natural or social functions or processes could be substantially affected or altered to the extent that they could temporarily or permanently cease.
Duration	• **Short term** - 0-5 years. • **Medium term** - 5-11 years. • **Long term** - impact ceases after the operational life cycle of the activity either because of natural processes or by human intervention. • **Permanent** - mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.
Probability	• **Almost certain** - the event is expected to occur in most circumstances. • **Likely** - the event will probably occur in most circumstances. • **Moderate** - the event should occur at some time. • **Unlikely** - the event could occur at some time. • **Rare/Remote** - the event may occur only in exceptional circumstances.

Significance

Provides an overall impression of an impact's importance, and the degree to which it can be mitigated. The range for significance ratings is as follows-

0 - Impact will not affect the environment. No mitigation necessary.
1 - No impact after mitigation.
2 - Residual impact after mitigation / some loss of populations and habitats of non-threatened species.
3 - Impact cannot be mitigated / exceeds legal or regulatory standard / increases level of risk to public health / extinction of biological species, loss of genetic diversity, rare or endangered species, and critical habitat.

B. Impact Assessment

(1) Land Use & Land Cover

Relevant Alternatives & Activities	**All physical infrastructure that forms part of the Project**
Project life-cycle	**Construction & Operational phases**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
Land acquisition and servitude restrictions.	• Land acquisition process to abide by the prevailing legislation. • Servitude restrictions to be explained to the affected landowners. • Inspect the permanent servitude to identify encroachments.

	+/- Impacts	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	-	local	high	permanent	almost certain	2
After Mitigation	-	local	low	permanent	almost certain	1

APPENDIX E10: Social Impact Assessment

Proposed Seelo Beta 240MW Solar Photovoltaic (PV) And Battery Energy Storage System (BESS) Project Near the Town of Carletonville, North West Province

Social Impact Assessment Report

July 2023

Prepared for: Seelo Beta Solar PV (RF) (PTY) LTD

Title and Approval Page

Project Name:	Proposed Seelo Beta 240MW Solar Photovoltaic (PV) and Battery Energy Storage System (BESS) Project near the town of Carletonville, Northwest Province
Report Title:	Social Impact Assessment Report
Report Status:	Draft for Public Review

Client	Seelo Beta Solar PV (RF) (Pty) Ltd

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Report Reference:				R-PRO-REP|20170216

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Amendments Page

Date:	Nature of Amendment	Amendment Number:
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List of Abbreviations

AIDS	Acquired immunodeficiency syndrome
BESS	Battery Energy Storage System
BID	Background Information Document
CSR	Corporate Social Responsibility
DDM	District Development Model
DKKDM	Dr Kenneth Kaunda District Municipality
DMRE	Department of Mineral Resources and Energy
ECD	Early Childhood Development
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme
GDP	Gross Domestic Product
GIS	Geographic Information System
GVA	Gross Value Added
Ha	Hectare
HIV	Human Immunodeficiency Virus
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEP	Integrated Energy Plan
IFC	International Finance Corporation
ILO	International Labour Organisation
IRP	Integrated Resource Plan
ISO	International Organisation for Standardization
JBMLM	JB Marks Local Municipality
Km	Kilometre (1 000m)
kV	Kilovolt
LFPR	Labour Force Participation Rate
LM	Local Municipality
MCLM	Merafong City Local Municipality
NDP	National Development Plan
NEMA	National Environmental Management Act (No. 107 of 1998)
MW	Mega Watt (one million watts)
OHS	Occupational Health and Safety
PV	Photovoltaic
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SA	South Africa
SIA	Social Impact Assessment
SMME	Small, Medium, and Micro Enterprise

1 INTRODUCTION

The team of Caroline Tanhuke and Ciaran Chidley of Nemai Consulting have been appointed to undertake the Social Impact Assessment (SIA) as part of the environmental authorisation process for the proposed Seelo Beta 240MW Solar Photovoltaic (PV) and Battery Energy Storage System (BESS).

This solar PV generator aims to provide 240 MW of electricity to the electrical grid. The project is being prepared for submission to bid for the current and future Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows and/or other renewable energy markets within South Africa. The project is located on sites near the town of Carletonville, Northwest Province.

One of the specialist studies required by the Environmental Impact Assessment (EIA) is a Social Impact Assessment. This report fulfils the requirements of the Social Impact Assessment, and its recommendations will be included into the EIA.

1.1 Terms of Reference

The terms of reference for the study are as follows:

- Describe the social baseline conditions that may be affected by the project;
- Describe the approach proposed for assessing the potentially significant issues that should be addressed by the SIA during the EIA phase;
- Determine the specific local social impacts of the project;
- Identify the potential social issues associated with the project;
- Suggest suitable mitigation measures to address the identified impacts; and
- Make recommendations on preferred options from a social perspective.

1.2 Structure of the report

The remainder of the report is structured as follows:

Section 2: Project Description – This section provides an introduction and motivation to the project. It includes a description of the study area.

Section 3: Legislation – A description of the statutory and regulatory requirements that informed this report.

Section 4: Definition of the Study Area – Defines the studies areas for the SIA.

Section 5: Methodology – Outlines the methodology used to determine the social impacts of the proposed project.

Section 6: Status Quo Analysis – A desktop analysis of the baseline situation in the regional study area.

Section 7: Local Study Area Overview – Provides an analysis of the social aspects of the local study area. The section includes a discussion on the findings that resulted from community engagement, site visits and stakeholder participation.

Section 8: Identification of Impacts - Aspects and Impacts – The identification of the project activities and an investigation into what aspects of these activities will result in social impacts.

Section 9: Analysis of Alternatives – Decision making with regards the preferred project alternatives from a social perspective.

1.2 Specialists' Details

This report is written by Caroline Tanhuke and Ciaran Chidley. Ciaran Chidley obtained bachelor's degrees in civil engineering, economics and philosophy, and holds a Master of Business Administration. His experience over the past 26 years includes economic and social assessments for a wide variety of linear and site-based infrastructure and industrial projects. Caroline Tanhuke holds a B.A Environmental Management (Geography) Degree and has three years of experience. Her experience in assessing social impacts of infrastructure projects include renewable energy infrastructure, powerlines and pipelines. She has conducted social facilitation projects throughout South Africa.

1.3 Specialist Declaration

Nemai Consulting operates as an independent consultant conducting environmental impact assessments and associated specialists' studies. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (time and budget).

2 PROJECT DESCRIPTION

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 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.

To this end the proponent has proposed the subject of this report, a solar photovoltaic generation facility.

2.1 Project Components

The Seelo Beta Solar PV project is planned on sites near Carletonville in the Northwest Province and falls within the Dr Kenneth Kaunda District Municipality and the JB Marks Local Municipality. The site is located approximately thirteen kilometers to the North-west of the town of Carletonville.

The project proponent 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 south Africa, in compliance with the National Energy Act was promulgated in 2008 (Act 34 of 2008).

The solar energy functions by the conversion of solar energy into electricity. The generation of electricity using solar energy is a non-consumptive use of a natural resource that requires no fuel for continued operation. In comparison to typical coal-fired power plants, solar energy creates a negligible amount of greenhouse gases during its existence. And in the operational phase of solar power, it does not emit carbon dioxide, Sulphur dioxide, or any other kind of air-pollution.

Photovoltaic technology produces direct current, which is then converted to alternating current via power electronic inverters. Figure 1 below provides an overview of a typical Solar PV Power Plant project.

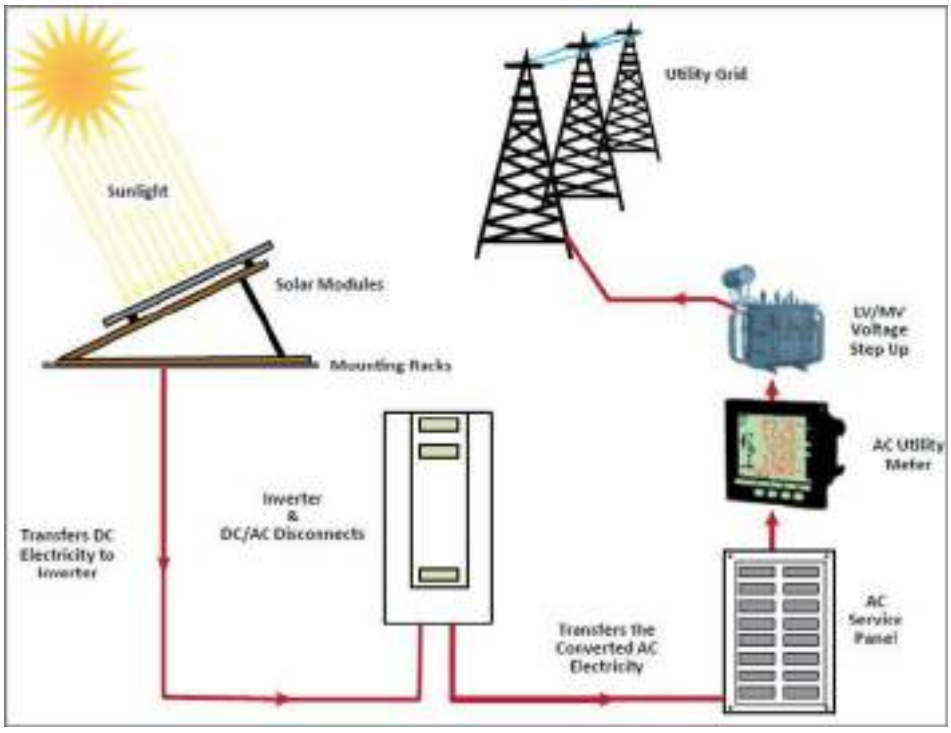

Figure 1:Overview of the solar power plant

(Source: International Finance Corporation, 2015. Utility-Scale Solar Photovoltaic Power Plants)

Energy is harvested from the solar modules, which are angled toward the sun using mounting racks. The energy harvested is in the form of direct electrical current, which is processed through the inverters to convert this electrical power into alternating electrical current, which can be used by the national electrical system. The alternating current is transferred via the facility substation onto the national grid.

Figure 2 below, provides a typical example of a solar park.

Figure 2: Example of a Solar Park.

Source: www.sma-america.com

2.2 Components of Seelo Solar PV

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

- PV panel arrays, which are the subsystems which convert incoming sunlight into electrical energy.
- Mounting structures to support the PV panels.
- On-site inverters to convert DC to facilitate AC connection between the solar energy facility and electricity grid;
- BESS;
- IPP substation;
- The dedicated grid connection for the proposed project, which includes a 132/33kV switching substation, does not form part of the current application for Environmental Authorisation.

- Cabling between the Project's components, to be laid underground (where practical);
- Administration Buildings (Offices);
- Workshop areas for maintenance and storage;
- Temporary and permanent laydown areas;
- Internal access roads and perimeter fencing of the footprint;
- High Voltage (HV) Transformers; and
- Security Infrastructure.

2.3 Project Locality

The Project is located to the eastern part of the Northwest Province, at the boundary between Northwest and Gauteng. The project site falls within the Dr Kenneth Kaunda District Municipality (DKKDM) and the JB Marks Local Municipality (JBMLM). The site is located approximately thirteen kilometres to the north-west of the town of Carletonville.

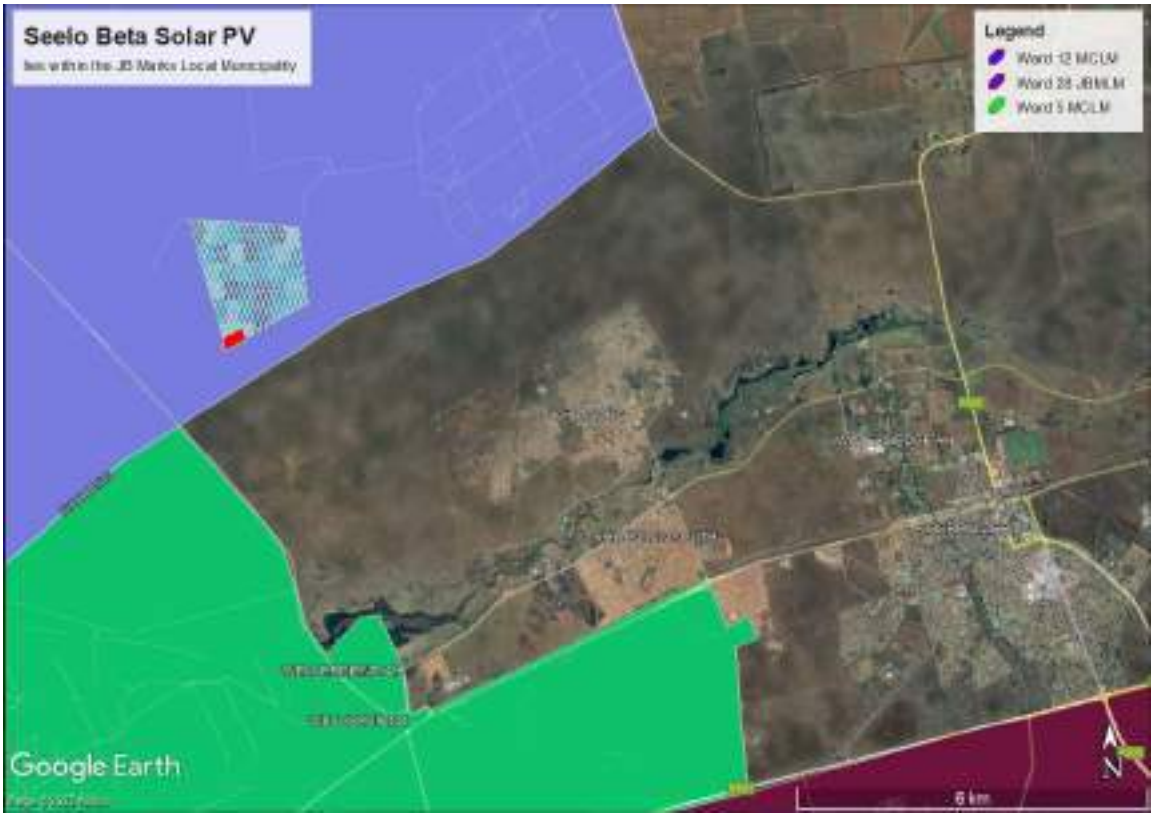

Figure 3: Seelo Beta Solar PV Facility

No	Applicant	MW Output	Properties Affected
Solar PV Project			
1.	Seelo Beta Solar PV (RF) (Pty) Ltd	Up to 240MW	• Portion 1 of Farm 96 (Rooipan)

2.4 Social Stimulus

Solar PV creates several social impacts which are created at different stage of the value chain. The value chain can be conceptualised as being the following events (IRENA and CEM, 2014):

- Project planning – consulting work conducted by specialists;
- Manufacturing – raw material sourcing and component manufacture and assembly. Component manufacturing covers the solar modules, transformers, inverters, electrical cabling, combiner boxes and module support structures;
- Installation – a labour intensive process involving civil engineering contractors, module installation and electrical engineering contractors;
- Grid Connection – carried out by specialised electrical engineering contractors. This work allows the solar park to contribute to the national grid, thereby contributing to stabilising supply of electricity;
- Operations and Maintenance – a long-term activity requiring regular plant monitoring, equipment inspections and repair services; and
- De-commissioning – plant at the ned of their lifespan require activities such as recycling the modules and disposal or reselling of components.

The potential for creating value within the regional study area and into the broader Free State economy is depends on the level of development of the renewable energy sector. The major cost items for a solar park are the modules, the transformers, and the inverters – these will be imported items. The cabling and electrical systems can be manufactured in South Africa. The economic value created through installation and grid connection can be created within South Africa, with much of the labour and semi-skilled workers being available within the regional study area.

As South Africa's level of development in the renewable energy field increases, so the value captured within the country will increase all along the value chain.

2.4.1 Job Creation

The number of direct and indirect jobs created for the construction phase was estimated in 2007 as being 69.1 per MW installed, and 0.73 / MW installed during the operations and maintenance phase (IRENA and CEM, 2014). The definition of "jobs" in this case would be work opportunities of any duration above one month. For the proposed project, if it reaches its full-rated capacity, this yields total values of 9 218 during construction, and 96 during operations and maintenance. These jobs are not all created on the construction site, they are distributed throughout the value chains of these two phases, at different parts of the country where the value is being created. It must be pointed out that this data is based upon the state of solar photovoltaic technology in 2007. Technology changes since then have improved solar farm outputs, and this may not have increased the proportion of manhours required for the plant in a linear fashion.

The Independent Power Producers programme, managed by the Department of Energy has local content requirements and targets for the bid windows. Some of these targets are:

- Job creation for SA citizens – a minimum of 50% and a target of 80%; and
- Local content for SA manufactures – a minimum of 45% and a target of 65%, the minimum has been increased by 10% from bid window 2.

The proportion of employment from local communities for all renewable energy projects have been reported (Department of Energy, 2019). The Department of Energy reports that of the 33 019 job years created for the entire renewable energy procurement programme, 18 253 job years were attributable to people from the local community – this is a proportion of 55%. This proportion can be attributed to the proposed project. The Department of Energy also cites figures that 8% of employment was female and 41% was from the youth category (Department of Energy, 2019). These proportions can also be attributable to the project.

An estimate of the number of direct job years to be created by the proposed project can be derived from the Department of Energy Report using the figures to date for the Northwest Province.

The table below summarises the job creation estimates for the proposed project. Readers should bear in mind the various sources for this information, the assumptions made and the dates of the data – together these factors combine to set the degree of accuracy for these estimates at 20%.

Table 1: Job Creation Estimate

Description	Total No.	Local No.
Total Jobs Created (durations above one month)	16 759	9 218
Planning and Construction Phase	16 584	9 121
Operation and Maintenance Phase, 20 years	175	96

Table 2: Estimated Job Years Created

Description	Total No.	Local No.
Total Job Years Created	8 455	4 650
Planning and Construction Phase	2 522	1 387
Operation and Maintenance Phase, 20 years	5 933	3 263

2.4.2 Economic Value Creation

The contribution of the project to South Africa's Gross Domestic Product (GDP) can be estimated from published literature. A Department of Energy report using the figures for renewable project delivery to date for the Limpopo Province provides an indication. A provincial breakdown is provided for 3 projects (all completed) which all use Solar PV technology. It was reported that 118MW of energy was generated, creating R3.6 billion in GDP contribution (Department of Energy, 2019). Applying this proportion to the proposed project yields a total GDP contribution of R9.8 billion. This captured the total impact of the project on the nation's economy, both through direct and indirect spending.

The local content for Solar PV projects has varied over the four bid windows. Bid window 1 achieved 50% local content, bid window 2 achieved 52%, bid window 3 achieved 55% and bid window 4 achieved 75% (Department of Energy, 2019). This increasing trend demonstrates the possible impact that the proposed project could have on the South African value chain. To date, the average local content spend for PV projects in South Africa has been R46.5 billion versus a comparable total project value of R90.3 billion – a percentage of 51%.

If this value is applied to the proposed project value of R7.3 billion, a local value chain addition of R3.7 billion can be estimated. The proportion of value attributable to the regional study could not be estimated and figures from the literature are not available.

3 RELEVANT LEGISLATION, STANDARDS AND GUIDELINES

Legislation, policy, plans, and strategy provide an important framework and governance of the SIA. This section provides a summary of the prevailing acts, policies, plans and strategy which were considered by this study.

3.1 The Constitution of South Africa (Act 7 of 1996)

The Constitution emphasizes human rights with the intention of establishing a society based on democratic values; social justice and fundamental human rights. Furthermore, The Constitution recognizes the general need to improve the quality of life of all citizens. These constitutional rights can be used to support reasonable environmental demands. Other fundamental rights in the Constitution which support environmental demands include:

- The right to life (Section 11).
- The right to human dignity (Section 10).
- The right to privacy (Section 14).
- Certain socio-economic rights.

Socio-economic rights relevant to environmental rights:

- The right of access to adequate housing (Section 26).
- The right of access to sufficient food and water (Section 27).
- The right of access to health care services (Section 27).
- The rights of children to basic nutrition and shelter, and to be protected from maltreatment; neglect; abuse or degradation (Section 28).

3.2 National Development Plan (2011)

The National Development Plan (NDP) of 2010 proposes to “invigorate and expand economic opportunity through infrastructure, more innovation, private investment, and entrepreneurialism.

The Plan aims to ensure that all South Africans attain a decent standard of living through the elimination of poverty and reduction of inequality. The core elements of a decent standard of living identified in the Plan are:

- Housing, water, electricity and sanitation;
- Safe and reliable public transport;
- Quality education and skills development;
- Safety and security;
- Quality health care;
- Social protection;
- Employment;
- Recreation and leisure;
- Clean environment; and
- Adequate nutrition.

3.3 National Energy Act (Act 34 of 2008)

The National Energy Act was promulgated in 2008 (Act 34 of 2008); and one of the key objectives of the Act was to promote diversity in the supply of energy and its sources. The development of a National Integrated Energy Plan (IEP) was envisaged in the White Paper on the Energy Policy of the Republic of South Africa of 1998. In terms of the National Energy Act, 2008 (Act No. 34 of 2008), the Minister of Energy is mandated to develop and, on an annual basis, review and publish the IEP in the Government Gazette. The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development.

The IEP notes that South Africa needs to grow its energy supply to support economic expansion and in so doing, alleviate supply constriction and supply-demand deficits. In addition, it is essential that all citizens are provided with clean and modern forms of energy at an affordable price. As part of the Integrated Energy Planning process; eight key objectives were identified; namely:

- Objective 1: Ensure security of supply;
- Objective 2: Minimize the cost of energy;
- Objective 3: Promote the creation of jobs and localization;
- Objective 4: Minimize negative environmental impacts from the energy sector;
- Objective 5: Promote the conservation of water;
- Objective 6: Diversify supply sources and primary sources of energy;
- Objective 7: Promote energy efficiency in the economy; and
- Objective 8: Increase access to modern energy.

3.4 National Environmental Management Act (Act 107 of 1998)

The National Environmental Management Act (NEMA) and the principles contained therein have a significant influence on the need to identify and assess social impacts. The NEMA principles are based on the basic rights, as set out in Chapter 2 (Bill of Rights) of the Constitution referred to above.

According to Barber (2007:16) the following NEMA principles have an important impact on social issues:

- Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.
- Development must be socially, environmentally and economically sustainable.
- Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must consider the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option;
- Environmental justice must be pursued 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;
- Equitable access to environmental resources, benefits, and services to meet basic human needs and ensure human well-being must be pursued and special measures may be taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination;
- The participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop the understanding, skills, and capacity necessary for achieving equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured;
- Decisions must consider the interests, needs and values of all interested and affected parties, and this includes recognising all forms of knowledge, including traditional and ordinary knowledge;
- Community well-being and empowerment must be promoted through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means;
- The social, economic, and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed, and evaluated, and decisions must be appropriate in light of such consideration and assessment;
- The right of workers to refuse work that is harmful to human health or the environment and to be informed of dangers must be respected and protected;
- Decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the law;

- The environment is held in public trust for the people. The beneficial use of environmental resources must serve the public interest and the environment must be protected as the peoples' common heritage; and
- The vital role of women and youth in environmental management and development must be recognised and their full participation therein must be promoted.

3.5 Guideline for Involving Social Assessment Specialists in EIA Processes (Barbour, 2007)

These guidelines direct the role of social assessment specialists in the Environmental Impact Assessment (EIA) process within the South African context.

3.6 Social Impact Assessment: Guidance document (2015) (Vanclay, Esteves, Aucamp, & Franks, 2015)

This document encapsulates the core values of the international SIA community providing a set of principles to guide SIA practitioners in incorporating the social element into environmental impact assessments.

3.7 International Labour Organisation

A guide on gender issues in employment and labour market policies: working towards women's economic empowerment and gender equality.

"The objective of this resource guide is to strengthen the capacities of International Labour Organisation (ILO) constituents and development policy makers in the formulation of employment policies. There is a well-known proclivity among many policymakers and practitioners to treat employment as a "residual" of economic growth" (Otobe, 2014).

3.8 International Organisation for Standardization, ISO 14001:2004

The International Organisation for Standardization (ISO) is used for identifying impacts. The ISO 14001: 2004 – Environmental Management Systems definitions for aspect, activity and impact are used in keeping with best practice.

ISO 14001:2004 specifies requirements for an environmental management system to enable an organization to develop and implement a policy and objectives and information about significant environmental aspects. It applies to those environmental aspects that the organization identifies as those which it can control and those which it can influence.

4 DEFINITION OF THE STUDY AREA

A study area is defined by the International Finance Corporation (IFC) as "an area that is likely to experience impacts from, or exert influence over, the Project or activity being evaluated" (IFC World Bank, 2012). For the purposes of this study, a study area that conforms to existing administrative boundaries, has been identified.

Three study areas have been delineated for the purposes of analysing the project and its social impacts: a regional study area which comprises the affected local municipalities; and a local study area which is the Ward in which the project is located, and a direct study area which is the site's close neighbours upon which the project will be located. A radius of five kilometres from the site has been selected as the direct study area. The centre of the solar cluster is the centre of the impact circle.

4.1 Regional Study Area

The regional study area is composed of the JB Marks Local Municipality and the Merafong City Local Municipality within the North-west province. This regional study area is most likely to have both direct positive and negative impacts, including economic pull (job creation), in-migration of workers and multiplier effects in the local and regional economy, due to the proximity of the Project footprint.Figure 4 below shows the regional study area.

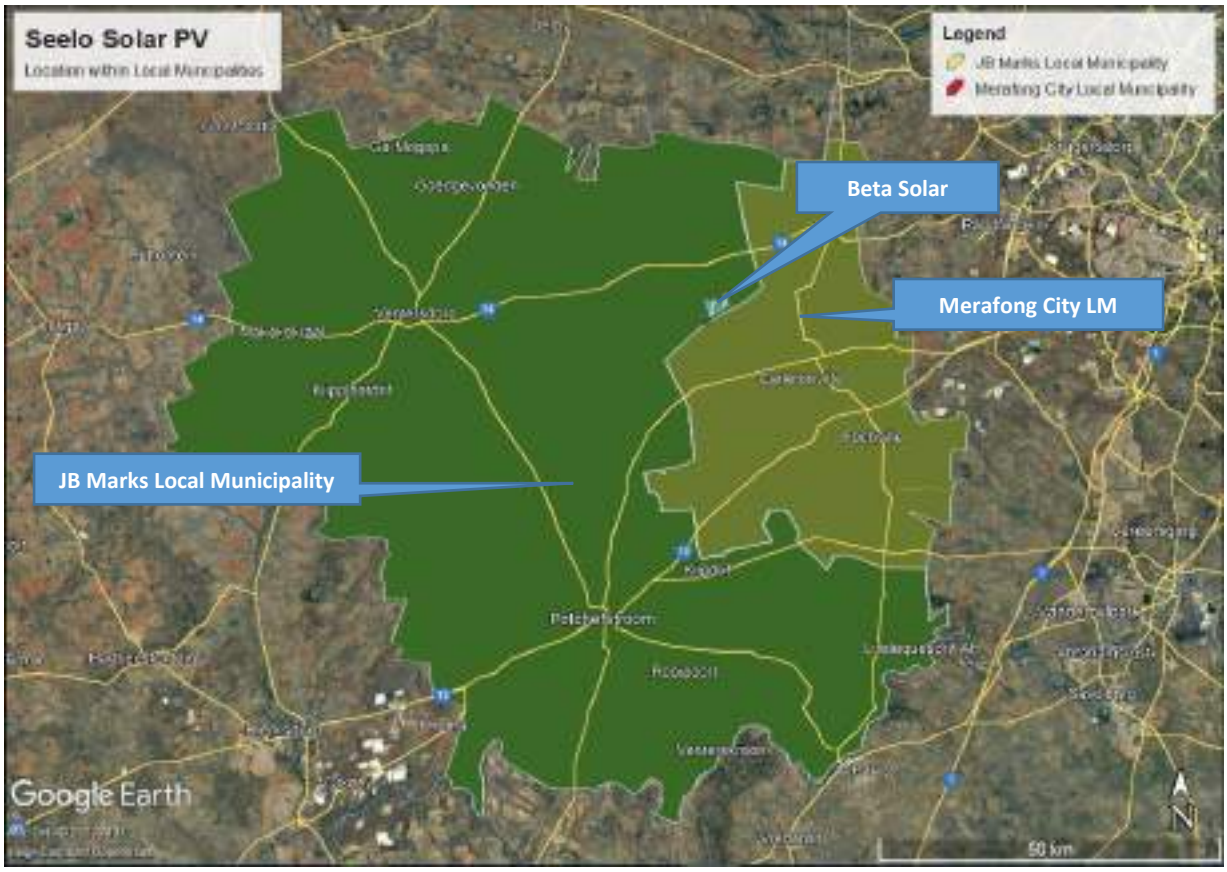

Figure 4: Seelo Beta Solar PV in Local Municipal Context

Local Municipality	Affected Wards
Merafong City LM	Ward 05
Merafong City LM	Ward 12
JB Marks LM	Ward 28

4.2 Local Study Area

The local study area is Ward 5 and Ward 12 of the Merafong City Local Municipality and Ward 28 of the JB Marks Local Municipality, as shown in the ward context in Figure 5 below.

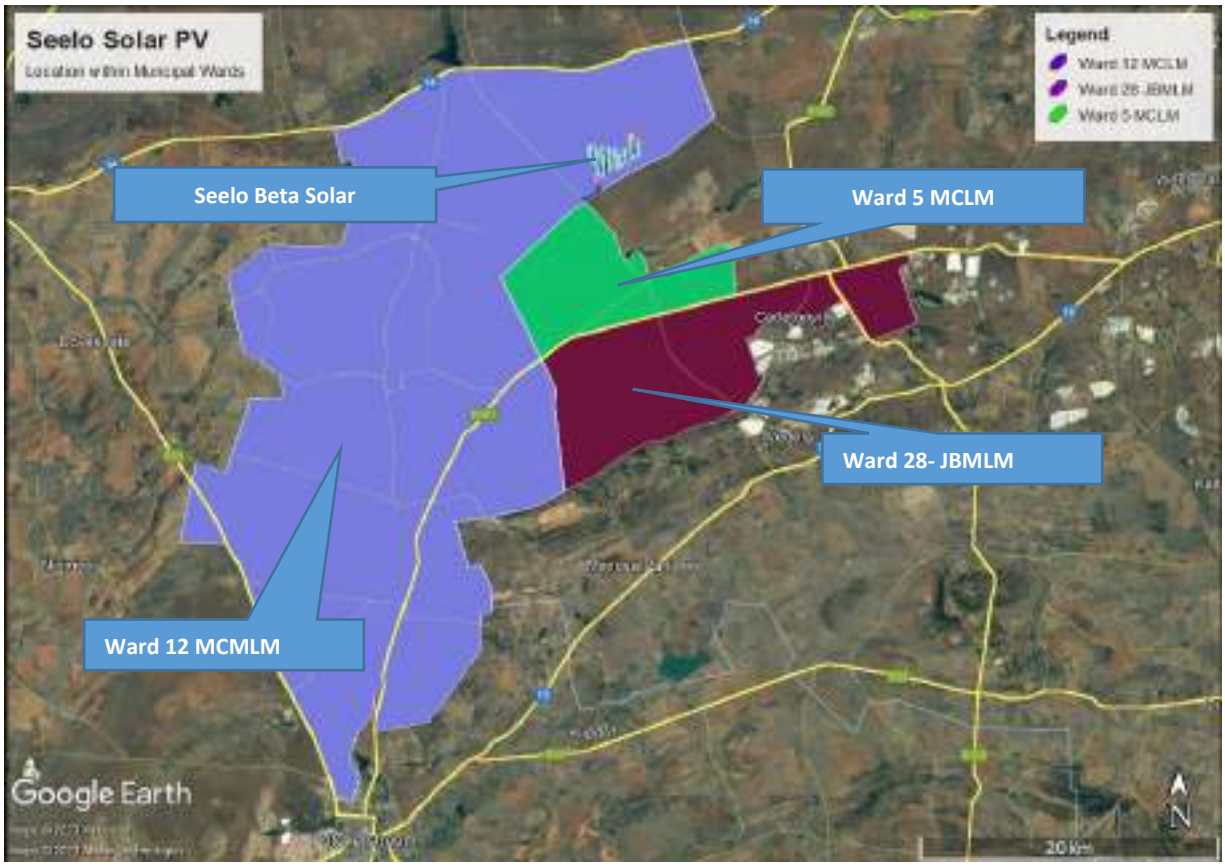

Figure 5: Seelo Beta Solar PV within Wards in MCLM and JBLM

4.3 Direct Study Area

The direct study area is that immediately adjacent to the project. They are captured in the Google Earth image Figure 6 below.

Figure 6: Seelo Beta Solar PV Direct Study Area

Labour sending areas such as Khutsong and Welverdiend are located at approximately four kilometres and five kilometres, respectively, from the project site. There are several mining and agricultural activities recorded in the area. Therefore, the direct project area is influenced by significant economic drivers.

5 METHODOLOGY

The information presented in this report was obtained through the following data collection methods.

5.1 Sourcing of Information and Data Analysis

The Socio-Economic Impact Assessment sets out the socio-economic baseline of the study area, predicts social and economic impacts, and makes recommendations for the mitigation of negative impacts whilst providing measures which can be taken to enhance positive impacts.

The baseline study is based on both primary and secondary data. Primary data was collected directly from engagements with community members, landowners, and business owners. Secondary data was accessed through South African economic and social databases. Articles and internet searches were also used and are referenced in the text and in the reference sections of this report.

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

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

5.2 Primary Data

5.2.1 Public Participation

The Public Participation Process granted Interested and Affected Persons (I&AP) an opportunity to comment on the project during the Scoping and EIA phase. Comments and responses used during this process have formed one of the bases of the analysis of the socio-economic impacts considered in this report.

Further primary data was collected for the purposes of the study; these were collected using the following approaches:

- Rapid Rural Assessment: A survey was conducted to capture visual observations on the social dynamics, community proceedings, community resources and infrastructure.
- Stakeholder Consultations: Consultations with the affected communities carried out by members of the project team along each project component to discuss the proposed project and to gather their concerns and feedback on the project; and
- Key Informant Interviews: Informal discussions with the IAP's to help inform the baseline were conducted during site visits and as well as during the scoping phase. These included community members and authority members.

5.3 Secondary Data

An assessment of the EIA and Scoping phase was conducted to provide an understanding of the project detail, location, and possible impacts.

The required information was collected using different sources; these included Statistics South Africa Census data as well as relevant municipal, district, and other related literature. The discussion of the demographics and the development profile of the study area is carried out using Census 2011 data produced by Statistics South Africa. The Census 2011 data is the most comprehensive dataset available for the subject areas, and it is currently the best data at hand. Where possible, information from the Community Survey 2016 was included in the analysis. The ward and municipal data have been extracted using the project Geographic Information System, and the data for the affected areas will be presented in tables and figures throughout the report.

5.4 Geographic Information System

A Geographic Information System (GIS) was used to conduct an analysis of the area. The use of GIS brings together the demographic and socio-economic data to enable a thorough analysis of the project area.

5.5 Impact Assessment

The identification of the socio-economic impacts associated with the project is issues-based, with the main headings referring to a common theme addressing several related impacts. Under each of these issues, the specific impacts and potential mitigation strategies are discussed for pre-construction, construction, operation, and decommissioning phases.

5.6 Assumptions and Limitations

The following assumptions and limitations underlie this socio-economic impact assessment:

- 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.

6 STATUS QUO ANALYSIS

This section has been compiled from research of the JB Marks Local Municipality, the Merafong City Local Municipality, and the North West Province Integrated Development Plan (IDP) documents, giving broad background information on the mining areas and surrounding municipalities. Worth noting at this stage is that the Merafong City Local Municipality is situated in the Gauteng Province; however, its character more closely represents that of the North West, being situated right on the border separating the two provinces. Statistics South Africa and the Community Survey have also been used as resources for the statistical information. The following section presents the socio-economic profile of the study areas.

6.1 Project Locality Context

The Northwest Province, as the name implies, is situated in the north-west of South Africa. It came into existence in the year 1994 through the merger of Bophuthatswana and the Western boundaries of the Transvaal. It serves as the provincial capital and is divided into four district municipalities, which are subdivided into eighteen local municipalities; the four districts are, namely, the Bojanala Platinum

District, Dr Kenneth Kaunda District, Dr Ruth Segomotsi Mompati District, and Ngaka Modiri Molema District (Northwest IDP, 2021).

Northwest Province covers an area of 105 238 square kilometers and in the year 2016 was recorded as having a population size of 3 748 435 people. The biggest cities in the province are Klerksdorp and Potchefstroom, and towns that can be found in the vicinity are Brits, Lichtenburg, and Rustenburg. It is located south of Botswana and is locally bordered by Limpopo, Gauteng, the Free State, and the Northern Cape. The province includes two universities: the University of Northwest and Potchefstroom University. Furthermore, tourist attractions have been established in the province, with Sun City, situated next to the Pilanesburg National Park, being the most popular. Sun City has a variety of entertainment facilities, including a casino, a golf course, theatres and performance halls, hotels, and beaches, to name a few (Northwest IDP, 2021).

The Dr Kenneth Kaunda District Municipality (DKKDM) lies in the south-east of the province, bordered by the Free State province to its south and Gauteng province to its east. It consists of three local municipalities, namely City of Matlosana Local Municipality, Maquassi Hills Local Municipality, and JB Marks Local Municipality. The Dr Kenneth Kaunda District Municipality is a category C municipality, with municipal executive and legislative authority. The district includes the N12 Treasure Corridor, which connects Johannesburg and Cape Town, running from east to west across the district. The Treasure Corridor serves as a potential concentration point to attract future industrial, commercial, and tourism development (DKKDM DDM, 2021)

JB Marks Local Municipality (JBMLM) is the second largest local municipality in the Dr Kenneth Kaunda District Municipality, with the largest land mass by geographical area. It is situated furthest east in the district, also marking the border where the North West province meets Gauteng province. To its south-west is the City of Matlosana Local Municipality, and to the south-west of this is the Maquassi Hills Local Municipality. JBMLM is a category B municipality and was established in August 2016 when the former Ventersdorp Local Municipality and the Tlokwe City Council Local Municipality were amalgamated.

JB Marks is majorly composed of two towns – Potchefstroom and Ventersdorp. Potchefstroom is known as being an academic town because its chief feature is the Potchefstroom Campus of the North West University. In addition, its industrial zone consists of many large companies that operate in the steel, food, and chemicals industries. Ventersdorp focuses mainly on agricultural activity, with its other sectors including Community Services, manufacturing, trade finance, transport, and mining (JBMLM IDP, 2022).

Merafong City Local Municipality (MCLM) is situated to the east of JB Marks Local Municipality, which situates it in the West Rand District Municipality, a category C municipality at the most westerly end of the Gauteng province. MCLM is one of three local municipalities in the district, the other two being Rand West City Local Municipality to its east, and, to the north-east of this, Mogale City Local Municipality. MCLM is a category B municipality, with an Executive Mayor governance system. The towns in the local municipality most relevant to the project are Welverdiend, Khutsong, and Carletonville.

6.2 Population and Demographics

In this section, we will discuss the JB Marks Local Municipality. As mentioned, the Merafong City Local Municipality falls in the province of Gauteng; however, according to the Dr Kenneth Kaunda District Municipality IDP, Merafong City Local Municipality is included in its reporting because of the old boundaries that still recognized the local municipality. Merafong City Local Municipality is also closer to the North West in character than the rest of Gauteng Province.

JB Marks Local Municipality is the fastest growing local municipality in the district; in 2011, it reported 219 463 people and by 2016, the number had risen to 243 527 people, marking a growth rate of 2.36 between the two periods. This makes it the fourth fastest growing local municipality across all the districts in the province for the same period.

Table 3 provides an overview of the demographic data below.

Table 3: Municipality Demographic Data (2016)

	Census 2011	Community Survey 2016	Annual Population Growth
North West Province	**3 509 953**	**3 748 435**	**1.49**
Dr Kenneth Kaunda District Municipality	695 933	742 821	1.48
JB Marks Local Municipality	219 463	243 527	2.36

6.3 Population

Comparing the Census 2011 data to the Community Survey 2016 for the North West province reveals that only one age cohort in the population, that of ages 35 to 64, showed a decrease, going from 28.8% in 2011 to 26.2% in 2016. The other three cohorts, that of 0-14, 15-34, and 65+, all recorded an increase, with the greatest of those being the 65+ cohort, which recorded an increase of 2.4% between the two reporting periods.

A more comparative breakdown of the age groups in the three relevant administrative levels is presented in the Community Survey 2016. Increments of five years result in thirteen intervals, ending with the 60+ cohort. For the province and the district, the cohort with the largest representation is 0-4 years old, with a figure of 10.8% of the population for the province and 10.3% for the district. This is followed by the 5-9 years old bracket, with a figure of 9.9% of the population for the province and 10% for the district. This trend is the case for City of Matlosana Local Municipality and Maquassi Hills Local Municipality, too; however, surprisingly, JB Marks Local Municipality has as its largest representation the 20-24 years old age bracket, with 10.7% of the population in its municipality.

Table 4: North West Distribution of Age Groups

Age Cohort	North West	DKKDM	JBMLM

0-4	407 509	77 165	23 405
5-9	373 184	74 881	24 143
10-14	335 658	65 902	21 176
15-19	347 520	64 323	22 100
20-24	348 714	66 150	26 141
25-29	352 737	66 873	21 186
30-34	300 579	59 573	17 929
35-39	256 732	53 526	16 469
40-44	220 117	47 101	15 093
45-49	195 485	42 234	14 109
50-54	165 037	35 984	11 790
55-59	144 338	30 736	10 544
60+	300 825	58 375	19 442
Total	**3 748 435**	**742 821**	**243 527**

6.4 Household Characteristics

When considering the household statistics in the province, it is found that an increase in numbers is consistently seen across the relevant administrative areas between 2011 and 2016. For the Northwest Province, the population number increased from 3 509 953 in 2011 to 3 748 435 in 2016. The number of households increased from 1 061 998 in 2011 to 1 248 766 in 2016, while the household size decreased from 3.3 to 3. For the district, the population size increased from 696 933 people in 2011 to 742 821 people in 2016. The number of households increased from 208 045 to 240 543, and the household size decreased from 3.3 to 3.1. Finally, the local municipality recorded a population size of 219 463 in 2011, which increased to 243 527 in 2016. The number of households also increased from 67 098 to 80 572, and the household size decreased from 3.3 to 3.

Table 5: Household Characteristics

Indicator	North West	DKKDM	JBMLM
2011			
Population number	3 509 953	696 933	219 463
Number of households	1 061 998	208 045	67 098
Household size	3.3	3.3	3.3
2016			
Population number	3 748 435	724 821	243 527
Number of households	1 248 766	240 543	80 572
Household size	3	3.1	3

Consistently, across the province, the heads of households are predominantly male. This applies for both reporting periods of 2011 and 2016. In 2011, the population of household heads who were male was reported as 63.4%. In 2016, 64.8% of the population of household heads were male. This illustrates a growth of 1.4% in households with males at the head.

There are four types of dwellings that are classified under the Community Survey: formal dwelling, traditional dwelling, informal dwelling, and a non-specific "other" category. For the North West province, 78.2% of houses are classified as formal dwellings. In comparison, 86.4% of houses in the Dr Kenneth Kaunda District Municipality are formal dwellings. The JB Marks Local Municipality has 82% formal dwellings. Across the province, this is followed by informal dwellings, with 18.3% at the provincial level, 11.3% at the district level, and 16.2% at the local level. The third most prominent dwelling type is "other," but only at the district level, with a figure of 1.5%, and at the local level, with a figure of 1.1%. The provincial figure for this type of dwelling classifies it as the least prominent of the four, with 1.5%. Finally, traditional dwellings constitute 1.8% in the province, 0.7% in the district, and 0.3% in the local municipality.

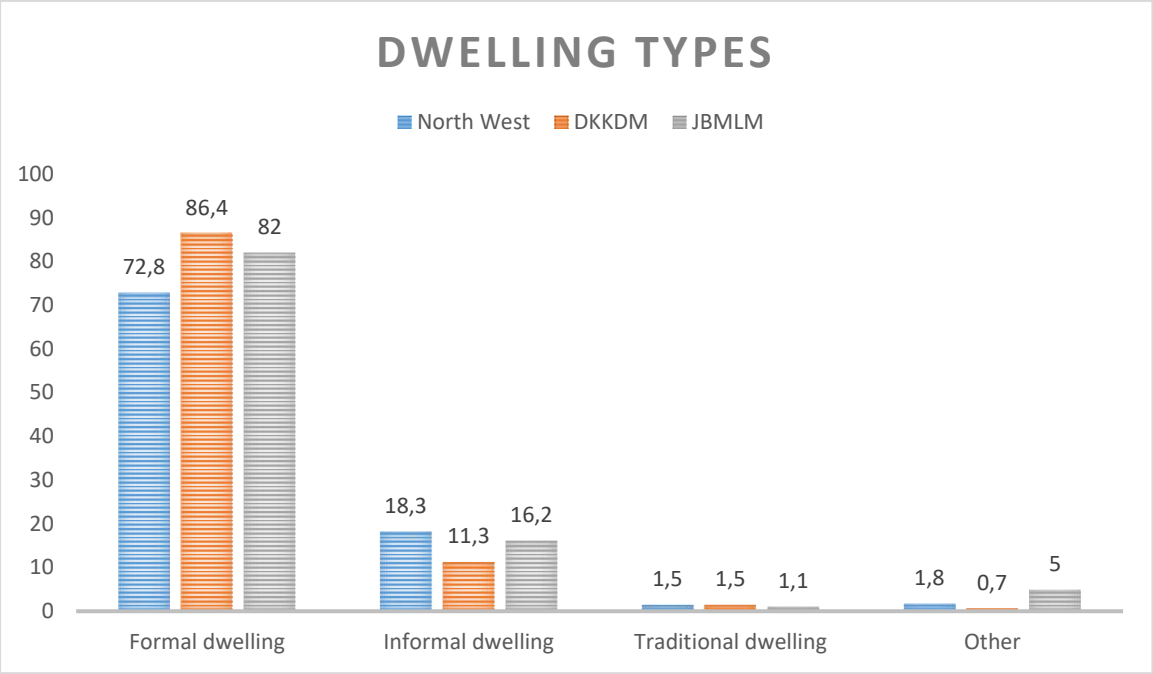

Figure 7: Dwelling Types

The Reconstruction and Development Programme (RDP) funded houses in the North West Province constitute only 21.1% of homes. This places the province as fourth out of the nine provinces in terms of prevalence of RDP-funded housing. In comparison, 38.1% of houses in the district are RDP-funded, and 28.7% in the local municipality. Predominantly, across the province, the perceptions of the RDP housing are favourable. However, in the local municipality only 38.5% of residents feel that the housing is good, with 37.1% feeling that it is poor. This later representation is considerably higher than the rest of the local municipalities, who are much closer to the provincial figure of 22.4%

6.5 Spoken Language

The North West borders Botswana to the province's north. The prevalence of Setswana in both these regions suggests a commonality most likely related to the free movement of Bantu-speaking peoples throughout the Southern African region. In the province, there has only been one language that has seen an increase in the number of speakers between the two reporting periods of 2011 and 2016. Setswana has gone from 63.3% in 2011 to 71.5% in 2016. The second most widely spoken language in the province is Afrikaans, which decreased in representation from 9% in 2011 to 7.2% in 2016. This is followed by Sesotho, which saw no marked difference between the reporting years, staying steady at 5.8%. IsiXhosa is the fourth most widely spoken language, with a recorded 5.5% of speakers in 2011 decreasing to 5.1% in 2016. English features as the fifth most widely spoken language, with 3.5% of speakers in 2011 and 1.4% in 2016, marking the most significant decrease of all the languages in the province. In total, 14 categories were reported for languages in the province. Figure 8 below provides a complete breakdown.

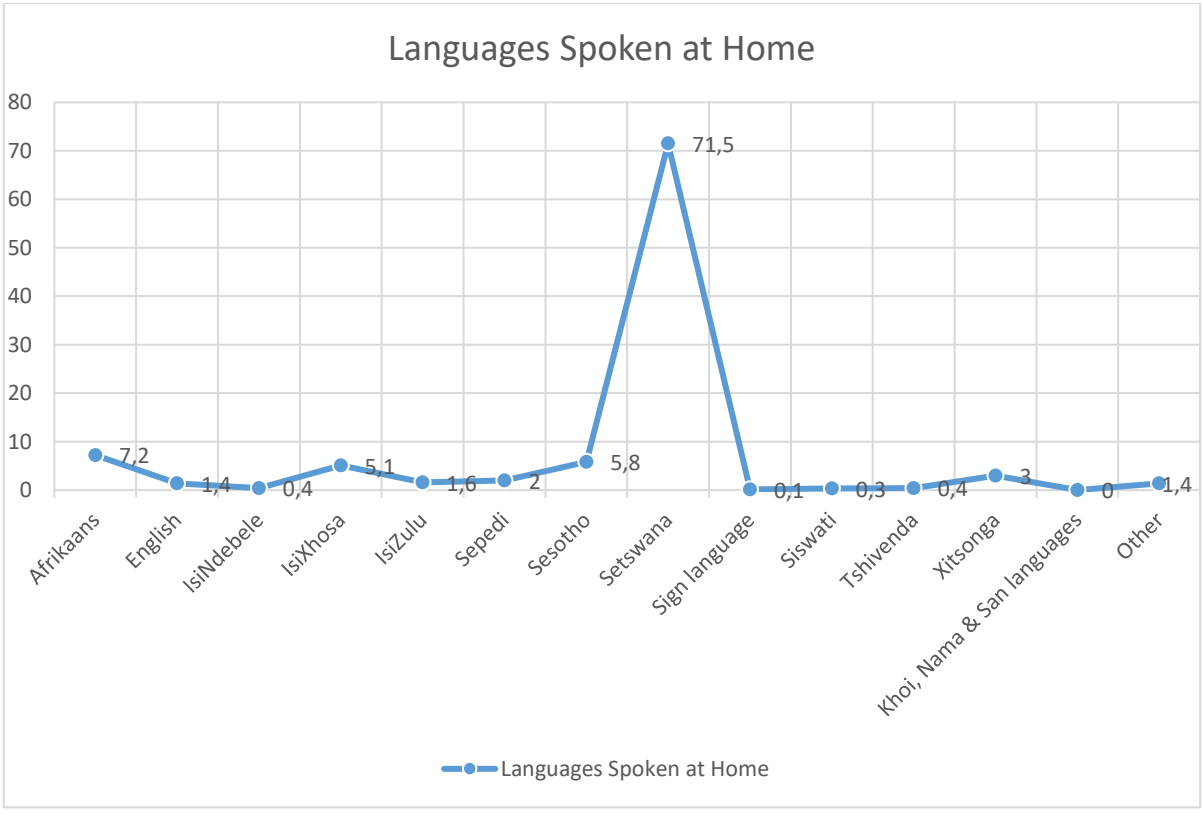

Figure 8: Spoken Language

6.6 Education

The Constitution of the Republic of South Africa states that it is important that all citizens have access to good basic education, including adult basic education. This refers to primary, secondary, and tertiary education; however, the latter is less easily applicable because of the costs associated and the strict entry requirements. In order for children to be adequately ready to attend school from the ages of 7, it is important that their early development is properly facilitated. This happens between the

ages of 0-4, as reported in the census studies. This early childhood development (ECD) is important for a child's ability to acquire perception-motor skills, which form the foundation for reading, writing, and numeracy later in life. The Dr Kenneth Kaunda District Municipality is the best performing district in the North West Province, with 37.2% of the population in this age bracket attending an ECD centre. Of the three local municipalities in the district, JB Marks Local Municipality performs the best, with 42.6% of appropriately aged children attending an ECD centre.

The population of individuals who are between the ages of 5 and 24 who are attending an educational institution in the North West Province has markedly improved during the two reporting periods of 2011 and 2016. In 2011, 880 621 people, 70.4% of the provincial population, were attending an educational institution, and by 2016, that number had increased to 1 037 694 people, accounting for 73.9% of the provincial population and marking an improvement of 3.5%. The representation for the Dr Kenneth Kaunda District Municipality indicates that in 2011, 71.6% of the provincial population were attending an educational institution, with that number rising to 76.1% in 2016. The JB Marks Local Municipality happened to record the lowest increase across the three local municipalities in the district, going from 73.2% in 2011 to 76.5% in 2016.

In terms of educational attainment across the three tiers of learning, secondary education remains the most prominent, with 65.1% of the provincial population at least attaining this level. Unfortunately, this is followed by those who have received no schooling, with a figure of 19.3%. This trend follows across the Dr Kenneth Kaunda District Municipality, which has 64.9% of its population at least attaining secondary level education, with 18.8% of the population without any schooling. JB Marks Local Municipality has 62.8% of its population having attained secondary level education, with 18.2% without any schooling. The highest proportion of the population in the district having attained higher education falls within the JB Marks Local Municipality at 9.8%, which also makes it the second best performing for this educational bracket in the province.

Table 6: Education Profile

Education Level	North West	DKKDM	JBMLM
Primary School	114 215 (11%)	21 368 (9.8%)	6 837 (9.2%)
Some Secondary School	672 483 (65.1%)	141 400 (64.9%)	46 906 (62.8%)
Higher Education	47 384 (4.6%)	14 214 (6.5%)	7 322 (9.8%)
No Schooling	199 626 (19.3%)	41 031 (18.8%)	13 571 (18.2%)

6.7 Access to Healthcare

The Community Survey 2016, as well as the IDPs for the municipality were reviewed to acquire healthcare information. However, there was an absence of related information in these documents. In lieu of verified information in this regard, and in an attempt to provide a general illustration of the healthcare facilities recorded in the area, Google Earth was used. It is worth stating that the

correctness of the information is dependent on the business owner as the party responsible for upkeeping this information on Google.

In JB Marks Local Municipality, there are a number of healthcare facilities that are available to service the particular needs of the community. They are spread across the five towns of Klerksdorp, Potchefstroom, Ventersdorp, Fochville, and Carletonville. In Klerksdorp, there is the Westvaal Hospital, Tshepong Hospital, the Life Anncron Hospital, and Duff Scott Hospital. In Potchefstroom, there are several hospitals, including hospital complexes, such as Witrand Hospital and Potchefstroom Hospital; private hospitals, such as Mediclinic, MooiMed Private Hospital, and M-Care, which deals specifically with physical and psychiatric rehabilitation; a private family medical centre, Cachet Park Medical Centre; and a military hospital, AMHU North West. In Ventersdorp is only the Ventersdorp Hospital. In Fochville are four hospitals, namely Leslie Williams Memorial Hospital, Sibanje Hospital, Fochville Hospital, and the Mponeng Mine Occupational Health Centre. In Carletonville, there appears to be only one hospital, named Carletonville Hospital.

6.8 Economic Development Indicators

According to the JB Marks Local Municipality IDP, which records 2017 as its latest reporting period, the Gross Value Added (GVA) in Dr Kenneth Kaunda District Municipality comes from nine distinct sectors: Agriculture, Mining, Manufacturing, Electricity, Construction, Trade, Transport, Finance, and Community Services. Of these nine sectors, community services is the highest grossing sector for the district, contributing R14.5 billion to the GVA in 2017. This is followed by finance, which contributed R8.9 billion to the GVA. The trade sector contributed R8 billion to the GVA. The smallest contributor was the construction sector, with R1.7 billion.

In terms of contribution to the district municipality, the largest GVA contributing sector from JB Marks Local Municipality was agriculture, which constitutes 54.8% of the district. This is followed by manufacturing, which contributed 48.4% to the district. In a close third was electricity, which contributed 48.2% to the district. The smallest sector was mining, with 19% being contributed to the district. However, in terms of actual monies being created in the local municipality, the best performing sector was community services, with R6.4 billion or 33.3% of the total GVA, followed by finance, with R3.2 billion or 16.6%, and trade, with R2.8 billion or 14.5%. The weakest sector was construction, earning R600 million or 3.1% of the total GVA of the local municipality.

The best performing sectors over the period between 2007 and 2017 were finance, with an average growth of 3.24%, followed by agriculture, with 2.53%, and community services, with 2.51%. The worst performing sector over the ten-year period was mining, with an annual growth of -7.23%. Forecasting the next five years, from 2017 to 2022, the best performing sectors are expected to be finance, transport, and electricity. The worst performing is expected to be community services.

6.9 Labor Force

The labour force consists of people who are between the ages of 15 and 64. This age bracket is also sometimes referred to as the “economically active population”. According to the JB Marks Local Municipality IDP, those groups not included in this classification are students, retired people, stay-at-

home parents, incarcerated individuals, people employed in jobs with unreported incomes, and discouraged workers (those who no longer seek work but who would form part of the workforece if given the chance). In the ten-year reporting period between 2007 and 2017, the largest demographic in the working age population for the North West Province falls in the 20-24 year group in 2007 and then in the 25-29 year group for 2017. For the Dr Kenneth Kaunda District Municipality, the same trend applies. It is only different in JB Marks Local Municipality, where the predominant working age population falls within the 20-24 year group for both reporting periods.

The economically active population is in reference to those individuals who fall within the working age of 15 and 64, in particular those who are able and willing to work. It also includes those who are unemployed but who are actively seeking work. Between the two reporting periods of 2007 and 2017, there was a positive average annual growth of the economically active population across the province. JB Marks Local Municipality grew by 1.24%, which is a better performance than both the district and the province, which grew by 0.16% and 1.17%, respectively. The labour force participation rate (LFPR), which "is the economically active population expressed as a percentage of the total working age population" (JBMLM IDP, 2022), stands at 55.4% for the local municipality, 55% for the district municipality, and 52.4% for the province.

6.10 Access to Electricity

Across the provincial, district, and local municipal levels, household energy is consistently supplied majorly by in-house prepaid meters. At the provincial level, 973 231 or 77.9% of households have this type of energy supply; at the district level, 177 094 or 73.6% of households account for this type of energy supply; and at the local level, 56 003 or 69.5% of households rely on this type of energy supply. Other sources of energy supply are the conventional in-house meter, connections to other sources that houses either do or do not pay for, solar home systems, generators or batteries, and a non-descript "Other" source.

In JB Marks Local Municipality, the second most popular source of energy supply comes through the conventional in-house meter, with 13 231 or 16.4% of homes connected to the electrical grid in this way. This amounts to 69 234 or 85.9% of homes in the local municipality connected to the grid. Unfortunately, the third largest percentage of homes in this demographic is those without any access to electricity, a figure of 7 768 or 9.6%, the highest in the district (Community Survey, 2016).

6.11 Water and Sanitation

Access to safe drinking water and sanitation is considered a human right by the United Nations. The Dr Kenneth Kaunda District Municipality ranks highest of all the districts in the North West, in terms of access to safe drinking water, with 87.6% of its population being in this favorable position. JB Marks Local Municipality grants access to safe drinking water for even more of its local population, with 90.4% accounted for. In comparison, the provincial figure of those who have access to safe drinking water stands at 80.2%. Predominantly, at a rate of 68.9% for the province, 91.9% for the district, and 86.5% for the local municipality, water is provided by the municipality (Community Survey, 2016).

7 LOCAL STUDY AREA OVERVIEW

This section gives an overview of the direct study area and its receiving environment within a five-kilometer radius of the proposed project cluster.

The project area is dominated by commercial agricultural activities, such as livestock farming, crop farming, tree nurseries, and game farming. Table 7 below shows some of the farming activities noticeable in the area.

Table 7: Images of Cattle and Game Farming

	

7.1 Land use and Infrastructure

The land use in the project area is commercial agriculture, with low density homesteads and farm properties located to the northeast of the proposed development site and some sparsely located properties within a five kilometre buffer of the site. The proposed project site is accessible from the D90 road, which links with the N14. The N14 is likely to be the road used by developers when approaching the project site. The access point to the site is located on the boundaries of Gauteng and the North West Province, along the D90 road. The most closely located residential areas to the project site are Khutsong, Khutsong South, and Welverdiend. A little further away are the areas of Waters Edge, Oberholzer, Westdene, Carletonville, and Western Deep Levels. These areas are expected to be where labour will be travelling from.

The major agricultural activities that contribute to the local economy are commercial cattle farming, chicken farming, and crop farming. The major economic activities in the area include game farming, tree plantations, a privately owned mining property, and a nature reserve (Abe Bailey Nature Reserve). These are in addition to the major industrial sectors that contribute to the local economy.

Situated in Waters Edge, which falls on the border between Carletonville and Khutsong, the Abe Bailey Nature Reserve is well-known for its bird watching activities. Part of its property stretches to the boundaries of the development property. The reserve keeps different types of bird species and offers sightseeing activities to visitors. The economic growth generated by the project is likely to impact positively on this facility as it contributes to ecotourism and sustainable initiatives. A common opinion of stakeholders in the area is that the installation of the solar panels will likely come with security upgrades that would also benefit the game animals in the reserve.

Khutsong is a densely populated residential area with several schools, religious facilities, a police station, and a taxi rank. Below it, and separated by Welverdiend Road, is the area of Khutsong South, which is also densely populated and has several socio-economic receptors, such as schools, religious facilities, a library, and businesses. It can be noted that Khutsong and Khutsong South will have NO view of the solar farm. The figure below shows a graph of elevation from Khutsong to the closest point of the Seelo Solar facility.

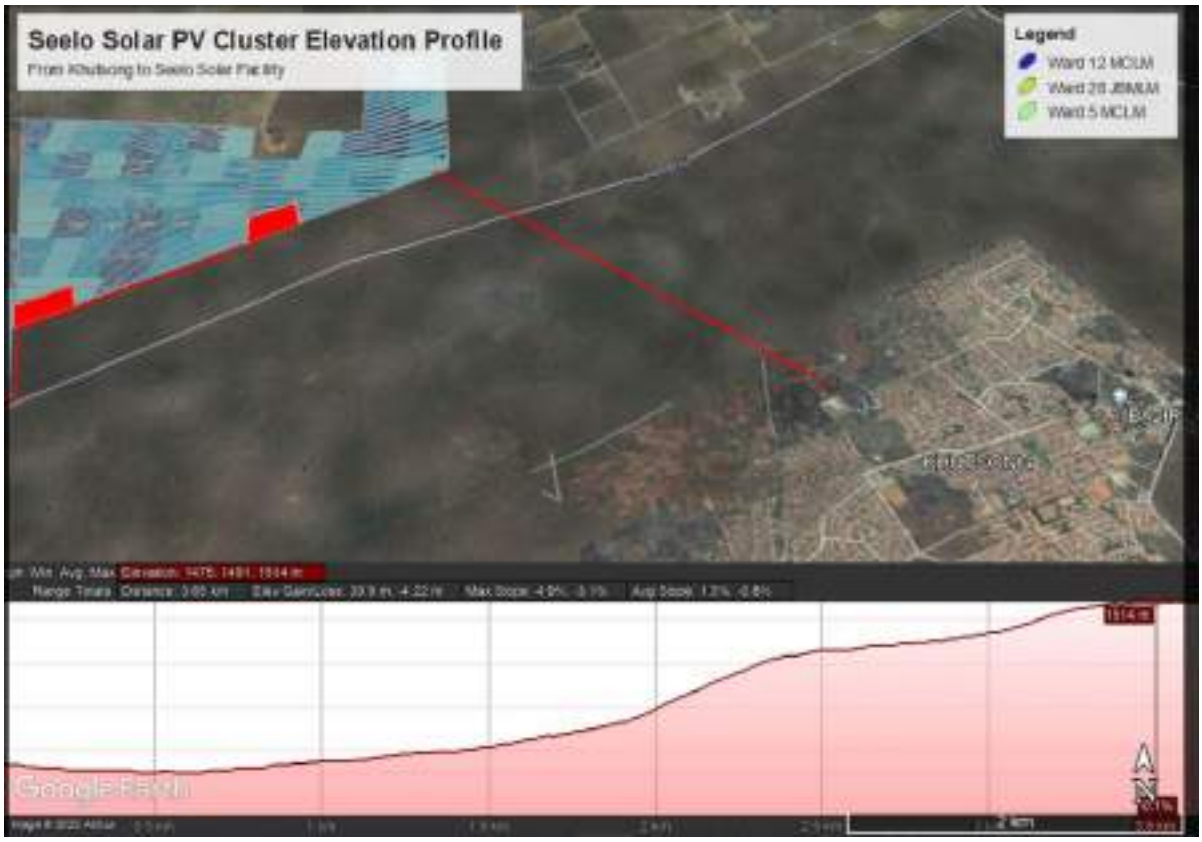

Figure 9: View from Khutsong to Seelo Solar Facility.

7.2 Profile of the receiving Environment

This section of the report details the status quo of the social environment. The following data was gathered using the Rapid Rural Assessment and stakeholder interviews.

7.2.1 Community facilities

Mobile healthcare clinics frequent the area to cater for the local farming community every week. Moreover, major healthcare, educational and administrative facilities are distributed in towns and residential areas such as Ventersdorp, Carletonville, Khutsong, and Welverdiend.

The Klerkskraal South African Police Station services the local farming community.

7.2.2 Access to Basic services

The farm communities rely on flush or chemical toilets inside their houses, with septic tank systems processing the waste. Farm based solid waste management systems are in place and some landowners manage their solid waste using “reduce-reuse-recycle” principles. Municipal waste collection services do not cover the project area. In some cases, households also rely on communal dumps as convenient methods of refuse disposal.

7.2.3 Road infrastructure

The main roads servicing the project site are the N14, R500 and the D90. Most of the feeder roads are graveled.

The condition of the R500 and the D90 roads is dangerous. It is littered with potholes, which make travelling slow and cautious. Additional gravel routes can be seen tracking alongside these main roads, which provides an indication of the extent to which locals have had to find alternatives. Table 8 below provides an illustration of the state of the tar roads and one of the alternate routes that locals had fashioned.

Table 8: Potholes along D90 and inner gravel routes

7.2.4 Transport

Busses and taxis can be seen travelling on the roads. In Khutsong, there is a taxi rank, which provides convenient transport for the residents there. Farmers also provide transport to their workers and other residents. The type of vehicles operating in the vicinity vary, with commercial trucks, farm vehicles, minibuses, buses, taxis, and sedans being identified along the N14.

7.2.5 Livelihoods

The IFC PS5 defines livelihoods as "the full range of means that individuals, families, and communities utilize to make a living, such as a wage-based income, agriculture, fishing, foraging and other natural resource-based livelihoods, petty trade and bartering".

Workers depend on a mix of livelihood sources such as wage employment, local economic activities, and social grants for sustainable living.

7.2.6 Crime, Safety & Security

Local interviewees indicated that crime is an issue within the area. There are existing neighbourhood watch groups and associations; however, they are overstretched. The Klerkskraal Police station also indicated that there has been a rise in crime in the area, such as armed robberies and stock theft.

Adjacent landowners further expressed concerns regarding crime and trespassing due to an influx of people into the project area. Fear of livestock theft and vandalisation of farm properties were the major impacts highlighted.

7.3 Stakeholder Engagement

The World Bank's Environmental and Social Framework (2018:97) defines the stakeholder engagement process as a process that is inclusive and conducted throughout the project life cycle. The procedure further supports the development of strong, constructive, and responsive relationships that are important for successful management of a project's environmental and social risks.

The following stakeholder engagement methodologies were carried out as part of either the public participation process of an earlier Scoping process and as part of direct contacts with the affected parties.

7.3.1 Comments Made by the Public

The process of collating comments and inputs is still ongoing. Site notices have been placed around the project area to sensitize I&APs about the cluster of projects proposed in the area. A database of the potentially affected parties and community elected representatives were sent email notifications, which included a Background Information Document (BID). This document provided an overview and description of the proposed project.

7.3.2 Primary Data Collection Report

A baseline study of the area's infrastructure was conducted on Google Earth Pro to identify social receptors in the direct study area. The images in the following table show some of these receptors.

Table 9: Social Receptors in the Direct Study Area

	
Steikfontein Poultry Farms	**Klerkskraal South African Police Services**
	
Abe Bailey Nature Reserve	**Khutsong Residential Area**
	

Varkens Laagte Minerals	**Eucalyptus Tree Nursery**

7.3.3 Rapid Rural Assessment Process.

A site visit was conducted on the 22nd of June 2023 and then again on the 17th of July 2023. The purpose of these visits was to compile and collect primary data on the receiving social environment, as well as to understand the expectations of the local people with reference to the proposed project.

7.3.4 Social assessment informant survey

Barrow, CJ (2000) suggests that the purpose of random interviews is to involve the diverse public in decision making, even those that are reluctant or marginalized. The following random interviews took place with the people listed in the table below.

The purpose of the face-to-face stakeholder interactions was to establish and record unbiased views and/or comments of the proposed project, to ensure that all comments and issues raised during the EIA phase is included in the SIA report.

The overall attitude that was displayed during the interviews was one of the positive expectations of the proposed Solar PV project. However, landowners highlighted the need to ensure that security measures are improved not only for the proposed development but to also benefit nearby properties. Vandalism, property break-ins and armed robberies were amongst the reported crimes according to the local people and the Klerkskraal police services.

Table 10: Stakeholder Comments

John Moyo	**Ward Councilor – Ward 28, JB Marks Local Municipality**	**064 682 3165**
John Moyo was helpful, despite our inability to meet in person. We made two trips out to JB Marks but were unable to meet him on both occasions because of conflicting appointments in his schedule. Our conversations were telephonic. The councilor expressed his approval of the project, saying that it would be good for the area. He believes that it will bring economic stability to related industries, especially since the power challenges of the national grid have presented ongoing challenges. When prompted on his thoughts about any issues he imagined may arise from the project, the councilor was unable to think of any concerns. His general take on the project is that it will benefit the area.		
Willem **Alex**	**Administrator – Abe Bailey Nature Reserve**	**072 534 043** **018 787 9918**
On our first trip to the project site, we managed to have a chat with Willem, who is the administrator at the Abe Bailey Nature Reserve in Merafong. The reserve also borders JB Marks and so it is an adjacent land area that is expected to be impacted by the project. Willem expressed that there		

were no major concerns from the reserve about the project. There is a general understanding that it will bring benefits to the area. However, he did request that the developers did their best to ensure that the boundaries are maintained. As the reserve caters to wildlife that is dependent on a natural environment that supports their activities, and the economic wellbeing of the reserve is dependent on the sustainability of this, it matters that the developers do not encroach on the premises or unnecessarily disturb the habitat of the fauna and flora there. Willem also suggested that the development contribute to security measures that would deter any continuation in the spate of criminal activity that had recently affected the area. He suspects that labourers from Khutsong would likely traverse the reserves boundaries in order to reach the project site, which is not ideal. The developers should be aware of this and take steps to prevent labourers from doing so.

Captain Gramah **Sergeant Tshabalala**	**Klerkskraal SAPS**	**082 568 4930** **018 769 1039**

Also on the first trip to the project site, we met with the SAPS force at Klerkskraal. The representatives present were the captain and the sergeant, both of whom were very forthcoming about their concerns. These were more related to the criminal activity in the area that had been on the rise. They said that the development would undoubtedly be good for the area; however, they requested that the developers engage with them so that any untoward business could be snubbed. This is in relation to the upsurge in construction mafias that have been making news reports around the country, but also as relates to opportunistic activities that may hamper the project or negatively impact the businesses in the surrounds.

Jan Vermaak	**Ukuthula Wild & Jag**	**082 540 7931**

Jan Vermaak is the owner of Ukuthula Wild en Jag, a game farm in the area. The farm will also support a portion of the Alpha Solar PV. We spoke to Mr Vermaak telephonically and he was happy to share his thoughts with us. He said that the project was a good idea because it would bring economic benefits to the community. He said that he believed in the potential of the project to positively benefit the area so much that he was willing to dedicate a portion of his farm for the purpose. Of course, this portion of his farm is not currently in use; therefore, he will not be losing out on any productive land. The land is better served for supporting the solar array. Mr Vermaak did not suspect any negative impacts from the project.

Bill van Zyl	**Farm 94 De Beers Kraal**	**078 505 5840**

Bill van Zyl is a landowner of property adjacent to the project site. We contacted Mr van Zyl telephonically and he was happy to share his thoughts. In general, he did not have massive concerns about the installation of the solar array. He believes that the creation of energy is a good thing and he hopes that it will positively impact the community. He also believes that the security measures that will be taken to protect the solar array will also protect the community against criminal elements. He did share one concern about the processes that would be used to prepare the ground

for the installation. He shared that he rears sheep and they graze freely. If the process of preparing the ground utilised chemicals, he said that he would be concerned about how those chemicals might affect the soil and the ground water. He does not believe that the developers would be reckless about this, especially considering the number of farms in the area; however, he believes it is worth raising so that there is clarity on how the development will be undertaken.

G.F Oosthuizen	**G.F. Oosthuizen Boerdery Eiendoms (Farm 94 De Beers Kraal)**	**083 406 0840**
Mr Oosthuizen did not have much to contribute. A farmer of livestock, he was happy to share with us, telephonically, that he had no concerns with the project.		
John Lightfoot	**Lightfoot Family Trust (Farm 96 Rooipan)**	**082 446 8080**
John Lightfoot is the owner of the farm where the solar array will be installed. We had two engagements with Mr Lightfoot – one in-person and one telephonic. He was very friendly and shared his thoughts and experiences with us. According to Mr Lightfoot, the neighbours had only expressed enthusiasm about the project, a fact that we had noticed in our own engagements with adjacent landowners. He says that the solar array will offer a general increase in security because of the measures that will be taken to protect the site. He finds it hard to imagine that the installation will be threatening to people in the area because labour will mostly be locally sourced and traffic to and from the site will not flow through communities. In fact, as neighbours have expressed to him, there is a hope that the installation will lead to a decrease in crime in the area. We raised the concern from Mr van Zyl about whether chemicals would be used to prepare the ground and Mr Lightfoot expressed that his intention was to allow the sheep to graze in the area rather than using chemicals, which would keep the grass short and provide grazing to the livestock.		

Error! Reference source not found. below provides a summary of the needs of the immediate community identified through stakeholder engagements:

Table 11: Community's Needs

Key needs / Issues Identified	Mitigation methods
Inner road infrastructure development	- There is a need of road maintenance on the D90 and R500 routes.
Security	- There is a need to improve and increase security measures.
Healthcare Facilities for the farming community	- The need to develop a permanent healthcare facility that will benefit the farming community.

8 IDENTIFICATION OF IMPACTS

8.1 Impacts and Mitigation Framework

Socio-economic impacts are expected to arise because of a proposed project. All impacts discussed in this section will follow a context of nature, extent, magnitude, duration, probability, and significance.

ISO 14001-2004 defines impacts as "any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects".

When considering an assessment of the impacts and their mitigation, the following definitions as per **Error! Reference source not found.** apply.

Table 12: Impact and Mitigation Quantification Framework

Nature	The project could have a positive, negative, or neutral impact on the environment.
Extent	**Local** – extend to the site and its immediate surroundings. **Regional** – impact on the region but within the province. **National** – impact on an interprovincial scale. **International** – impact outside of South Africa.
Magnitude	Degree to which impact may cause irreplaceable loss of resources: **Low** – natural and socio-economic functions and processes are not affected or minimally affected. **Medium** – affected environment is notably altered; natural and socio-economic functions and processes continue albeit in a modified way. **High** – natural or socio-economic functions or processes could be substantially affected or altered to the extent that they could temporarily or permanently cease.
Duration	**Short term** – 0-5 years. **Medium term** – 5-11 years. **Long term** – impact ceases after the operational life cycle of the activity either because of natural processes or by human intervention. **Permanent** – mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.
Probability	**Almost certain** – the event is expected to occur in most circumstances. **Likely** – the event will occur in most circumstances. **Moderate** – the event should occur at some time. **Unlikely** – the event could occur at some time. **Rare/Remote** – the event may occur only in exceptional circumstances.
Significance	Provides an overall impression of an impact's importance, and the degree to which it can be mitigated. The range for significance ratings is as follows- **0** – Impact will not affect the environment. No mitigation necessary. **1** – No impact after mitigation. **2** – Residual impact after mitigation. **3** – Impact cannot be mitigated.
Mitigation	Information on the impacts together with literature from socio-economic science journals, case studies and field work will be used to provide mitigation recommendations to ensure that any negative impacts are decreased, and positive benefits are enhanced.

Monitoring	Monitoring usually involves developing and implementing a monitoring programme to identify deviations from the proposed action and to manage any negative impacts. The recommended mitigation measures will also include monitoring measures.

A well-designed, well implemented, professionally managed solar park can bring significant socio-economic benefits to the communities that it serves. If configured or operated in a way that ignores significant socio-economic needs or potential impacts, the proposed project may have significant socio-economic costs or liabilities for the stakeholders and affected communities.

Therefore, assessing socio-economic impacts is a complex process due to the multi-dimensional nature of the human interactions. This occurs in situations where a particular impact affects a group of stakeholders differently. An inter-connection of impacts can also be encountered whereby several impacts are related and when assessed cumulatively, their impacts may be of significance.

The impact assessment scores, both before and after mitigation, were arrived at by the specialist team engaging in a modified version of the Delphi technique, where the team discussed the scores, and through a process of iteration arrived at a consensus for each of the values. Where additional information was needed to make a decision, the technique would be halted, the necessary information would be uncovered and included in the report, and the technique would be recommenced.

8.2 Identification of Activities and Aspects

An "Activity" is defined as a distinct process or risks undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or pieces of infrastructure that are possessed by an organisation (International Organization for Standardization, 2011).

An aspect is defined as elements of an organisation's activities, products, or services that can interact with the environment.

To capture the impacts associated with the proposed infrastructure, an activity – aspect – impact table was created. It is refer to in **Error! Reference source not found.** below.

Table 13: Activity, Aspects and Impacts of the Project

Activity	Aspect	Potential Impact – Positive	Potential Impact – Negative
Planning Phase	Land Acquisition		Loss of agricultural production
			Loss of land through land acquisition for project infrastructure
	Servitude Rights		Some restrictions on use of productive land, owing to servitude rights being established

Activity	Aspect	Potential Impact – Positive	Potential Impact – Negative
Construction Phase	Access into private property		Property Damage
			Risk of trespassing
	Solar Park Construction – piling, frame erection and solar panel mounting, electrical installation and rehabilitation	Employment of local staff	
		Opportunity for local business	
		Skills development	
			Noise
			Dust
			Cultural Resistance to Women in the Workplace
			Injuries and poor workforce health
			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 behaviour, and incidence of HIV/AIDS)
			Livestock and game animal theft
	Transport of goods to site and employment of staff		Increased traffic
	Rehabilitation		Damage or wear to access roads
			Security
			Damage to property or equipment
Scheme Operations	Electricity generation	Economic growth and induced impacts	
	Supply of goods and services to the project	Opportunity for local business	
		Employment of local staff	
	Administration and Technical Input	Employment of local staff	
		Skills development	

8.3 Impact and Mitigation Assessment

Based on the project description as well as the applicable legislation and policy and planning issues, the impacts that have been identified have been classified in accordance with Vanclay's list of socio-economic impact variables (Vanclay, 2002; Wong, 2013). Vanclay's classification system is widely used in the social impact assessment field to determine the scope of the social impacts for a project. The fitting of the project impacts into the Vanclay classification, as carried out below, has been undertaken to demonstrate completeness:

Health and Well-Being Impacts

- Injuries and poor workforce health

Quality and the Living Environment Impacts

- Risk of trespassing
- Dust
- Noise
- Increased traffic
- Damage or wear to access roads
- Security

Economic and Material Well-Being Impacts

- Economic growth and induced impacts
- Employment of local staff
- Opportunity for local business
- Skills development
- Loss of agricultural production
- Loss of land through land acquisition for project infrastructure
- Some restrictions on use of productive land, owing to servitude rights being established
- Damage to property or equipment
- Livestock and game animal theft

Cultural Impacts

- Increased community conflicts due to employment of outsiders
- Influx of people seeking employment and associated impacts

Gender Relations Impacts

- Cultural Resistance to Women in the Workplace

These categories are not exclusive, nor fully inclusive of the project specific impacts, and at times tend to overlap, as certain processes may have an impact within more than one category.

8.4 Impacts during the Planning Phase

The planning phase of any project ensures the analysis of potential impacts. This allows the assessment of any risk to be measured on a scale of high, medium, or low. This pro-active approach ensures the identification of key social issues that can be mitigated before moving further to other phases of development in the project.

The assessment of the key social issues for the proposed project were identified based on the project related information including specialist studies, primary data collection methodologies, the project team's familiarity with the project area, and experience with similar project studies.

8.4.1 Land Acquisition and Servitude Rights

- Loss of land through project infrastructure
- Loss of agricultural production
- Some restrictions on use of productive land

During the planning phase of the project, it is expected that there will be impacts created by land acquisition and the acquiring of servitude rights. The authors view this as a low impact, given that the economic yield from agricultural land in the area is very much lower than the economic yield from a solar park. The economic impact – both in terms of contribution of the Gross Value Added to the regional study area, and in terms of jobs created, of the land being used as a solar park will far outweigh any possible agricultural use.

The farm portions directed affected by the production would be acquired from their owners and the land-use changed from agriculture to electricity generation. Servitude rights would have to be obtained, which would limit agricultural production on the land under servitude. This process will be conducted under a willing buyer, willing seller basis, with the seller being compensated for the loss of productive land.

These impacts will be experienced by the community from the start of construction, but the impacts will be created at the planning phase of the project.

There are mitigation measures that can be planned to reduce the negative impacts. These are below:

Table 14: Planning Phase Impacts – Land Acquisition and Servitude Rights

Environmental Feature	Land Acquisition and Servitude Rights
Project life cycle	All Phases
Potential Impact	Proposed Management Objectives / Mitigation Measures
Loss of agricultural production	• This impact has been considered by a dedicated specialist study. The SIA defers to the opinions of the agricultural specialists in this regard and their mitigation measures should be adopted
Loss of land through acquisition for project infrastructure	• Any land acquisition should be conducted on a willing buyer, willing seller basis and that the owner is not treated unfairly in the process.
Some restrictions on use of productive land, owing to	• Any servitude establishment should result in fair compensation for land owners.

servitude rights being established		• The establishment of servitude rights should not reduce the existing productivity of land owner's land holdings.				
	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 land acquisition is not compensated. This can be effectively mitigated. The impact has no consequence for project alternatives.					
Cumulative Impact	An increase in agricultural production loss, loss of land, and restrictions on productive land use, commensurate with the carrying out of three projects simultaneously.					

8.5 Impacts During the Construction Phase

The construction activity will impact the social environment both positively and negatively. Given the nature of the project area, construction activity is likely to cause several social nuisances as well as possible economic implications on the communities and commercial activities. With a project of this nature, most social impacts are experienced during the construction phase, as this is when construction related activities, relating to the influx of labour and the use of construction machinery occurs.

8.5.1 Economic Opportunities

- Employment of local staff
- Opportunity for local business
- Skills development

The project is expected to bring economic benefit to the local community through employment opportunities for labourers and locally owned businesses.

In addition to the economic value added, the construction phase was estimated to produce some 1 387 job years in the regional study area. Considering experience with renewable project implementation in South Africa, 111 job years (8%) are likely to accrue to females, and a total of 624 years (41%) are likely to accrue to youth.

The official youth unemployment rate in the region is likely higher than the general unemployment rate, this being the trend nationwide. This project has the potential to impact positively on this rate should employment practises targeted at workers (male and female) under 35 years old be adopted.

The high number of impoverished households shows that there are vulnerable communities in the study area. It is recommended that the appointed contractor use local SMME's and local unskilled labour as far as possible during the construction phase to enhance any local economic impact. In addition, this would increase the skills in the area after construction is completed.

In this way more project revenue will stay in the area, raising economic activity and increasing welfare, resulting in induced economic opportunity. In South Africa, most employment is generated through small and medium business. Given the size of the proposed project, should contracts between local SMMEs be implemented, it is likely that there will be an increase in employment by SMMEs for the duration of the contracts.

In particular, the project has the potential to create several opportunities for existing and new local SMMEs. These opportunities range from site clearing, to fencing, parts of the construction scope and supply of materials. There are also opportunities for community members to provide labour, catering, accommodation, and other services to the new workers.

Where possible, the project proponent should support and encourage the procurement of SMMEs and local or regional suppliers in line with government policy.

Education levels provide an indication of the level of skill in the community and the degree to which the community skills base can be increased. Attempts to break the poverty cycle of the project areas will require more than secondary school education. Higher education or further skills training is required. It is therefore important that the community members under-go skills development. It is recommended that the project proponent institute a skills development program during construction.

The project proponent should monitor the employment process. Employment audits should be conducted. It is important that women are also provided employment opportunities. Audits should pay attention to the employment process of women to ensure that exploitation does not take place.

As a result of the analysis above, the following impact/mitigation table has been generated.

Table 15: Construction Phase Impacts - Economic Opportunities

Environmental Feature		Economic Opportunities				
Project life-cycle		Construction phase				
Potential Impact		Proposed Management Objectives / Mitigation Measures				
Employment of people locally		• 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.				
Opportunity for local business		• Local SMMEs should be given an opportunity to participate in the construction of the project through the supply of services, material or equipment.				
Skills development		• 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	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 local participation should be encouraged. The economic benefits of construction will take place irrespective of which alternative is presented.
Cumulative Impact	An increase in local employment, opportunities for local businesses, and skills development, commensurate with the carrying out of three projects simultaneously.

8.5.2 Noise, Dust and Traffic

- Increase in dust
- Noise impacts
- Increase in traffic
- Damage or wear to access roads

During the construction phase, there is a potential for communities to be exposed to increased dust, and noise. The site is in an isolated area where the number of community receptors is limited, conversely however there a few noise and dust generating activities in the area, hence small increases in noise and dust will be noticed by local communities.

The generation of dust stems from activities such as clearing of vegetation, piling and vehicle movement. This situation will be worse during the dry season and during windy seasons. Airborne particulates may pose a hazard to residents downwind of the construction site that suffer from upper respiratory tract problems. Mitigation through dust suppression will allow for this impact to be effectively managed.

During the construction, equipment will be required for the site clearance, and during piling and trench excavation for electrical connections. A degree of noise generation will be unavoidable. The degree of noise, frequency of noise and individual perception are all important considerations when determining the impact on noise. Adequate warning of high noise events such as blasting (if required owing to the nature of the subsoil material) should be communicated to the affected communities prior to carrying out such activities. Construction times should be limited to normal working hours.

Traffic in the local study area will increase during the construction phase. Traffic sources will be generated by staff working at the site, and from goods and material deliveries to the site. Vehicles to be used will range from sedans to Light Delivery Vehicles and light trucks to heavy good vehicles.

As a result of the analysis above, the following impact/mitigation table has been generated.

Table 16: Construction Phase Impacts – Noise, Dust and Traffic

Environmental Feature	Noise, Dust and Traffic
Project life-cycle	Construction phase

Potential Impact	Proposed Management Objectives / Mitigation Measures
Increase in Dust	• Dust can be mitigated using appropriate dust suppression mechanisms. • Limit road speeds on site through the erection of speed limits signage
Noise impacts	• Prior notice should be given to surrounding communities of noisy events 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, notice should be given to the affected community or landowners.
Increase in Traffic	• This impact has been considered by a dedicated specialist study. The SIA defers to the opinions of the traffic specialists in this regard and their mitigation measures should be adopted
Damage or wear to access roads	• This impact has been considered by a dedicated specialist study. The SIA defers to the opinions of the traffic specialists in this regard and their mitigation measures should be adopted

	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	Nosie and dust during construction is to be expected. These can then be successfully mitigated through contractor controls and through the continuous monitoring of contractor progress during the 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.					
Cumulative Impact	An increase in dust, noise impacts, traffic, and damage to access roads, commensurate with the carrying out of three projects simultaneously.					

8.5.3 Cultural Resistance to Women in the Workplace

Gender relations are recognised as an important factor in the efforts to achieve equity across society. Construction is a male-dominated industry; however, skills development initiatives directed at women may mean it is an industry that could benefit from equitable representation.

Although equal access to employment across gender lines is a recognised right, the application of this right is often executed without careful consideration of the factors that may frustrate this right amongst women in the workplace. In this regard women are often subjected to cultural factors within the workforce from both peers on the job and from management who may resist both employing and promoting women, often based on cultural prejudices. Consequently, the International Labour Organisation points out that:

“Societies therefore have an obligation to create conducive social environment for all their citizens to be able to exercise their right to work, fully utilizing their human potential. Furthermore, evidence has

shown that when women are employed and have their own income in their hands, there exist both direct and indirect social benefits for themselves and their households" (Otobe, 2014, p. 1).

With the employment of women during the construction phase of the project it is important to ensure that cultural factors do not hinder the process of employing women and ensuring that they enjoy equal opportunities to men in the workforce.

Following on from the above, the division of labour is a critical aspect that will also lead to various impacts during both the construction and operational phases of the project. During the construction phase of the project women will be integrated into the workforce, however, this will come with various challenges. Women and men work on different tasks, have different biological, sex, gender and health needs, and have different roles within the family, all of which need to be considered in order to create a workplace, without discrimination, that is accessible to both women and men on an equal basis (World Health Organization, 2006).

In introducing women into the workforce, it must be noted that women are over-represented amongst the poorer sectors of society, particularly within the more rural communities, and under-represented, both vertically in terms of responsibility and seniority as well as horizontally in respect of certain functional areas and job categories (Otobe, 2014, p. 22). This is especially the case in the local project area where the proportion of women to men is higher than the provincial average. Thus, the potential labour force is dominated by women.

The workplace should be free of harassment and employment practises should be transparent and free from any coercion or trading. The workplace should make adequate provision for separate gender changing areas and ablution facilities. As a result of the analysis above, the following impact/mitigation table has been generated.

Table 17: Construction Phase Impacts - Cultural resistance towards women

Environmental Feature	Cultural resistance towards women
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 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 phase
	• Employment practises should be demonstrated free of coercion or harassment.
	• Develop a grievance procedure to specifically address gender matters. There should be a policy on harassment that is well understood by all.

		• There should be separate changing and ablution facilities for men and women, and they should be clearly marked as such.				
	Nature	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	Negative	Site	Moderate	Short term	High	2
After Mitigation	Positive	Site	Low	Short term	High	1
Significance of Impact and Preferred Alternatives	The employment of women during the construction phase will have moderately negative impacts should workforce integration not be addressed. If workforce integration is successfully implemented, the impact on the project be positive. The impact has no influence on the choice between project alternatives.					
Cumulative Impacts	An increase in cultural resistance to gender representation in the workforce, commensurate with the carrying out of three projects simultaneously.					

8.5.4 Injuries and Poor Workforce Health

The impacts of construction can affect the health and safety of those working on the construction site. These impacts can be mitigated in the Environmental Management Programme (EMPr) and through adherence to the Occupational Health and Safety Act 85 of 1993.

An influx of workers is often characterised by higher health risks, particularly if the influx is male dominated. These include a higher disease burden and rise in HIV/AIDS rates.

It is expected that this influx will be limited owing to the large pool of potential workers for the project being available in the local study area. The fact that the labour sending areas, such as Khutsong and Welverdiend are fairly close to the construction site will obviate the need for communal living conditions that may increase the chances for the spread of disease.

There should also be awareness and education campaigns on health and socio-economic risks such as HIV/AIDS.

As a result of the analysis above, the following impact/mitigation table has been generated.

Table 18: Construction Phase Impacts – Injuries and Poor Workforce Health

Environmental Feature	Injuries and Poor Workforce Health
Project life cycle	Construction Phase
Potential Impact	Proposed Management Objectives / Mitigation Measures
Injuries and poor workforce health	• 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 access road • Contractors should establish HIV/AIDS awareness programmes at their site camps. • Measures should be taken to provide condoms and, where necessary, access to counselling to address any risks to health

	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 potential significance of the impact is high if a lack of attention to this aspect results in injuries to staff. The implementation of a safety system on site will minimise the risk of injuries and poor staff health during the construction phase. The impact has no influence on the choice between project alternatives.					
Cumulative Impacts	An increase in injuries and workforce health, commensurate with the carrying out of three projects simultaneously.					

8.5.5 Influx of Job Seekers

- Influx of people seeking employment and associated impacts
- Increased community conflicts due to employment of outsiders

It is expected that the impact of this influx will be limited owing to the large pool of potential workers for the project being available in the local study area. The fact that Khutsong is close to the construction site will ensure that the workforce is able to live at home for the duration of the construction project.

An influx of workers is often characterised by higher health risks, particularly if the influx is male dominated. These include a higher disease burden and rise in HIV/AIDS rates. There is an increased risk associated with the gathering of construction workers in a concentrated area and the availability of disposable income which may attract prostitution. In this regard the World Bank (Gender in Agriculture Sourcebook, 2009, pp. 367-368) indicates that there is a strong link between infrastructure projects and health as:

“Transport, mobility, and gender inequality increase the spread of HIV and AIDS, which along with other infectious diseases, follow transport and construction workers on transport networks and other infrastructure into rural areas, causing serious economic impacts.”

Furthermore, social pathologies, such as alcohol abuse, risky sexual behaviour, and gambling should be considered, and appropriate measures taken to limit adverse consequences from this.

The above discussion above has generated the below impact table.

Table 19: Construction Phase Impacts - Influx of Job Seekers

Environmental Feature	Influx of Job Seekers
Project life cycle	Construction Phase
Potential Impact	Proposed Management Objectives / Mitigation Measures

Influx of people seeking employment and associated impacts (e.g., cultural conflicts, squatting, demographic changes, anti-social behaviour, and incidence of HIV/AIDS)	• 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. • The risk exists that un-controlled 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 municipal by-laws are complied with.
Increased community conflicts due to employment of local and non-local labourers	• Programmes should be developed to boost the local economy. These should be in the form of Corporate Social Responsibility (CSR) that will favour local empowerment.

	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 unmitigated 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. The impact has no influence on the choice between project alternatives					
Cumulative Impacts	An increase in the influx of people seeking employment and the associated impacts of this, commensurate with the carrying out of three projects simultaneously.					

8.5.6 Property and Security Impacts

- Risk of trespassing
- Livestock and game animal theft
- Security
- Damage to property or equipment

During the construction phase, it is expected that there will be impacts on the agriculture, livestock, and game animals, as well as on private property. There is a risk of construction workers trespassing on neighbouring farms. Livestock and game in the area are valuable and so it is necessary to mitigate the risks of theft or of poaching. In carrying out construction activities there is a risk that damage to private property will occur owing to construction activities.

Mitigation measures include the project proponent, prior to construction, planning for the management of workers by taking measures such as readily identifiable clothing, having the site fenced and secured and taking measures to ensure workers do not congregate outside the site before or after working hours. A security policy must be drafted and strictly enforced by the contractors.

In relation to the analysis above, the following mitigation measures are presented:

Table 20: Construction Phase Impacts - Property and Security Impacts

Environmental Feature	Property and Security Impacts
Project life-cycle	Construction phase
Potential Impact	Proposed Management Objectives / Mitigation Measures
Risk of trespassing	• A project policy on management of workers should be developed. This would include education and awareness to be conducted with regards trespassing.
Livestock and game animal theft	• There should be clear demarcation of the area in development so that livestock and game animals are prevented from wandering nearby.
Security	• The camp site and the project 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. • Security staff alone should be allowed to reside at contractor camps and no other employees.
Damage to property or equipment	• If a risk exists of damage taking place on a property owing to construction, a condition survey should be undertaken prior to work commencing. • The contractor is to acknowledge and make good any damage that occurs on any property as a result of construction work; • Where crops 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 on account of the contractor.

	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	Property and security impacts during construction are to be expected and must be mitigated. Such impacts can be successfully mitigated through contractor specifications that are issued at a tender stage and through the continuous monitoring of contractor progress performance during the 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					
Cumulative Impacts	An increase in the risk of trespassing, risk of livestock and game animal theft, security risks, and damage to property and equipment, commensurate with the carrying out of three projects simultaneously.					

8.6 Impacts on Operational Phase

8.6.1 Economic Impact

- Economic growth and induced impacts
- Opportunity for local business
- Employment of local staff
- Skills development

The positive economic and material well-being impacts associated with the project include: support to the national grid through the generation of electricity; stimulus to the national and regional study area in the form of spending associated with the project; and increase in employment opportunities; and increased opportunities for SMMEs.

Jobs created during the operational phase of the project will be limited when compared to the construction phase, but 175 jobs will be created directly by the project over its 20-year operational lifespan. In total it was estimated that 96 jobs in total will be created in this timeframe in the South African economy owing to the project.

Economic opportunities will range from the supply of labour and skills to the project, supply of materials and equipment and an increase in wholesale and retail trade in the regional economy.

To ensure that economic activity derived from the project is localised as far as possible, measures should be adopted to increase local procurement of the human resources.

As a result of the analysis above, the following operational phase impact/mitigation table has been generated.

Table 21: Operational Phase Impacts - Economic Impacts (positive)

Environmental Feature	Economic Impacts (positive)
Project life-cycle	Operational Phase
Potential Impact	Proposed Management Objectives / Mitigation Measures
Economic growth and induced impacts	• 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
Opportunity for local business	• 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.

Employment of local staff	• Women should be given equal employment opportunities and encouraged to apply for positions.					
Skills development	• 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 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. The impact has no influence on the choice between project alternatives					
Cumulative Impacts	An increase in economic growth, opportunities for local businesses, the employment of local staff, and skills development, commensurate with the carrying out of three projects simultaneously.					

9 ANALYSIS OF ALTERNATIVES

An analysis of the project alternatives is carried out below.

9.1 No-Go Alternative

The No-Go alternative will present the following implications:

- There will be no contribution employment and skills development to the local community.
- The local economy will remain unchanged like the area and will not attract new economic investment like ecotourism.
- The opportunity to improve the overall supply of electricity in the regional will be missed; and
- The economic stimulus presented by the project will be foregone.

There will be less economic development as there will be no opportunities for SMMES and local laborers. Having taken into consideration the project aims of electricity generation using renewable power sources and considering the assessment above which does not indicate any fatal socio-economic flaws, the benefits from the project going ahead, from a socio-economic perspective, will be larger than not proceeding. The “No-go” option is not supported by this study.

9.2 Technical Alternatives

No site alternatives are proposed for this project.

10 SITE SENSITIVITY VERIFICATION

The site sensitivity was verified by means of the methodology and findings of this report. There is no social theme for this project in the screening tool, hence this report conforms with the Environmental Impact Assessment regulations requirements.

The methodology establishes existing land use and includes motivation and evidence of such land use. The nature of this study and its impacts dictate that a larger study area than the immediate site and its adjoining properties be assessed. In this sense, the precise nature of the land development on the site is not relevant in this case.

11 IMPACT STATEMENT

An impact statement is required as per the NEMA regulations regarding the proposed development.

The regional study area is a rural economy with a narrow base. 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 negative impacts are limited in nature and scope and can be successfully mitigated by management rules and practices. It is therefore found that the project, once the recommended mitigation measures have been implemented, has a net positive impact on the social environment of the regional study area.

12 LIST OF REFERENCES

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ANNEXURE I: CENSUS OF INTERESTED AND AFFECTED PARTIES

Possible Social Impacts Within Five Kilometer Radius of the Cluster - Google Earth				
No	**Description**	**Coordinates**	**Satellite Image**	**Site Level Image**
1.	Residential	26°16'12.56" S 27°13'23.96" E		
2.	Residential 2	26°18'32.16" S 27°14'11.95" E		

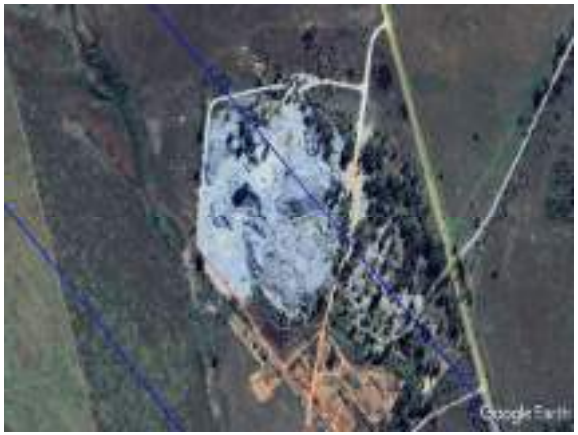
Possible Social Impacts Within Five Kilometer Radius of the Cluster - Google Earth				
No	**Description**	**Coordinates**	**Satellite Image**	**Site Level Image**
3.	Main road access point to Seelo Alpha, Seelo Beta and Seelo Charlie	26°20'05.26" S 27°14'21.53" E		 

Possible Social Impacts Within Five Kilometer Radius of the Cluster - Google Earth				
No	**Description**	**Coordinates**	**Satellite Image**	**Site Level Image**
4.	Residential 3	26°17'16.42" S 27°16'11.07" E		
5.	Residential Cluster 1	26°16'09.74" S 27°17'51.56" E		

Possible Social Impacts Within Five Kilometer Radius of the Cluster - Google Earth				
No	**Description**	**Coordinates**	**Satellite Image**	**Site Level Image**
6.	Residential Cluster 2	26°16'38.71" S 27°18'04.98" E		
7.	Residential Cluster 3	26°17'00.93" S 27°18'32.26" E		

Possible Social Impacts Within Five Kilometer Radius of the Cluster - Google Earth				
No	**Description**	**Coordinates**	**Satellite Image**	**Site Level Image**
8.	Residential Cluster 4	26°17'42.82" S 27°18'09.76" E		
9.	Farm properties	26°18'21.93" S 27°17'24.63" E		

Possible Social Impacts Within Five Kilometer Radius of the Cluster - Google Earth				
No	**Description**	**Coordinates**	**Satellite Image**	**Site Level Image**
10.	Khutsong settlement	26°20'11.15" S 27°18'15.16" E		
Possible Social Impacts Within a 100-meter buffer along the existing power line.				
13.	Clustered properties in Welverdiend along 12th Avenue	26°22'32.96" S 27°15'56.67" E		

Possible Social Impacts Within Five Kilometer Radius of the Cluster - Google Earth				
No	**Description**	**Coordinates**	**Satellite Image**	**Site Level Image**
14.	Clustered properties in Welverdiend along 1st Street.	26°23'18.51" S 27°16'20.56" E		
15	Existing Mine	26°24'53.46" S 27°17'40.36" E		

Possible Social Impacts Within Five Kilometer Radius of the Cluster - Google Earth				
No	**Description**	**Coordinates**	**Satellite Image**	**Site Level Image**
16	Existing substation	26°25'42.08" S 27°18'30.22" E		No image

APPENDIX F

DATABASE OF AUTHORITIES, STAKEHOLDERS & IAPS

Organisation	Name
NATIONAL GOVERNMENT	
Department of Forestry, Fisheries and the Environment (DFFE)	Lerato Mokoena
DFFE: Directorate: Priority Infrastructure Projects	Mmamohale Kabasa
DFFE: Directorate: Priority Infrastructure Projects	Constance Musemburi
DFFE: Directorate: Priority Infrastructure Projects	Jay-Jay Mpelane
DFFE: Directorate: Priority Infrastructure Projects	Wayne Hector
DFFE: Directorate: Priority Infrastructure Projects	Coenrad Agenbach
DFFE: Directorate: Priority Infrastructure Projects	Trisha Rene Pillay
DFFE: Directorate: Priority Infrastructure Projects	Muhammad Essop
DFFE: Biodiversity Conservation	Mmatlala Rabothata
DFFE: Biodiversity Conservation	Aulicia Maifo
DFFE: Biodiversity Conservation	Portia Makitla
DFFE: Biodiversity Conservation	Seoka Lekota
DFFE: Biodiversity Conservation	Kamogelo Mathetja
DFFE: Biodiversity Conservation	Mrs M Rabothata
Department of Water & Sanitation (DWS)	Piet Ackerman
DWS	Roets Wietsche
DWS	Sipho Skosana
DWS	Thokozani Mazibuko
DWS	Siboniso Mkhaliphi
Department of Energy	Ompi Aphane
Department of Energy	Mokgadi Mathekgana
Department of Energy	Pheladi Masipa
Department of Energy	Mthetheleli Maphinda
Department of Agriculture, Land Reform and Rural Development (DALRRD)	Anneliza Collett
DALRRD	Lesley Shadung
DALRRD	Mr. S. Ogunronbi
DALRRD	Lesley Shadung
DALRRD	Annette Geertsema
South African Heritage Resource Agency (SAHRA)	Dr Ragna Redelstorff
SAHRA	Natasha Higgitt
SAHRA	Sityhilelo Ngcatsha
National Dept of Finance	Malcolm Pautz
National Dept of Tourism	Palesa Kadi
National Dept of Tourism	Kingsley Makhubela
National Dept of Public Enterprises	Caroline Richardson / Joan Arrikum
South African Chamber of Commerce and Industry	
Dept of Land Affairs	Eddie Mohoebi
Department of Cooperative Governance	Elroy Africa
South African Local Government Association (SALGA)	William Moraka
SALGA	I Chauke
National Energy Regulator of South Africa	Andile Gxasheka
National Energy Regulator of South Africa	Bongi Masemola
South African Civil Aviation Authority (SACAA)	Lizell Stroh
SACAA	Cecile Marié Pretorius
SACAA	Gugulethu Khanyile
SACAA	Windfarm and Power Plants
Air Traffic and Navigation Services (ATNS)	Windfarm and Power Plants
PROVINCIAL GOVERNMENT	
Department of Economic Development, Environment, Conservation and Tourism (DEDECT)	Palesa Kadi
DEDECT	Kingsley Makhubela
DEDECT	Khumoetsile Molatlhegi
DEDECT	Lufuno Tshikovhi
DEDECT	Abbey Tlaletsi
DEDECT	Lufuno Tshikovhi
Department of Water and Sanitation: North-West (DWS)	Dr TP Ntili
North West Provincial Heritage Resources Authority (NWPHRA)	Mosiane Mothlabane
Department of Mineral Resources and Energy (DMRE)	Pumudzo Nethwadzi
DMRE	Wesi
Department of Infrastructure Development	Brian Setswambung
Department of Infrastructure Development	Sello Tatai
Department of Public Works and Roads	Pakiso Mothupi
Department of Public Works and Roads	Moatlhodi Seditl
Department of Public Works and Roads	Collette Anthony
Department of Public Works and Roads	Dintle Brenda Tumagole
Department of Social Development	Dikeledi Mothobi
Department of Culture, Arts and Traditional Affairs	Nono Bapela
Department of Agriculture and Rural Development	Poncho Mokaila
Department of Agriculture and Rural Development	Harry Maphutha
Department of Agriculture and Rural Development	Linda Page
Department of Agriculture and Rural Development	Joel Mamabolo
LOCAL GOVERNMENT	
JB Marks Local Municipality	Ishmael Moilwa
JB Marks Local Municipality	Ishmae M
JB Marks Local Municipality	Lunkile Linky
JB Marks Local Municipality	Mogorosi John Moyo
JB Marks Local Municipality	Kopanelo,M
JB Marks Local Municipality	K,B
JB Marks Local Municipality	Modise Molefe
JB Marks Local Municipality	Israel N
JB Marks Local Municipality	D,S
JB Marks Local Municipality	Gideon Moremedi
Dr Kenneth Kaunda District Municipality	Ms Madillo Maria
Dr Kenneth Kaunda District Municipality	T Tshukudu
Dr Kenneth Kaunda District Municipality	Mr Tebogo Chanda
Dr Kenneth Kaunda District Municipality	Ronnie Masopha
Dr Kenneth Kaunda District Municipality	Flora
Dr Kenneth Kaunda District Municipality	Ms Matlakala Irene Matthews

Organisation	Name
PARASTATAL, BUSINESS & COMMERCE	
Eskom	John Geeringh
Eskom	Earl Daniels
Eskom	Rene De Bruin
Eskom	Lungile Motsisi
Eskom	Jacob Madumo
Eskom	Linda van Deventer
Eskom	Lebohang Motoai
Eskom	Jacob Madumo
Eskom	Dimakatso Monatisa
Eskom	Belinda Jonasi
Transnet	Sarie Lombard
Transnet	Andre Bodenstein
Transnet Pipelines	Thami Hadebe
Transnet	Raymond Lehloma
Transnet Corporate	Vincent Matabane
Transnet Property BLM	Keneuwe Mabe
Transnet Freight Rail	Maureen Kunene
Transnet Freight Rail	Gideon Ackermann
Transnet Freight Rail	Nsumbulana Mtsenga
Transnet Freight Rail	Maureen Kunene
Transnet Freight Rail	Nsumbulana Mtsenga
Transnet Freight Rail	Yolanda Potgieter
Transnet Freight Rail	Zanele Manyathi
Transnet	Andiswa Njonga
Transnet: Radio Communication	Herman Coetzee
South African National Roads Agency SOC Ltd	C Landman
South African National Roads Agency SOC Ltd	Thobile Duma
South African National Roads Agency SOC Ltd	Nicole Abrahams
South African National Roads Agency SOC Ltd	Nelis Brink
South African National Roads Agency SOC Ltd	Judy Marx
South African National Roads Agency SOC Ltd	Thobile Duma
Telkom	
Openserve	Greg Green
Telkom	Ben Roestof
Telkom	Mantwa Aletta Gabaitumele
MTN	Justice Molebatsi
MTN	Dennis Govender
Vodacom	Hennie Barnard
Altech Netstar	Frans Swart
Sentech	Johan Koegelenberg
Sentech	Serame Motlhake
SA Weater Service	Rydall Jardine
AGRICULTURAL SECTOR	
Agri SA	Janse Rabie
Agri NW	Boeta du Toit
Grain SA	Jaap van der Westhuizen
ENERGY SECTOR	
Sustainable Energy Society of Southern Africa	Christoph Kausch
Southern African Alternative Energy Association	Alwyn Smith
South African Photovoltaic Industry Association (SAPVIA)	Niveshen Govender
SAPVIA	Wido Schnabel
SAPVIA	Kim Thomas
SAPVIA	Pierre Nothard
ENVIRONMENTAL & TOURISM SECTOR	
The Endangered Wildlife Trust (EWT)	Dr Ian Little
EWT	Constant Hoogstad
WESSA	Delana Eksteen
WESSA	Morgan Griffiths
WESSA	Suzanne Erasmus
Birdlife South Africa	Hanneline Smit-Robinson
Birdlife South Africa	Daniel Marnewick
Birdlife South Africa	Simon Gear
Birdlife South Africa	Samantha Ralston
SANBI	John Dini
SANBI	Kristal Maze
South African Bat Assessment Association	Kate MacEwan
Project Vulture	
GENERAL	
Square Kilometre Array	Dr Adrian Tiplady
Square Kilometre Array	Selaelo Matlhane
Square Kilometre Array	Tshegofatso Monama
Square Kilometre Array	Vivienne Rowland
Square Kilometre Array	Alice Pienaar-Marais
Square Kilometre Array	Angelo Syce
South African Radio Astronomy Observatory (SARAO)	Rob Adam
Johannesburg Skydiving Club	

Name	Organisation
JP van der Merwe	Afriforum Fochville
Caryn Clarke	G7 Renewable Energies (Pty) Ltd

Project Component	Farm Name / Township	Portion	Owner
Beta			
PV Site	Farm 96 (Rooipan)	Portion 1	Lightfoot Family Trust
Adjacent	Farm 96 (Rooipan)	Portion 2	Adrian and Sandra Vermaak
Adjacent	Farm 58 Leeuwpan	Portion 2	LIGHTFOOT FAMILY TRUST
Adjacent	Farm 97 Welverdiend	Portion 27	FAR WEST RAND DOLOMITIC WATER ASSOC
Adjacent	Farm 97 Welverdiend	Portion 26	FAR WEST RAND DOLOMITIC WATER ASSOC
Adjacent	Farm 97 Welverdiend	Portion 25	ULUSABA SAWMILL CC
Adjacent	Farm 97 Welverdiend	Portion 24	FAR WEST RAND DOLOMITIC WATER ASSOC
Adjacent	Farm 96 Rooipan	Portion 6	LIGHTFOOT FAMILY TRUST
Adjacent	Farm 96 Rooipan	Portion 3 RE	SECOND EMPIRE INV 38 PTY LTD
Adjacent	Farm 96 Rooipan	Portion 5 RE	CORNELIUS HERMANUS MEYER
Adjacent	Farm 96 Rooipan	Portion 0 RE	NDITSHENI HERMAN NETSHIDZIVHANI

APPENDIX G

COMMENTS AND RESPONSES REPORT

PROPOSED SEELO BETA 240MW SOLAR PHOTOVOLTAIC (PV) AND BATTERY ENERGY STORAGE SYSTEM (BESS) PROJECT NEAR THE TOWN OF CARLETONVILLE, NORTH WEST PROVINCE

COMMENTS AND RESPONSES REPORT

FINAL SCOPING REPORT

MAY 2023

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3 COMMENTS AND RESPONSES REPORT 1
4 COMMENTS AND RESPONSES – DRAFT SCOPING REPORT REVIEW PHASE 2

1 INTRODUCTION

Seelo Beta Solar PV (RF) (Pty) Ltd (the Applicant) has proposed the development of the Seelo Beta 240MW Solar PV Project and BESS near the town of Carletonville, in the North West Province (the "Project"). The electricity generated by the Project will be injected into the existing Eskom 132 kV distribution system.

The Applicant intends to bid for the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows.

2 SCOPING AND ENVIRONMENTAL IMPACT REPORTING PROCESS

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

The process for seeking authorisation is being undertaken in accordance with Government Notice No. R. 982 of 4 December 2014 (as amended). Based on the types of activities involved, the requisite environmental assessment for the Project is a Scoping and Environmental Impact Reporting (S&EIR) Process.

Nemai Consulting was appointed by the Applicant as the Environmental Assessment Practitioner (EAP) to undertake the S&EIR Process for the proposed Project.

3 COMMENTS AND RESPONSES REPORT

This Comments and Responses Report (CRR), which accompanies the final Scoping Report, serves to record the comments received from authorities and Interested and Affected Parties (I&APs) during the:

- Draft Scoping Report Review Phase.

This CRR also attempts to address these comments through responses and input provided by the Applicant, project team, EAP and environmental specialists (as relevant).

The following is noted:

- The CRR will be updated during the course of the S&EIR process.
- All written comments received are included verbatim in the CRR.

4 COMMENTS AND RESPONSES – DRAFT SCOPING REPORT REVIEW PHASE

The draft Scoping Review Phase, which was undertaken from 14 April until 15 May 2023, served to obtain comments from authorities and I&APs regarding the proposed Project through the review of the draft Scoping Report, to understand potential concerns and to guide the environmental assessment.

No.	COMMENT / QUERY / ISSUE	RAISED BY	SOURCE	RESPONSE BY	RESPONSE
1.	14/12/16/3/3/2/2342 ACKNOWLEDGEMENT OF RECEIPT OF THE NEW APPLICATION AND DRAFT SCOPING REPORT FOR ENVIRONMENTAL AUTHORISATION FOLLOWING A SCOPING ASSESSMENT PROCESS FOR THE PROPOSED SEELO BETA 240 MW SOLAR PHOTOVOLTAIC (PV) & BATTERY ENERGY STORAGE SYSTEMS (BESS) PROJECT NEAR THE TOWN OF CARLETONVILLE, NORTH WEST PROVINCE. The Department confirms having received the Application form and Draft Scoping Report for Environmental Authorisation for the abovementioned project on 31 March 2023. You have submitted these documents to comply with the Environmental Impact Assessment (EIA) Regulations, 2014, as amended. Kindly note that your application for Environmental Authorisation falls within the ambit of an application applied for in terms of Part 3 of Chapter 4 of the EIA Regulations, 2014, as amended. You are therefore referred to Regulation 21 of the EIA Regulations, 2014 as amended. Please take note of Regulation 40(3) of the EIA Regulations, 2014, as amended, which states that potential Interested & Affected Parties, including the Competent Authority, may be provided with an opportunity to comment on reports and plans contemplated in Regulation 40(1) of the EIA Regulations, 2014, as amended, prior to the submission of an application but must be provided an opportunity to comment on such reports once an application has been submitted to the Competent Authority. Note that in terms of Regulation 45 of the EIA Regulations, 2014, as	EIA Applications (DFFE: Integrated Environmental Authorisations)	Email (03/04/2023)		

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	amended, this application will lapse if the applicant fails to meet any of the time-frames prescribed in terms of these Regulations, unless an extension has been granted by the Department in terms of Regulation 3(7) of the EIA Regulations, 2014, as amended. You are hereby reminded of Section 24F of the National Environmental Management Act, Act No. 107 of 1998, as amended, that no activity may commence prior to an Environmental Authorisation being granted by the Department. Kindly quote the abovementioned reference number in any future correspondence in respect of the application.				
2.	Please send me KMZ files of the affected properties and proposed development footprint and grid connection. Please find attached Eskom requirements for work at or near Eskom infrastructure and servitudes, as well as a setbacks guideline for renewable energy developments. Kind regards	J. Geeringh (Senior Consultant Environmental Management – Eskom Transmission Division)	Email (14/04/2023)	Nemai Consulting	Good day John Thank you for your e-mail and response. Please see attached KMZ of the proposed Seelo PV cluster and planned access points. Note that the grid connection does not form part of the current application for Environmental Authorisation (EA). The proposed grid connection route is still being finalised. Please let me know if you have any queries. Best Regards
3.	Water use authorisation required where necessary in regulated area of a watercourse Regards	P. Ackerman (DWS WAII)	Email (14/04/2023)	Nemai Consulting	Thank you for your e-mail and response. Your e-mail is acknowledged, and content noted. Best Regards
4.	Your wayleave application dated 14 April 2023 has reference. Transnet Pipelines, a division of Transnet SOC Limited, is not affected by the proposal. Your awareness of the existence of Transnet's pipeline servitudes and concern for their integrity is highly appreciated.	MT Hadebe (Transnet Pipelines)	Email (14/04/2023)	Nemai Consulting	Dear Thami Thank you for your e-mail and response. Your e-mail is acknowledged and content noted. Best Regards

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	This authorisation shall be valid for 48 months from the date - 14 April 2023. Yours Sincerely				
5.	Kindly send us the kmz or kml files of the planned facilities for processing and approval. Regards,	Serame Motlhake (Sentech)	Email (15/04/2023)	Nemai Consulting	Dear Serame Thank you for your e-mail and response. Please see attached KML of the proposed Seelo PV cluster and planned access points. Please let me know if you have any queries. Best Regards
6.	Good day, I would like to register as an I&AP for all three proposed projects near Carletonville: 1.PROPOSED SEELO ALPHA 240MW SOLAR PHOTOVOLTAIC (PV) AND BATTERY ENERGY STORAGE SYSTEM (BESS) PROJECT NEAR THE TOWN OF CARLETONVILLE, NORTH WEST PROVINCE Ref 4/12/16/3/3/2/2343 2.PROPOSED SEELO BETA 240MW SOLAR PHOTOVOLTAIC (PV) AND BATTERY ENERGY STORAGE SYSTEM (BESS) PROJECT NEAR THE TOWN OF CARLETONVILLE, NORTH WEST PROVINCE Ref 14/12/16/3/3/2/2342 3.PROPOSED SEELO CHARLIE 140MW SOLAR PHOTOVOLTAIC (PV) AND BATTERY ENERGY STORAGE SYSTEM (BESS) PROJECT NEAR THE TOWN OF CARLETONVILLE, NORTH WEST PROVINCE 14/12/16/3/3/2/2341	JP vd Merwe (Fochville Afriforumtak)	Email (16/04/2023)	Nemai Consulting	Dear JP Thank you for your email. We will include your particulars in our database of I&APs and will keep you posted as these respective EIA processes unfold.
7.	Can you please send the details of this development in KML format for assesment?	W. Du Rant (Manager – Radio Planning and Quality: MTN)	Email (17/04/2023)	Nemai Consulting	Good day Wouter Thanks for your e-mail and feedback. Please see attached KML of the proposed Seelo PV cluster and planned access points. Please let me know if you have any queries.

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					Best Regards
8.	Could I please request that Caryn Clarke with email address eia@g7energies.com be registered as an I&AP for the proposed Seelo Alpha, Seelo Beta, Seelo Charlie Solar and BESS Projects (1 and 2). Could you also please send through any relevant documents and reply with confirmation of registration. Thank you very much.	Shonese Bloy (Environmental Intern -G7 Renewable Energies)	Email (19/04/2023)	Nemai Consulting	Dear Shonese Thank you for your e-mail and request. Please note that Caryn Clarke with provided e-mail address (eia@g7energies.com) have been registered as an I & AP for the proposed Seelo PV Cluster (Alpha, Beta & Charlie). Please refer to the attached documents. Best Regards
9.	Dear Sir/Madam DFFE Directorate: Biodiversity Conservation hereby acknowledge receipt of the invitation to review and comment on the project mentioned on the subject line. Kindly note that the project has been allocated to Mrs M Rabothata and Mr K Mathetja (Both copied on this email). In addition, kindly share the shapefiles of the development footprints/application site with the Case Officers. Please note: All Public Participation Process documents related to Biodiversity EIA review and any other Biodiversity EIA queries must be submitted to the Directorate: Biodiversity Conservation at Email: BCAdmin@environment.gov.za for attention of Mr Seoka Lekota Regards,	Kamogelo Mathetja (DFFE Directorate: Biodiversity Conservation)	Email (20/04/2023)	Nemai Consulting	Dear Kamogelo Thank you for your e-mail and acknowledgement of receipt. As requested, please see attached the kmz (Google Earth) file for the proposed Seelo PV cluster. Please let me know should you have any queries. Best Regards
10.	This Project does not affect Transnet land and therefore we have no objection. (The pink in the below image is Transnet land) Kind regards,	Carol Gore (Property Technician: Transnet Property)	Email (20/04/2023)	Nemai Consulting	Thank you for your e-mail and feedback. Your e-mail is acknowledged, and response noted. Best Regards
11.	RE: PROPOSED SOLAR PHOTOVOLTAIC (PV) PROJECTS NEAR CARLETONVILLE, NORTH WEST PROVINCE. SARAO has completed preliminary risk assessments with regard to the electromagnetic emissions for the above mentioned solar energy facilities and their possible impact on the Square Kilometre Array radio telescopes.	Selaelo Matlhane (Spectrum & Telecommunications Manager – SARAO)	Letter (26/04/2023)	Nemai Consulting	Thank you for the response letter provided. The receipt of the response letter is acknowledged and content noted.

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	Based on the locations of these projects, SARAO confirm that the facilities are too far to be of any risk to the SKA telescopes. Thank you for your correspondence, our office remains open to discuss any matter relating to the above.				
12.	Kindly see the SARAO response letter for the Seelo Solar PV Cluster. Regards,	Thato Nape (SARAO)	Email (02/05/2023)	Nemai Consulting	Dear Thato Thank you, we acknowledge receipt of your correspondence.
13.	Greetings I hope this email finds you well. I just want to find out if will the proposed Seelo Solar PV Cluster and associated infrastructure project affect Transnet's Railway line. Regards	Onalenna Mokoena (Transnet Freight Rail)	Email (02/05/2023)	Nemai Consulting	Dear Onalenna Thank you for your e-mail and query. Please see attached kmz file of the proposed Seelo PV cluster and access roads/points. I have also the Transportation infrastructure map. According to our information the project does not affect any railway line. Let me know should you have any queries.
14.	COMMENTS ON THE DRAFT SCOPING REPORT FOR THE PROPOSED SEELO BETA 240MW SOLAR PHOTOVOLTAIC (PV) AND BATTERY ENERGY STORAGE SYSTEMS (BESS) PROJECT NEAR THE TOWN OF CARLETONVILLE IN THE JB MARKS LOCAL MUNICIPALITY IN THE NORTH WEST PROVINCE The Application for Environmental Authorisation and the draft Scoping Report (SR) dated March 2023 and received by the Department on 31 March 2023, refer. This letter serves to inform you that the following information must be included to the final SR:	S. Malaza (DFFE Integrated Environmental Authorisations)	Letter (03/05/2023)	Nemai Consulting	Introductory section of letter. No response required.
15.	(a) Specific Comments (i) The co-ordinates in the SR must be specific to each activity and infrastructure that is proposed on the site. The co-ordinates for each corner of the solar field, substation, and battery energy storage system (BESS) must be included in the report, 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.			Nemai Consulting	(i) The footprints and co-ordinates for each development parameter will be provided in the Final Scoping Report.

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	(ii) Please provide a concise, but complete, summary and bullet list of the project description and associated infrastructure (or project scope). This must include a list of all development components and associated infrastructure. (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 final SR. (iv) The final SR must clearly provide a detailed section which addresses the site sensitivity verification requirements where a specialist assessment is required but no specific assessment protocol has been prescribed, as well as the site sensitivity verification and minimum report content requirements for all specialist assessments undertaken, which were included in the screening tool report. (v) Please provide a detailed description as well as any associated assessments related to the technology required for the Battery Energy Storage System (BESS) in the final SR. (vi) The SSVR for the Aquatic Biodiversity (Appendix E1) makes reference to a Geohydrological Report (Page 5). Kindly provide clarity in the final SR on whether a Geohydrological Study would be done for the proposed development as it is not listed as one of the specialist studies that would be undertaken for the proposed development in the draft SR (page 99). (vii) Figure 2 of the Terrestrial Biodiversity SSVR (Appendix E2) does not correspond to the map of relative terrestrial biodiversity theme sensitivity as produced by the screening tool report. Furthermore, the Terrestrial Biodiversity SSVR is said to confirm the low sensitivity rating of the screening tool report which is inaccurate as the screening tool gives the site a very high sensitivity rating for the terrestrial biodiversity theme. Please provide clarity in the final SR as to why the map (Figure 2) in the Terrestrial Biodiversity SSVR is different from the map of relative terrestrial biodiversity theme sensitivity in the screening tool report.				(ii) A summary in bullet list format of the project description and associated infrastructure is contained under Section D of the Executive Summary and under Section 9.3 (Project Overview) of the Scoping Report. (iii) The development footprints and specifications of proposed infrastructure and associated infrastructure are contained under Section 9.3.1 (Overview of Technical Details) of the Scoping Report. ((iv) Section 14.4 of the Final Scoping Report addresses the site sensitivity verification requirements. (v) A description of the technology alternatives for the Battery Energy Storage System (BESS) are provided under Section 10.4.2 of the Final Scoping Report. An assessment of the technology alternatives in terms of their advantages and disadvantages and risks involved will be provided during the EIA Phase. (vi) Clarity have been provided in the Final Scoping Report whether a Geohydrological study will be undertaken for the project. (vii) Figure 2 of the Terrestrial Biodiversity SSVR have been corrected to correspond to the map of relative terrestrial biodiversity theme sensitivity as produced by the screening too report. The Terrestrial Biodiversity SSVR have furthermore been amended to refer to the very high sensitivity rating for the terrestrial biodiversity theme as designated in terms of the screening tool report.

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16.	(b) Listed Activities (i) Kindly provide clarity on what electrical infrastructure is proposed for the proposed development that triggers Activity 11(i) of Listing Notice 1 of the EIA Regulations, 2014 as amended, is it a 132kV powerline or a 132kV substation? Please take note the applicant must be specific when describing the development/activity which the applicable listed activity relates to in the application form. (ii) Please take note that the removal of indigenous vegetation cannot trigger both Activity 27 of Listing Notice 1 and Activity 15 of Listing Notice 2 of the EIA Regulations, 2014, as amended, as Activity 27 refers to the clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation and Activity 15 of Listing Notice 2 refers to the clearance of an area of 20 hectares or more of indigenous vegetation. The activity related to the clearance of indigenous vegetation cannot trigger both these activities as the activity's thresholds are mutually exclusive to each other. Kindly update the application form in the final SR to include the applicable activity. (iii) Please ensure that all relevant listed activities are applied for, are specific and that it can be linked to the development activity or infrastructure as described in the project description. (iv) The listed activities represented in the SR, and the application form must be the same and correct. (v) If the activities applied for in the application form differ from those mentioned in the final SR, an amended application form must be submitted. (vi) Please note that the Department's application form template has been amended and can be downloaded from the following link https://www.dffe.gov.za/documents/forms.			Nemai Consulting	(i) The proposed Seelo Alpha Solar PV Facility will require the construction and operation of an on-site facility substation with a capacity of up to 132kV to facilitate the connection of the facility to the national grid. (ii) The status of vegetation on the site will be confirmed as part of the Terrestrial Biodiversity Assessment during the EIA Phase to inform the hectares of indigenous vegetation. As the size of indigenous vegetation is not fully known at this stage as well as potential changes to the layout in the EIA phase, the approach was taken to include both Activity 27 of Listing Notice 1 and Activity 15 of Listing Notice 2. The listed activity applicable will be confirmed during the EIA phase. (iii) Table 9 in the final Scoping Report reflects the triggered activities. The details of activities, as they relate to the Project, have also been elaborated on in Table 9. (iv) The listed activities represented in the final Scoping Report and the application form are the same and correct. (v) The listed activities represented in the final Scoping Report and the application form are the same and correct. (vi) The latest application form version was completed (form current as of April 2021).
17.	(c) Layout and Sensitivity Maps (i) The final SR must provide coordinate points for the proposed development site (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.			Nemai Consulting	(i) The coordinate points of the proposed development site are detailed under Section 4.2 of the final Scoping Report. (ii) The final Scoping Report include a layout map which include the following:

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	(ii) Please provide a layout map which indicates the following: a) A clear indication of the envisioned area for the proposed solar field; b) Internal roads; c) All supporting onsite infrastructure such as laydown area, guard house and control room etc. (existing and proposed); d) Substations, transformers, switching stations and inverters; e) Battery Energy Storage System; f) Connection routes (including pylon positions) to the distribution/transmission network; g) All existing infrastructure on the site, especially railway lines and roads; and h) Buildings, including accommodation. (iii) Please provide an environmental sensitivity map which indicates the following: a) The location of sensitive environmental features identified on site, e.g. CBAs, protected areas, heritage sites, wetlands, drainage lines, nesting and roosting sites, 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.				• Envisioned area for the proposed solar field/PV arrays; • Internal roads; • Areas for the construction yard/laydown and storage area • Offices; • BESS; • On site substation; • Proposed access points; and • Existing infrastructure. (iii) The layout of the proposed development footprint in relation to sensitive environmental features (including watercourses, terrestrial ecology, CBAs and ESAs, agriculture, palaeontology, etc.) is presented in various maps contained in Section 11 (Profile of the Receiving Environment) of the Scoping Report. (iv) In the above mentioned maps the layout is superimposed over the sensitive environmental features. The EIA Report will include updated sensitivity maps, based on the findings of the respective specialist studies. Buffer areas and n-go zones will also be determined as part of these studies. The EIA Report will also contain a consolidated sensitivity map. Figure 7 in the Scoping Report shows renewable energy applications within a 30km radius in relation to the Project. Cumulative impacts in terms of sensitive environmental features will be determined as part of the specialist studies, which will include mapping (as relevant).
18.	<u>(d) Alternatives</u> (i) Please provide a description of any identified alternatives for the proposed activity that are feasible and reasonable, including the advantages and disadvantages that the proposed activity or			Nemai Consulting	The alternatives considered including site, layout/design and technology alternatives are discussed under Section 10 of the final Scoping Report.

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	alternatives will have on the environment and on the community that may be affected by the activity as per Appendix 2 of GN R.982 of 2014 (as amended). (ii) Alternatively, you should submit written proof of an investigation and motivation if no reasonable or feasible alternatives exist in terms of Appendix 2.				
19.	(e) Public Participation Process (i) Please ensure that comments from all relevant stakeholders are submitted to the Department with the final SR. This includes but is not limited to the North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT), the Dr Kenneth Kaunda District Municipality, the JB Marks Local Municipality, the Department of Water and Sanitation (DWS), the South African Heritage Resources Agency (SAHRA), BirdLife SA, the Department of Mineral Resources and Energy, and the Department of Forestry, Fisheries and the Environment: Directorate Biodiversity and Conservation. (ii) Please ensure that all issues raised, and comments received during the circulation of the SR from registered I&APs and organs of state which have jurisdiction in respect of the proposed activity are adequately addressed in the final SR, including comments from this Department, and must be incorporated into a Comments and Response Report (CRR). (iii) Proof of correspondence with the various stakeholders must be included in the final SR. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments. (iv) The Public Participation Process must be conducted in terms of Regulation 39, 40, 41, 42, 43 and 44 of the EIA Regulations 2014, as amended. (v) A comments and response trail report (C&R) must be submitted with the final SR. The C&R report must incorporate all historical 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 Annexure 1 of this comments letter. Please refrain from summarising comments made by I&APs. All comments			Nemai Consulting	(i) Copies of the draft Scoping Report were provided to the following parties, which include key regulatory and commenting authorities with jurisdiction over the receiving environment: • DFFE (including Biodiversity Conservation Unit); • DEDECT; • DWS: North West Region; • Department of Mineral Resources and Energy (DMRE); • North West Department of Public Work and Roads (DPWR); • North West Provincial Heritage Resources Agency (NWPHRA); • Dr Kenneth Kaunda District Municipality; • JB Marks Local Municipality; and • BirdLife SA. (ii) Section 12.5 provides an overview of the public participation process undertaken as part of the review of the draft Scoping Report. Copies of the comments received from authorities and I&APs during the review period for the draft Scoping Report are contained in Appendix E5 of the final Scoping Report. These comments were incorporated into this CRR. (iii) Refer to Appendix F3 of the final Scoping Report for proof of notification emails and Appendix E5 for copies of all correspondence received.

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	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.				(iv) The Public Participation Process was undertaken in terms of the 2014 EIA Regulations (as amended). (v) The CRR (this document) serves to record the comments received on the draft Scoping Report. This CRR also attempts to address these comments through responses and input provided by the Applicant, project team, EAP and environmental specialists (as relevant). The CRR will be updated during the course of the S&EIR process.
20.	(f) Specialist Assessments (i) The EAP must ensure that the terms of reference for all the identified specialist studies include the following: a) A detailed description of the study's methodology; indication of the locations and descriptions of the development footprint (solar arrays) 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 Department's 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.			Nemai Consulting	(i) The terms of reference for identified specialist studies will be aligned with these requirements. (ii) Contradicting recommendations by specialists will be investigated and resolved by the EAP, in consultation with the relevant specialists. (iii) Specialist recommendations will be aligned with applicable and most recent guidelines. (iv) The Terms of Reference for the specialist studies (refer to Section 14.4.3 of the Scoping Report) indicates that all specialist reports will adhere to Appendix 6 of the EIA Regulations or to the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes (GN No. 1150 in Government Gazette No. 43855 of 30 October 2020), as relevant. The relevant specialist studies will be undertaken in accordance with the Protocols applicable to their respective environmental themes. (v) Specialist Declaration of Interest forms will indicate the scientific organisation

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	(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. (iii) Please ensure that all mitigation recommendations are in line with applicable and most recent guidelines. (iv) It is further brought to your attention that Procedures for the Assessment and Minimum Criteria for Reporting on 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. (v) 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. (vi) Please also ensure that the final SR includes the Site Verification Report as required by the relevant environmental themes and assessments. (vii) 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.				registration/member number and status of registration/membership of each specialist. (vi) Site Sensitivity Verification Reports are included under Appendix F of the final Scoping Report. (vii) Relevant specialist certificates will be attached to the relevant specialist reports.
21.	<u>(g) Cumulative Assessments</u> (i) Should there be any other similar projects within a 30km radius of the proposed development site, the cumulative impact assessment for all identified and assessed impacts 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			Nemai Consulting	Section 6.6 of the Scoping Report identifies renewable energy applications that have been made for properties that are located within a 30km radius of the PV Site, according to the SA Renewable Energy EIA Application (REEA) Database. The EIA Report will assess the cumulative impacts of these developments together with the Project. This assessment will incorporate the cumulative impacts evaluated as part of the specialist studies. A cumulative

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	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.				impact environmental statement will also be included in the EIA Report.
22.	(h) General You are further reminded to comply with Regulation 21(1) of the NEMA EIA Regulations 2014, as amended, which states that: "If S&EIR must be applied to an application, the applicant must, within 44 days of receipt of the application by the competent authority, submit to the competent authority a scoping report which has been subjected to a public participation process of at least 30 days and which reflects the incorporation of comments received, including any comments of the competent authority" You are further reminded that the final SR to be submitted to this Department must comply with all the requirements in terms of the scope of assessment and content of Scoping reports in accordance with Appendix 2 and Regulation 21(1) of the EIA Regulations 2014, as amended. Further note that in terms of Regulation 45 of the EIA Regulations 2014, as amended, this application will lapse if the applicant fails to meet any of the timeframes prescribed in terms of these Regulations, unless an extension has been granted in terms of Regulation 3(7). You are hereby reminded of Section 24F of the National Environmental Management Act, Act No. 107 of 1998, as amended, that no activity may commence prior to an Environmental Authorisation being granted by the Department.			Nemai Consulting	The Application Form and draft Scoping Report were submitted to DFFE on 31 March 2023. The 30-day public review period ended on 15 May 2023. The final Scoping Report will be submitted to the Department before the lapsing of the 44 days. As a minimum, the Scoping Report aimed to satisfy the requirements stipulated in Appendix 2 of GN No. R 982 of 4 December 2014 (as amended). Table 1 in the Scoping Report presents the document's composition in terms of the aforementioned regulatory requirements.
23.	Received, with tanks.	Cherie Rabie (Adjacent Landowner)	Email (04/05/2023)	Nemai Consulting	Good day Cherine Thanks for the confirmation of receipt. Best Regards

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24.	Good day Please note that Transnet will not be affected by this wayleave.	Banzi Mlungu (Chief Admin Official – Transnet Freight Rail)	Email (04/05/2023)	Nemai Consulting	Good day Banzi Thank you for your e-mail and feedback. Your e-mail is acknowledged, and response noted. Best Regards
25.	COMMENTS ON THE DRAFT SCOPING REPORT FOR THE PROPOSED SEELO CLUSTER SOLAR PHOTOVOLTAIC (PV) AND BATTERY ENERGY STORAGE SYSTEM (BESS) PROJECT NEAR THE TOWN OF CARLETONVILLE, NORTH WEST PROVINCE The Directorate: Biodiversity Conservation reviewed and evaluated the draft report and doesn't have any objections to the Scoping Report and the Plan of Study. However, it is recommended that the PV facilities be placed in such a way that they avoid any highly sensitive biodiversity areas. Furthermore, the layout Plan overlaid with biodiversity sensitivities must be included and submitted during the next phase of the EIA. All Public Participation Process documents related to Biodiversity EIA review and any other Biodiversity EIA queries must be submitted to the Directorate: Biodiversity Conservation at Email: BCAdmin@environment.gov.za for attention of Mr Seoka Lekota.	DFFE Directorate: Biodiversity Conservation (Mr. S. Lekota)	Letter (15/05/2023)	Nemai Consulting	The Final layout for the proposed solar PV facility and BESS project will be informed by the outcome of specialist assessments and sensitivities identified. A combined sensitivity map which include the layout map overlain over biodiversity sensitivities will be included during the EIA phase.
26.	In terms of Section 38(8) of the National Heritage Resources Act (Act 25 of 1999) Attention: WKN Windcurrent SA (Pty) Ltd P.O. Box 762 Wilderness 6560 A cluster of Proposed Solar PV Projects that are planned near Carletonville, within the JB Marks Local Municipality, North West Province. Thank you for notifying SAHRA of the proposed development of a cluster of proposed Solar PV Projects that are planned near Carletonville, within the JB Marks Local Municipality, North West Province. The proposed solar projects consists of the Seelo Charlie	South African Heritage Resources Agency (SAHRA)	Letter (15/05/2023)	Nemai Consulting	Three (3) separate applications will be created on SAHRIS for the three PV facilities (Alpha, Beta and Charlie) that form part of the Seelo PV cluster.

No.	COMMENT / QUERY / ISSUE	RAISED BY	SOURCE	RESPONSE BY	RESPONSE
	140MW Solar Photovoltaic (PV) and Battery Energy Storage System (BESS) 14/12/16/3/3/2/2341, the Seelo Beta 240MWW Solar Photovoltaic (PV) and Battery Energy Storage System (BESS) 14/12/16/3/3/2/2342 along with the Seelo Alpha 240MW Solar Photovoltaic (PV) and Battery Energy Storage System (BESS) 14/12/16/3/3/2/2343. Please note that three separate applications must be created on SAHRIS for the Solar PV project as three different Environmental Impact Assessment Applications have been undertaken. Please note that a fee is required as from 1 January 2023 for all development applications submitted on SAHRIS. Please see the following link: https://sahris.sahra.org.za/content/what-are-sahra-processing-fees-and-b Please pay the required amount of R2000 for each section 38(8) development application and upload the proof of payment (PoP) to the respective development application case. The status of the case will be changed to 'Returned to Applicant'. Once the development applications have been made on SAHRIS and the supporting documents have been attached, please change the status of the development cases to 'Submitted'. Should you have any further queries, please contact the designated official using the case number quoted above in the case header.				
27.	PROPOSED ESTABLISHMENT OF SEELO ALPHA SOLAR PV FACILITY AND ASSOCIATED INFRASTRUCTURE 1. The above matter refers. 2. We wish to advise that SENTECH SOC Ltd (“SENTECH”) has received an application from Seelo Alpha Solar PV (RF) (Pty) Ltd (“the applicant”), which plans to construct is proposing the development of three (3) solar energy facilities and associated infrastructure, as described in annexure 1, hereafter referred to as “Site”, in accordance with the provisions of Section 29(1) (b) of the Electronic Communications Act no. 36 of 2005 (“the Act”). 3. SENTECH has analysed the information provided by the applicant in accordance with the provisions of Section 29(1) (c) of the Act, and specifically the location of the site and confirm that there would be	S. Motlhake (Sentech)	Letter (12/05/2023)	Nemai Consulting	The applicant takes note of the correspondence and will adhere to all requirements and conditions, as relevant. The applicant will engage with SENTECH again prior to construction to confirm that their requirements have remained the same.

No.	COMMENT / QUERY / ISSUE	RAISED BY	SOURCE	RESPONSE BY	RESPONSE
	limited degradation of SENTECH transmitted Terrestrial UHF/VHF Television (TV), and/or FM radio services in the planned deployment area, as indicated in annexure 1. 4. SENTECH hereby grants the applicant approval to proceed with the construction of its energy project at the site subject to the following terms and conditions: 4.1 Due to the fact that the findings made by SENTECH are based on simulations and calculated on a theoretical model, using available data and assumptions where no data was provided, such findings may change at any time should any further information be made available to or come to SENTECH's attention; 4.2 At any time after the approval, and during construction of the project, should any radio transmissions be affected by construction activities, SENTECH will give the applicant 7 (seven) day's written notice to remove the cause of the interference. 4.3 Under no circumstances whatsoever will SENTECH be liable to the applicant or any third party for any damages, loss or costs, of any nature whatsoever or howsoever arising, suffered as a consequence of the aforementioned request and the applicant fully indemnify SENTECH; 4.4 SENTECH prior written consent must first be obtained before any construction activities underneath, along, across or within close proximity to SENTECH infrastructure can begin and shall comply with the applicable SENTECH guidelines relating to clearances between equipment and the proposed construction activity. Furthermore, the applicant shall clearly adhere to, and ensure all installations shall be fully compliant with the Occupational Health and Safety Act No. 85 of 1993. 5. This approval is further subject to the submitted applications boundaries or structures listed in annexure 1 hereto, the materials used, as well as the size and positioning of structures declared in the application. If the services of SENTECH or its clients is in any way compromised by a deviation or change of this submission, the applicant shall be liable for all costs to re-establish, or relocate the services, and under no circumstances whatsoever will SENTECH be liable to the applicant or any other third party for any damages, loss or costs, of any nature whatsoever or howsoever arising, suffered as a consequence. 6. This approval is valid and applicable between SENTECH and the				

No.	COMMENT / QUERY / ISSUE	RAISED BY	SOURCE	RESPONSE BY	RESPONSE
	applicant only. It does not include any approval for any of the other electronic communication operators which have current co-sharing agreements to utilise SENTECH's radio masts. 7. Any additions, amendments, additional structures to be built, or any change to the energy farm boundaries, will require a new application to SENTECH. 8. The validity of this approval is for a period of 12 (twelve) months. If construction of the designed project commences after the expiry of the twelve-month period, the application must be re-submitted to SENTECH for further evaluation and approval. 9. This approval does not imply any rights of access whatsoever to SENTECH property or use of SENTECH's access roads for construction or maintenance of the design project. Separate permission must be obtained from SENTECH in this regard. Furthermore, SENTECH reserves the right to claim damages in terms of Section 29 of the Act, for any loss or damages sustained as a result of damages to any of Sentech's electronic broadcast and communications infrastructure. 10. The applicant shall, in carrying out any work or project, take all the necessary precautions for the safety of SENTECH's employees, contractors, representatives and its property, including the radio transmitters and links on or near the site against damages as a result of construction of the applicant's energy project. 11. The applicant shall be liable for all and any direct and/or indirect, and/or consequential damages or injury that may be caused by the applicant, its contractors, subcontractors, employees, agents or representatives to any employee, contractor, representative or property of SENTECH including radio network transmitters and/or links or land which may have been disturbed shall be restored to the same condition in which it was before commencement of the construction of the energy project. 12. In no event will SENTECH, its employees, contractors, or representatives be liable to the applicant or any third party whatsoever for special, collateral, exemplary, direct, indirect, incidental, consequential or any other damages of any nature whatsoever or howsoever arising (including without limitation, loss of goodwill, loss of profits or revenues, loss of savings, loss of use,				

No.	COMMENT / QUERY / ISSUE	RAISED BY	SOURCE	RESPONSE BY	RESPONSE
	interruptions or noisiness, or injury) whether or not such damages or injury occurred prior or subsequent to, or are alleged as a result of any SENTECH radio network approved and/or not approved in terms of this letter, even if SENTECH has been advised of the possibility of such damages or injury.				

APPENDIX H

ENVIRONMENTAL MANAGEMENT PROGRAMME

APPENDIX H1: EMPr for Solar PV Plant

PROPOSED SEELO BETA 240MW SOLAR PHOTOVOLTAIC (PV) AND BATTERY ENERGY STORAGE SYSTEM (BESS) PROJECT NEAR THE TOWN OF CARLETONVILLE, NORTH WEST PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME – SOLAR PHOTOVOLTAIC PLANT

DFFE REFERENCE NO.: 14/12/16/3/3/2/2343

DRAFT

SEPTEMBER 2023

APPLICANT: SEELO BETA SOLAR PV (RF) (PTY) LTD

NEMAI CONSULTING

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Title and Approval Page

Project Name:	Proposed Seelo Beta 240MW Solar Photovoltaic (PV) and Battery Energy Storage System (BESS) Project near the town of Carletonville, North West Province
Report Title:	Environmental Management Programme - Solar Photovoltaic Plant
Authority Reference:	14/12/16/3/3/2/2343
Report Status:	Draft

Applicant:	Seelo Beta Solar PV (RF) (Pty) Ltd

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	Name	Date
Authors:	D. Henning & N. Brink	05/09/2023
Reviewed By:	N. Naidoo	05/09/2023

Amendments Page

Date:	Nature of Amendment	Amendment Number
Sep 2023	Draft for Review by Authorities and the Public	0

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DEFINITION OF KEY TERMS

Auditing	*A systematic and objective assessment of an organisation's activities and services conducted and documented on a periodic basis.*
Construction Area	*Immediate site influenced by specific construction activities, as approved by the Engineer.*
Construction Domain	*Entire footprint required for the construction of the overall project components.*
Environment	*The surroundings in which humans exist and which comprise:* • *The land, water and atmosphere of the earth.* • *Micro-organisms, plant and animal life.* • *Any part or combination of a) and b) and the interrelationships among and between them.* • *The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that can influence human health and well-being.*
Environmental Aspect	*Those components of the company's activities, products and services that are likely to interact with the environment.*
Environmental Feature	*Elements and attributes of the biophysical, economic and social environment.*
Environmental Impact	*The change to the environment resulting from an environmental aspect, whether desirable or undesirable. An impact may be the direct or indirect consequence of an activity.*
Environmental Management Programme (EMPr)	*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.*
Environmental Objective	*Overall environmental goal pertaining to the management of environmental features.*
Environmental Target	*Performance requirement that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.*
Monitoring	*A systematic and objective observation of an organisation's activities and services conducted and reported on regularly.*
Project Area	*The greater area within which the project is executed. Extends beyond the construction domain.*
Sensitive environmental features	*Environmental features protected by legislation (e.g., heritage resources), or identified during the EIA process as sensitive through specialists' findings and input received from Interested and Affected Parties.*
Watercourse	*A geomorphological feature characterized by the presence of a streamflow channel, a floodplain and a transitional upland fringe seasonally or permanently conveying surface water. According to the National Water Act (Act 36 of 1998), a watercourse constitutes a river or spring, a natural channel in which water flows regularly or intermittently, a wetland, lake or dam into which, or from which, water flows, and any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.*

1 PURPOSE OF THIS DOCUMENT

Nemai Consulting (Pty) Ltd was appointed by Seelo Beta Solar PV (RV) (Pty) Ltd (the "Applicant") to conduct the Environmental Impact Assessment (EIA) for the **Proposed Seelo Beta 240MW Solar Photovoltaic (PV) and Battery Energy Storage Systems (BESS) Project near Carletonville, 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 Environmental Management Programme (EMPr)** for the proposed Project' Solar PV Plant. This EMPr provides performance criteria required to address potential environmental impacts during the pre-construction, construction and operational phases of the proposed Project' Solar PV Plant. This report must be read in conjunction with the EIA Report.

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 environmental assessment 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:

- **Normal EMPr for the Solar PV Plant** (topic if this document);
- Generic EMPr for the development and expansion of substation infrastructure for the transmission and distribution of electricity (appended to the EIA Report).

The scope of the EMPr is as follows:

- Establish management objectives during the pre-construction, construction and operational phases in order to enhance benefits and manage (i.e., prevent, reduce, rehabilitate and/or compensate) adverse environmental impacts;
- Provide targets for management objectives, in terms of desired performance;
- Describe actions required to achieve management objectives;
- Outline institutional structures and roles required to implement the EMPr; and
- Provide the legislative framework.

2 DOCUMENT ROADMAP

As a minimum, the EMPr aims to satisfy the requirements stipulated in Appendix 4 of the EIA Regulations. **Table 1** below presents the document's composition in terms of the aforementioned regulatory requirements.

Table 1: Document Roadmap

Chapter	Title	Correlation with Appendix 4 of G.N. No. R982	
1	**Purpose of this Document**	N/A	
2	**Document Roadmap**	N/A	
3	**Project Overview**	N/A	
4	**Environmental Assessment Practitioner**	1(a)	Details of – (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including curriculum vitae.
5	**Legislation and Guidelines Considered**	N/A	
6	**Roles & Responsibilities**	1(i)	An indication of the persons who will be responsible for the implementation of the impact management actions.
7	**Monitoring**	1(g)	The method of monitoring the implementation of the impact management actions contemplated in paragraph (f).
		1(h)	The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f).
		1(k)	The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f).
		1(l)	A programme for reporting on compliance, taking into account the requirements as prescribed by the Regulations.
8	**Environmental Training & Awareness Creation**	1(m)	An environmental awareness plan describing the manner in which - (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment.
9	**EMPr Review**	N/A	
10	**Environmental Activities, Aspects and Impacts**	1(b)	A detailed description of the aspects of the activity that are covered by the final environmental management plan.

Chapter	Title	Correlation with Appendix 4 of G.N. No. R982	
11	**Sensitive Environmental Features**	1(c)	A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.
12	**Impact Management**	1(d)	A description of impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including – (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities.
		1(f)	A description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to - (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable.
		1(j)	The time periods within which the impact management actions contemplated in paragraph (f) must be implemented.
		1(l)	A programme for reporting on compliance, taking into account the requirements as prescribed by the Regulations.
N/A		1(n)	Any specific information that may be required by the competent authority
N/A		2	Where a government notice gazetted by the Minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.

3 PROJECT OVERVIEW

3.1 Project 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.

Seelo Beta Solar PV (RF) (Pty) Ltd (the Applicant) has proposed the development of the Seelo Beta 240MW Solar PV Project and BESS near the town of Carletonville, in the North West Province (the "Project"). The electricity generated by the Project will be injected into the existing Eskom 132 kV distribution system.

The Applicant intends to bid for the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows.

3.2 Project Description

The Applicant has proposed the development of the proposed Seelo Beta 240MW Solar PV and BESS Project. The Project is located in the most eastern part of the North West Province (at the boundary between North West and Gauteng) and falls within the Dr Kenneth Kaunda District Municipality and the JB Marks Local Municipality. The site is located approximately 13km to the north-west of the town of Carletonville.

The property earmarked for the Project [Portion 1 of Farm 96 (Rooipan) IQ] covers a combined area of approximately 1130 ha, of which the buildable area determined by the engineering team is approximately 355 ha. Refer to **Figure 1** and **Figure 2** below for the locality and layout map of the preferred layout.

The technical details of the proposed Solar PV Plant are captured in **Table 2** below.

Table 2: Technical details of the proposed PV Plant

No.	Component	Description / Dimensions
1.	Location of the site	Portion 1 of Farm Rooipan 96 IQ
2.	Maximum generation capacity of facility	240MW
3.	Height of PV panels	± 1 – 6 m
4.	Area of Project (total disturbance footprint, including access road)	Total area of ± 386.5 ha
5.	Area of PV Arrays only	Total area of ± 345 ha
6.	No. of PV Modules	±500 000
7.	Number of inverters required	Approximately 55
8.	Area occupied by inverter / transformer stations / substations	Area occupied by inverter stations (± 28 inverter stations) = ± 0.5 ha Area occupied by the facility transformer stations = ± 0.5 ha Area occupied by facility (step-up/switching) substation = ± 3 ha
9.	Capacity of on-site substation	33/132 kV
10.	Area occupied by both permanent and construction laydown areas	Construction laydown areas = ± 2 ha Operation & Maintenance infrastructure = ± 1 ha Total combined = ± 3 ha
11.	BESS Footprint	BESS = ± 3 ha
12.	Buildings	± 3 ha Including Operational Control Centre, Operation and Maintenance Area / Warehouse / Workshop and Office, Ablution Facilities and Substation Building
13.	Length of internal roads	± 11 km
14.	Width of roads	The internal roads = 12 m reserve and road width of 6 m. Access roads = 14 m reserve and road width of 8 m.
15.	Proximity to grid connection	Approximately 12.5 km 132 kV transmission line from PV Site to existing Eskom's Carmel Main Transmission Substation
16.	Height of fencing	± 3.5 m
17.	Type of fencing	Type will vary (e.g., welded mesh, palisade and electric fencing).

The project-lifecycle as well as resources and services required for construction and operation are explained in the EIA Report.

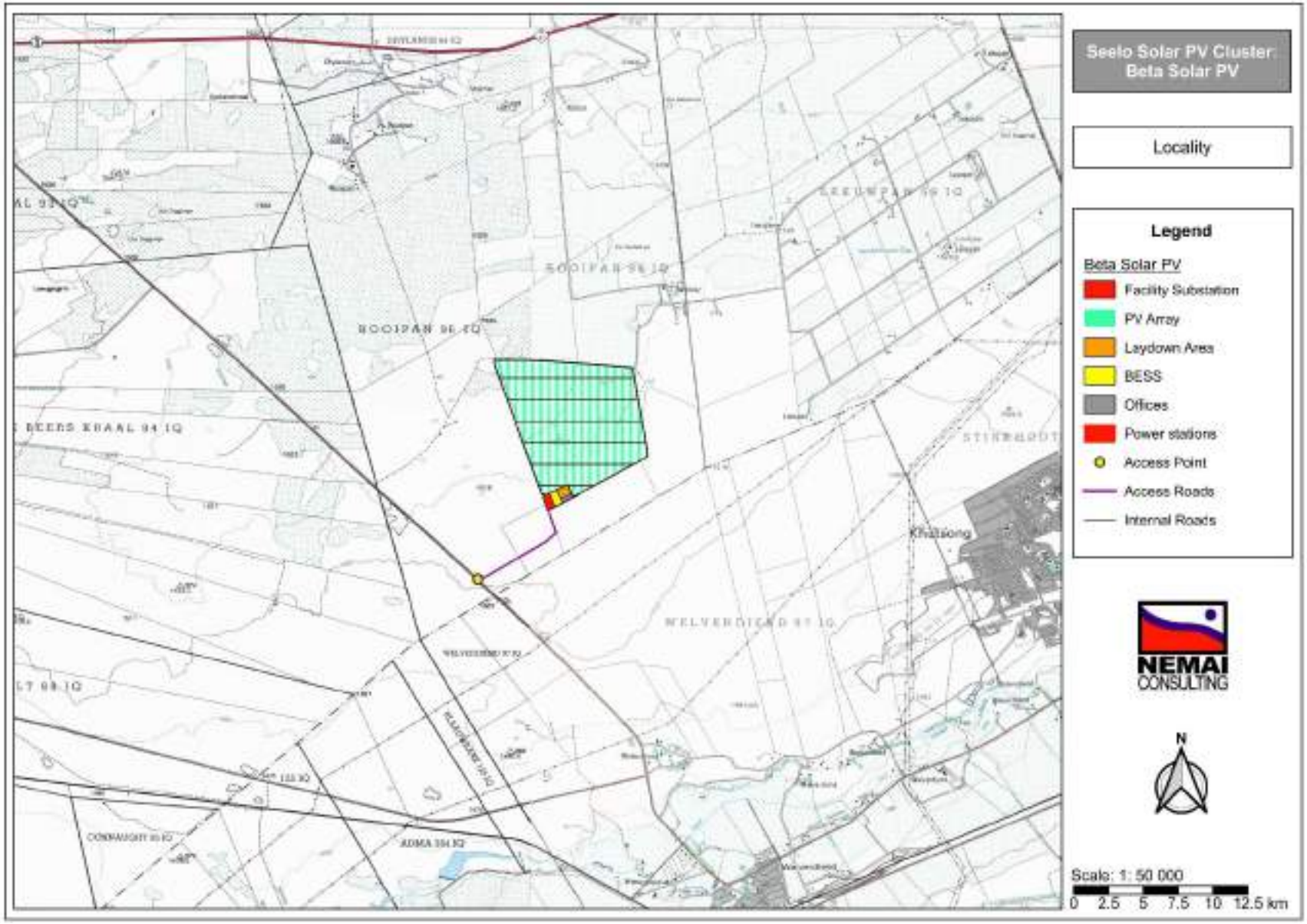

Figure 1: Locality map (preferred layout)

Figure 2: Layout map (preferred layout)

4 ENVIRONMENTAL ASSESSMENT PRACTITIONER

The details of the Environmental Assessment Practitioner (EAP) are as follows:

Name of EAP: Donavan Henning from Nemai Consulting
Professional registration: EAPASA Reg. no. 2020/1217
Tel No: 011 781 1730
Fax No: 011 781 1731
E-mail address: donavanh@nemai.co.za

The core members of Nemai Consulting that were involved with compiling the EMPr for the Project are captured in **Table 3** below, and their respective Curricula Vitae are contained in in the body of the EIA Report.

Table 3: EMPr Core Team Members

Name	Qualifications	Experience
Mr D. Henning	MSc (River Ecology)	22 years
Mr N. Brink	B.Sc (Hons) (Environmental Management)	13 years

5 LEGISLATION AND GUIDELINES CONSIDERED

5.1 Overview of Legislation

Activities during the pre-construction, construction and operational phases will be undertaken according to recognised best industry practices and will include measures prescribed within this EMPr. The EMPr shall form part of the contract documents and informs the Contractor about his duties in the fulfilment of the Project's objectives, with particular reference to the mitigation of environmental impacts that may potentially be caused by construction activities. The Contractor will note that obligations imposed by the EMPr are legally binding in terms of environmental legislation.

All Project activities must comply with all relevant South African legislation and regulations. All environmental statutory requirements should be included in the Contractors' conditions. Some of the pertinent environmental legislation that has bearing on the proposed development is captured in **Table 4** below.

Table 4: Environmental Legislative 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.
National Environmental Management Act (NEMA) (No. 107 of 1998)	▪ Key sections (amongst others): o Section 24 – Environmental Authorisation (control of activities which may have a detrimental effect on the environment). o Section 28 – Duty of care and remediation of environmental damage. ▪ Environmental management principles. ▪ Authorities – DFFE (national) (competent authority for this application) and the North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT) (provincial).
GN No. R 982 of 4 December 2014 (as amended)	▪ Purpose - regulate the procedure and criteria as contemplated in Chapter 5 of NEMA relating to the preparation, evaluation, submission, processing and consideration of, and decision on, applications for environmental authorisations for the commencement of activities, subjected to EIA, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto.
GN No. R. 983 of 4 December 2014 (as amended) (Listing Notice 1)	▪ Purpose - identify activities that would require environmental authorisations prior to commencement of that activity and to identify competent authorities in terms of sections 24(2) and 24D of NEMA. ▪ The investigation, assessment and communication of potential impact of activities must follow a Basic Assessment process, as prescribed in regulations 19 and 20 of GN No. R 982 of 4 December 2014 (as amended). However, according to Regulation 15(3) of GN No. R 982 (as amended), S&EIR must be applied to an application if the application is for two or more activities as part of the same development for which S&EIR must already be applied in respect of any of the activities. ▪ Activities under Listing Notice 1 that are relevant to this project are listed in the EIA Report.
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 Scoping and EIA process, as prescribed in regulations 21 - 24 of GN No. R 982 of 4 December 2014 (as amended). ▪ Activities under Listing Notice 2 that are relevant to this project are listed in the EIA Report.
GN No. R. 985 of 4 December 2014 (as amended) (Listing Notice 3)	▪ Purpose - list activities and identify competent authorities under sections 24(2), 24(5) and 24D of NEMA, where environmental authorisation is required prior to commencement of that activity in specific identified geographical areas only. ▪ The investigation, assessment and communication of potential impact of activities must follow a Basic Assessment process, as prescribed in regulations 19 and 20 of GN No. R 982 of 4 December 2014 (as amended). However, according to Regulation 15(3) of GN No. R 982 (as amended), S&EIR must be applied to an application if the application is for two or more activities as part of the same development for which S&EIR must already be applied in respect of any of the activities. ▪ No activities under Listing Notice 3 are relevant to this Project.

Legislation	Description and Relevance
National Water Act (NWA) (Act No. 36 of 1998)	▪ Sustainable and equitable management of water resources. ▪ Key sections (amongst others): o Chapter 3 – Protection of water resources. o Section 19 – Prevention and remedying effects of pollution. o Section 20 – Control of emergency incidents. o Chapter 4 – Water use. ▪ Authority – Department of Water and Sanitation (DWS).
National Environmental Management Air Quality Act (NEM:AQA) (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), DESTEA (provincial) and municipality.
National Environmental Management: Biodiversity Act (NEM:BA) (Act No. 10 of 2004)	▪ Management and conservation of the country's biodiversity. ▪ Protection of species and ecosystems. ▪ Authorisation type – Permit (*not required for the Project*). ▪ Authority – DFFE (national) and DEDECT (provincial).
National Environmental Management: Waste Act (NEM:WA) (Act No. 59 of 2008)	▪ Management of waste. ▪ Chapter 5 – licensing requirements for listed waste activities - GN No. R. 921 of 29 November 2013 (as amended). ▪ Authorisation type – Waste Management Licence (*not required for the Project*) ▪ Authority – DFFE (national) and DESTEA (provincial).
National Environmental Management: Protected Areas Act (NEM:PAA) (Act No. 57 of 2003)	▪ Protection and conservation of ecologically viable areas representative of South Africa's biological diversity and natural landscapes. ▪ No protected areas are directly affected by the Project
National Forests Act (NFA) (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 – Permit (*not required for the Project*). ▪ Authority – DFFE.
Minerals and Petroleum Resources Development Act (MPRDA) (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).
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

Legislation	Description and Relevance
	▪ Provides for the division of such substances or products into groups in relation to the degree of danger. ▪ Provides for the prohibition and control of the importation, manufacture, sale, use, operation, application, modification, disposal or dumping of such substances and products.
National Heritage Resources Act (NHRA) (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 the North West Provincial Heritage Resources Authority (NW PHRA).
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 (NW DARD). ▪ *Authorisation in terms of the Act not required for the project.*

Refer to **Section 5** of the EIA Report for an overview of the relationship between the proposed Project and certain key pieces of environmental legislation.

5.2 Method Statements

The Contractor shall provide detailed method statements on how the performance criteria in the EMPr will be met. These method statements are to be reviewed and approved by the Engineer to ensure that they are adequate.

The method statements must be project-specific and should explain in detail the following:

1. The manner in which the work is to be undertaken;
2. The estimated schedule for the works (timing);
3. The area where the works will be executed (location);
4. The materials and plant / equipment needed for the works;
5. The necessary mitigation measures that need to be implemented to adequately safeguard the environment, construction workers and the public (where applicable);
6. Training of employees;
7. Roles and responsibilities; and
8. Monitoring and reporting requirements.

The list of method statements required to assist in the implementation of this EMPr includes (where applicable):

- Method Statement for site clearing;
- Method Statement for establishing the construction camp;
- Method Statement with regard to waste and wastewater management;
- Method Statement to show procedures for dealing with possible emergencies that can occur, such as fire and accidental leaks and spillage of carbon fuels and oils;
- Method Statement for dust control;
- Method Statement for the storage and handling of hazardous substances;
- Method Statement for management of concrete and batching plants;
- Method Statement for managing spoil material;
- Method Statement for controlling alien invasive species and noxious weeds;
- Method Statement for the decommissioning of the construction works area;
- Method Statement for rehabilitation of construction footprint;
- Method Statement for the management of stormwater and erosion; and
- Method statement for managing traffic safety.

Note that the method statements are contractual requirements between the proponent and the Contractor and therefore not subject to approval by DFFE.

6 ROLES & RESPONSIBILITIES

As mentioned, a generic EMPr were compiled for the substation in accordance with GN No. 435 of 22 March 2019. For the sake of consistency, and to facilitate the implementation of multiple EMPr's, the roles and responsibilities contained in the generic EMPr's were adopted for the PV Plant's EMPr. These roles and responsibilities and captured in **Table 5** below.

It is noted that if no specific person, for example, an Environmental Control Officer (ECO) is appointed, the holder of the Environmental Authorisation (EA) remains responsible for ensuring that the duties indicated in this document for action by the ECO are undertaken.

Table 5: Guide to roles and responsibilities for implementation of an EMPr

Responsible Person	Role and Responsibilities
Developer's Project Manager (DPM)	Role The DPM is accountable for ensuring compliance with the EMPr and any conditions of approval from the competent authority (CA). Where required, an Environmental Control Officer (ECO) must be contracted by the Project Developer to objectively monitor the implementation of the EMPr according to relevant environmental legislation, and the conditions of the Environmental Authorisation (EA). The DPM is further responsible for providing and giving mandate to enable the ECO to perform responsibilities, and he must ensure that the ECO is integrated as part of the project team while remaining independent. Responsibilities - Be fully conversant with the conditions of the EA; - Ensure that all stipulations within the EMPr are communicated and adhered to by the Developer and its Contractor(s); - Issuing of site instructions to the Contractor for corrective actions required; - Monitor the implementation of the EMPr throughout the project by means of site inspections and meetings. Overall management of the project and EMPr implementation; and - Ensure that periodic environmental performance audits are undertaken on the project implementation.
Developer Site Supervisor (DSS)	Role The DSS reports directly to the DPM, oversees site works, liaises with the contractor(s) and the ECO. The DSS is responsible for the day-to-day implementation of the EMPr and for ensuring the compliance of all contractors with the conditions and requirements stipulated in the EMPr. Responsibilities - Ensure that all contractors identify a contractor's Environmental Officer (cEO); - Must be fully conversant with the conditions of the EA. Oversees site works, liaison with Contractor, DPM and ECO; - Must ensure that all landowners have the relevant contact details of the site staff, ECO and cEO; - Issuing of site instructions to the Contractor for corrective actions required; - Will issue all non-compliances to contractors; and - Ratify the Monthly Environmental Report.
Environmental Control Officer (ECO)	Role The ECO should have appropriate training and experience in the implementation of environmental management specifications. The primary role of the ECO is to act as an independent quality controller and monitoring agent regarding all environmental concerns and associated environmental impacts. In this respect, the ECO is to conduct periodic site inspections, attend regular site meetings, pre-empt problems and

Responsible Person	Role and Responsibilities
	suggest mitigation and be available to advise on incidental issues that arise. The ECO is also required to conduct compliance audits, verifying the monitoring reports submitted by the cEO. The ECO provides feedback to the DSS and Project Manager regarding all environmental matters. The Contractor, cEO and dEO are answerable to the Environmental Control Officer for non- compliance with the Performance Specifications as set out in the EA and EMPr. The ECO provides feedback to the DSS and DPM, who in turn reports back to the Contractor and potential and Registered Interested and Affected Parties (RI&AP's), as required. Issues of non-compliance raised by the ECO must be taken up by the DPM, and resolved with the Contractor as per the conditions of his contract. Decisions regarding environmental procedures, specifications and requirements which have a cost implication (i.e., those that are deemed to be a variation, not allowed for in the Performance Specification) must be endorsed by the Project Manager. The ECO must also, as specified by the EA, report to the relevant Competent Authority (CA) as and when required. <u>Responsibilities</u> The responsibilities of the ECO will include the following: - Be aware of the findings and conclusions of all EA related to the development; - Be familiar with the recommendations and mitigation measures of this EMPr; - Be conversant with relevant environmental legislation, policies and procedures, and ensure compliance with them; - Undertake regular and comprehensive site inspections / audits of the construction site according to the generic EMPr and applicable licenses in order to monitor compliance as required; - Educate the construction team about the management measures contained in the EMPr and environmental licenses; - Compilation and administration of an environmental monitoring plan to ensure that the environmental management measures are implemented and are effective; - Monitoring the performance of the Contractors and ensuring compliance with the EMPr and associated Method Statements; - In consultation with the Developer Site Supervisor order the removal of person(s) and/or equipment which are in contravention of the specifications of the EMPr and/or environmental licenses; - Liaison between the DPM, Contractors, authorities and other lead stakeholders on all environmental concerns; - Compile a regular environmental audit report highlighting any non-compliance issues as well as satisfactory or exceptional compliance with the EMPr; - Validating the regular site inspection reports, which are to be prepared by the contractor Environmental Officer (cEO); - Checking the cEO's record of environmental incidents (spills, impacts, legal transgressions etc) as well as corrective and preventive actions taken; - Checking the cEO's public complaints register in which all complaints are recorded, as well as action taken;

Responsible Person	Role and Responsibilities
	- Assisting in the resolution of conflicts; - Facilitate training for all personnel on the site – this may range from carrying out the training, to reviewing the training programmes of the Contractor; - In case of non-compliances, the ECO must first communicate this to the Senior Site Supervisor, who has the power to ensure this matter is addressed. Should no action or insufficient action be taken, the ECO may report this matter to the authorities as non-compliance; - Maintenance, update and review of the EMPr; and - Communication of all modifications to the EMPr to the relevant stakeholders.
developer Environmental Officer (dEO)	<u>Role</u> The dEOs will report to the DPM and are responsible for implementation of the EMPr, environmental monitoring and reporting, providing environmental input to the Project Manager and Contractor's Manager, liaising with contractors and the landowners as well as a range of environmental coordination responsibilities. <u>Responsibilities</u> - Be fully conversant with the EMPr; - Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures; - Ensure that all stipulations within the EMPr are communicated and adhered to by the Employees, Contractor(s); - Confine the development site to the demarcated area; - Conduct environmental internal audits with regards to EMPr and authorisation compliance (on cEO); - Assist the contractors in addressing environmental challenges on site; - Assist in incident management: - Reporting environmental incidents to developer and ensuring that corrective action is taken, and lessons learnt shared; - Assist the contractor in investigating environmental incidents and compile investigation reports; - Follow-up on pre-warnings, defects, non-conformance reports; - Measure and communicate environmental performance to the Contractor; - Conduct environmental awareness training on site together with ECO and cEO; - Ensure that the necessary legal permits and / or licenses are in place and up to date; and - Acting as Developer's Environmental Representative on site and work together with the ECO and contractor.
Contractor	<u>Role</u> The Contractor appoints the cEO and has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract are in line with the EMPr and that Method Statements are implemented as described. External contractors must ensure compliance

Responsible Person	Role and Responsibilities
	with this EMPr while performing the onsite activities as per their contract with the Project Developer. The contractors are required, where specified, to provide Method Statements setting out in detail how the impact management actions contained in the EMPr will be implemented during the development or expansion for overhead electricity transmission and distribution infrastructure activities. Responsibilities - Project delivery and quality control for the development services as per appointment; - Employ a suitably qualified person to monitor and report to the Project Developer's appointed person on the daily activities on-site during the construction period; - Ensure that safe, environmentally acceptable working methods and practices are implemented and that equipment is Properly operated and maintained, to facilitate proper access and enable any operation to be carried out safely; - Attend on site meeting(s) prior to the commencement of activities to confirm the procedure and designated activity zones; - Ensure that contractors' staff repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in EMPr, to the satisfaction of the ECO.
contractor Environmental Officer (cEO)	Role Each Contractor affected by the EMPr should appoint a cEO, who is responsible for the on-site implementation of the EMPr (or relevant sections of the EMPr). The Contractor's representative can be the site agent; site engineer; a dedicated environmental officer; or an independent consultant. The Contractor must ensure that the Contractor's Representative is suitably qualified to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the ECO and the public. As a minimum the cEO shall meet the following criteria: Responsibilities - Be on site throughout the duration of the project and be dedicated to the project; - Ensure all their staff are aware of the environmental requirements, conditions and constraints with respect to all of their activities on site; - Implementing the environmental conditions, guidelines and requirements as stipulated within the EA, EMPr and Method Statements; - Attend the Environmental Site Meeting; - Undertaking corrective actions where non-compliances are registered within the stipulated timeframes; - Report back formally on the completion of corrective actions; - Assist the ECO in maintaining all the site documentation; - Prepare the site inspection reports and corrective action reports for submission to the ECO; - Assist the ECO with the preparing of the monthly report; and

Responsible Person	Role and Responsibilities
	- Where more than one Contractor is undertaking work on site, each company appointed as a Contractor will appoint a cEO representing that company.

7 MONITORING

Monitoring is required to ensure that the receiving environment is suitably safeguarded against the identified potential impacts, and to ensure that the environmental management requirements are adequately implemented and adhered to during the execution of the Project.

7.1 Baseline Monitoring

7.1.1 General

Baseline monitoring aims to determine the pre-construction state of the receiving environment and serves as a reference to measure the residual impacts of the Project by evaluating the deviation from the baseline conditions and the associated significance of the adverse effects.

7.1.2 Preconstruction (walk-down) Survey

A pre-construction survey needs to be conducted for all areas that are to be affected by construction activities. The survey needs to include the following:

- Site investigations by appropriate members of the project team and specialists (as relevant);
- Generate records from survey which include site details, photographs, explanatory notes, etc. (as required);
- Record the condition of existing structures and infrastructure on the site; and
- Identify site-specific mitigation measures.

The records from the pre-construction survey must be used to establish and inform the reinstatement and rehabilitation requirements for the affected areas.

7.1.3 Environmental Parameters

The environmental parameters to be included in the baseline monitoring are shown in **Table 6** below.

Table 6: Baseline Monitoring

Environmental Parameter	Monitoring Locations	Requirements
Air Quality	Dust fallout units to be located taking into consideration significant sources of air pollution, sensitive receptors, and dominant wind direction.	Dust fallout – comply with ASTM D1739; SANS 1929, SANS 69.
Noise	Noise monitoring sampling sites to be located taking into consideration significant sources of noise, sensitive receptors and dominant wind	Comply with SANS 10103:2008.

Environmental Parameter	Monitoring Locations	Requirements
	direction. Sites to coincide with dust fallout sites (where relevant).	

7.2 Environmental Monitoring

Environmental monitoring entails checking, at pre-determined frequencies, whether thresholds and baseline values for certain environmental parameters are being exceeded. The parameters and sampling localities used during the baseline monitoring will form the basis of the environmental monitoring programme.

The environmental parameters to be included as part of the environmental monitoring programme, which is to be undertaken by the Contractor during the construction phase, are listed in **Table 6** above.

The following requirements need to be incorporated into the programme:

- Monitoring during normal operations, abnormal situations and emergency situations;
- Measuring equipment must be accurately calibrated;
- Adequate quality control of the sampling must be ensured;
- Certified methods of testing must be employed;
- Where legal specifications exist for testing and sampling methods, these must be considered; and
- Establish a process for identifying and implementing corrective measures.

7.3 Compliance Monitoring and Auditing

Compliance monitoring will commence in the pre-construction phase, where those conditions in the EA that need to be adhered to prior to Project implementation will need to be checked and recorded, as well as to check compliance with the provisions in the EMPr. Compliance monitoring will be completed at the end of the defects liability period to check the performance of rehabilitation measures and whether the related objectives have been met.

It is recommended that the ECO undertake monthly monitoring and bi-annual full compliance auditing, including an audit at the end of construction and one at the end of the defects notification period.

Auditing of compliance with the EA and EMPr must be conducted in accordance with Regulation 34 of the EIA Regulations in terms of the following:

1. The holder of the EA must, for the period during which the EA and EMPr remain valid -
   a. Ensure that the compliance with the conditions of the EA and EMPr is audited; and
   b. Submit an environmental audit report to DFFE.
2. The environmental audit report must -
   a. Be prepared by an independent person with the relevant environmental auditing expertise;
   b. Provide verifiable findings, in a structured and systematic manner, on -

   i. The level of performance against and compliance of an organization or project with the provisions of the requisite EA and EMPr; and
   ii. The ability of the measures contained in the EMPr to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity;
c. Contain the information set out in Appendix 7 of the EIA Regulations; and
d. Be conducted and submitted to DFFE at intervals as indicated in the EA.

3. The environmental audit report must determine-
   a. The ability of the EMPr to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity on an ongoing basis and to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the closure of the facility; and
   b. The level of compliance with the provisions of the EA and EMPr.

A document handling system must be established to ensure accurate updating of EMPr documents, and availability of all documents required for the effective functioning of the EMPr.

Supplementary EMPr documentation could include:

- Method Statements;
- Site instructions;
- Emergency preparedness and response procedures;
- Record of environmental incidents;
- Non-conformance register;
- Training records;
- Site inspection reports;
- Monitoring reports;
- Auditing reports;
- Public complaints register; and
- Grievance Mechanism/Process for public and contractor/employees.

8 ENVIRONMENTAL TRAINING & AWARENESS CREATION

Training aims to create an understanding of environmental management obligations and prescriptive measures governing the execution of the project. It is generally geared towards project team members that require a higher-level of appreciation of the environmental management context and implementation framework for the project.

Awareness creation strives to foster a general attentiveness amongst the construction workforce to sensitive environmental features and an understanding of implementing environmental best practices.

The various means of creating environmental awareness during the pre-construction and construction phases of the Project may include:

- Induction course for all workers before commencing work on site;
- Refresher courses (as and when required);
- Daily toolbox talks, focusing on particular environmental issues (task- and area specific);
- Courses must be provided by suitably qualified persons and in a language and medium understood by the workers;
- Erect signage and barricading (where necessary) at appropriate points in the construction domain, highlighting sensitive environmental features (e.g. grave sites, protected trees); and
- Place posters containing environmental information at areas frequented by the construction workers (e.g. eating facilities).

Training and awareness creation will be tailored to the audience, based on their designated roles and responsibilities. Records will be kept of the type of training and awareness creation provided, as well as containing the details of the attendees.

The Contractor must compile a project-specific Environmental Training and Awareness Programme, taking into consideration the abovementioned factors, to be approved by the DPM/ECO.

9 EMPr Review

Due to its dynamic nature, this EMPr will be reviewed and revised when necessary to ensure continued environmental improvement.

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. Changes to the EMPr shall also be required where the existing system:

- Does not make adequate provision for protecting the environment against the pre-construction, construction and/or operational activities;
- Needs to be modified to meet conditions of statutory approval;
- It is not achieving acceptable environmental performance;
- Requires changes due to the outcome of a monitoring or auditing event or management review;
- Provides redundant, impracticable or ineffective management measures; and
- Based on provisions in Regulation 34 of the EIA Regulations.

The amendment of the EMPr will be undertaken in terms of Regulation 34 – 37 of the EIA Regulations, as applicable.

10 ENVIRONMENTAL ACTIVITIES, ASPECTS AND IMPACTS

10.1 Environmental Activities

10.1.1 Pre-construction Phase

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 7** below.

Table 7: 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, EA 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 Species of Conservation Concern (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 conditions of EA and EMPr

10.1.2 Construction Phase

Some of the main Project activities, as well as high-level environmental activities, to be undertaken in the construction phase are listed in **Table 8** below.

Table 8: 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
▪ 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, EA 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 conditions of EA and EMPr

10.1.3 Operation Phase

Some of the main Project activities, as well as high-level environmental activities, to be undertaken in the operational phase are listed in **Table 9** below.

Table 9: Simplified List of Activities associated with Operation 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

Project Phase: Operation
▪ 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 conditions of EA and EMPr for Operational Phase

10.2 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 10** below. Note that only high level aspects are provided.

Table 10: Environmental Aspects associated with Project Life-Cycle

Project Phase: Pre-construction
▪ Inadequate consultation with landowner and other relevant stakeholders
▪ Inadequate rehabilitation of current eroded areas
▪ 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
▪ 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

Project Phase: Construction
▪ 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
▪ Disruptions to agricultural activities
▪ Damage to cultural heritage and palaeontological features (if encountered)
▪ Poor reinstatement and rehabilitation

Project Phase: Operation
▪ 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

10.3 Potentially Significant Environmental Impacts

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

Refer to **Table 11** below for the potentially significant impacts associated with the Project's activities and environmental aspects for the construction and operational phases.

Table 11: Potentially significant environmental impacts - Construction and Operational Phases

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. ▪ Servitude restrictions.
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.	▪ 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 PV Site. ▪ Surface water pollution due to spillages and poor construction practices.	▪ Sedimentation through silt-laden runoff, caused by inadequate stormwater management. ▪ Damage to the PV facility 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.	▪ Direct and indirect economic opportunities as a result of the Project. ▪ Threats to human and animal health from electromagnetic field (on-site substation).

Environmental Factor	Construction Phase Potential Issues / Impacts	Operational Phase Potential Issues / Impacts
	▪ 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).	
Air Quality	▪ Dust from the use of dirt roads by construction vehicles. ▪ Dust from exposed 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.	▪ Setbacks / conditions associated with surrounding land and infrastructure.
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 main access 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. ▪ Safe access to and from 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.
Health	▪ Hazards related to construction work. ▪ Increased levels of dust and particulate matter. ▪ Increased levels of noise.	▪ Hazards related to operation and maintenance work. ▪ Fire and explosion risks during BESS operation.

Environmental Factor	Construction Phase Potential Issues / Impacts	Operational Phase Potential Issues / Impacts
	▪ 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.	

11 SENSITIVE ENVIRONMENTAL FEATURES

The following sensitive and significant environmental features that are associated with the Project's receiving environment (related to the preferred layout) are highlighted, for which mitigation measures are included in the EIA Report and EMPr:

- The project is located within the 1km buffer zone surrounding the Abe Bailey Nature Reserve. A small portion of the project is located within an area designated as medium use zone;
- Three (3) of the expected avifauna SCC were recorded within the Project Area of Influence (PAOI) and surrounding area. The SCC recorded include *Anthropoides paradiseus* (Blue Crane), *Phoenicopterus roseus* (Greater Flamingo) and *Sagittarius serpentarius* (Secretarybird); and
- The district road D331 runs approximately 1.5km from the western boundary of the PV site from where access will be obtained to the site.

The combined sensitivity map overlaid with the Project's preferred layout is provided in **Figure 3** below. Key environmental features that contributed toward the sensitive areas shown in the map included avifaunal habitat (medium and low sensitivity). The sensitivity map shown in **Figure 3** below and the associated spatial data **must** be made available to the implementation team (including the DPM, ECO and Contractor) to allow for further consideration and adequate interpretation at an appropriate scale.

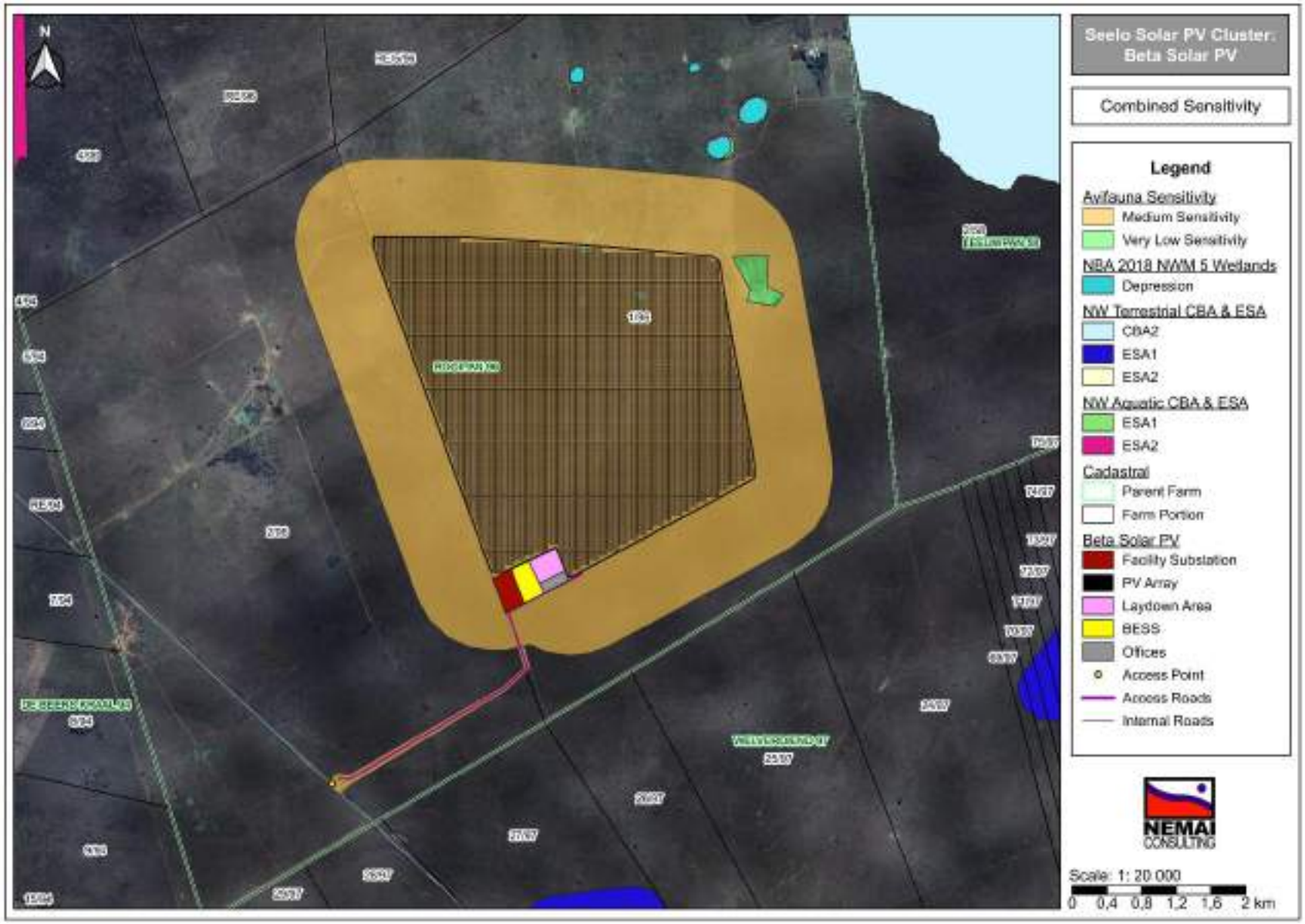

Figure 3: Combined sensitivity map (preferred layout)

12 IMPACT MANAGEMENT

12.1 Introduction

The framework for the subsequent management measures consists of the following:

- **Management objectives** – i.e. desired outcome of management measures for mitigating negative impacts and enhancing the positive impacts related to project activities and aspects (i.e. risk sources);
- **Targets** – i.e. level of performance to accomplish management objectives;
- **Management actions** – i.e. practical actions aimed at achieving management objectives and targets;
- **Responsibilities**; and
- **Monitoring requirements**.

12.2 Pre-Construction and Construction Phases

12.2.1 Pre-construction Survey for Sensitive Areas

Management Objective:

Identify and manage impacts to sensitive and protected environmental features.

Target:

- All sensitive and protected environmental features to be identified in the construction domain.

Management Actions:

- A pre-construction survey must be undertaken to identify the location and extent of the 300m buffer applicable for the Abe Bailey Nature Reserve.
- Barricading of the 300m buffer appliable to the Abe Bailey Nature Reserve and displaying of signage (no-go areas).

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Barricading of sensitive features and displaying of signage (no-go areas).	Pre-construction phase (prior to site clearing).

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• All necessary environmental consents to be in place with due consideration to the Project programme. • Pre-construction survey report. • Inspection of barricading (photographic records). • Visible signage (photographic records).

12.2.2 Administrative Requirements

Management Objective:

Ensure that all administrative measures and arrangements associated with the compliance with the EA and EMPr are in place.

Target:

- Administrative measures and arrangements are confirmed, checked and maintained.
- Document control procedure is in place.

Management Actions:

- Adequate financial provision should be made for the implementation of the conditions of the EA and the mitigation measures contained in the EMPr. Differentiate between those requirements that relate to the Applicant, Contractor, environmental team and other responsible parties.
- Document control procedure shall be provided and adhered to.
- Filing system shall be provided and maintained.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
DPM	Administrative provisions for compliance.	Pre-construction & construction phases.
Contractor & cEO		

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Document control procedure. • Filing systems. • Financial provisions (e.g. bill of quantities, budgets, etc.).

12.2.3 Construction Site Planning and Layout

Management Objective:

Proper planning and layout of the construction domain to ensure protection of sensitive environmental features. Refer to sensitive features highlighted in **Section 11**, findings from pre-construction survey.

Target:

- No negative impacts to sensitive environmental features as a result of poor construction site planning and layout.
- The entire construction domain shall be included in the pre-construction survey.

Management Actions:

- See requirements in EMPr for *Pre-Construction Survey for Sensitive Areas*.
- Conduct a pre-construction survey of the area to be affected by construction activities. This shall include site investigations with photographic records.
- The Contractor shall produce a site plan for the approval of the DPM prior to the establishment of the site, which aims to identify construction activities, facilities and structures in relation to sensitive environmental features. This plan will serve as a spatial tool that facilitates the execution of the construction phase with due consideration of sensitive environmental features. The plan shall show the following (as relevant):
  - Buildings and structures;
  - Contractors' camp and lay down areas;
  - Site offices;
  - Site laboratories;
  - Crusher plants;
  - Access routes;
  - Gates and fences;
  - Essential services (permanent and temporary water, electricity and sewage);
  - Solid waste storage and disposal sites;
  - Site toilets and ablutions;
  - Hazardous waste storage and disposal sites;
  - Firebreaks;
  - Excavations and trenches;
  - Cut and fill areas;
  - Topsoil stockpiles;
  - Spoil areas;
  - Construction material stores;
  - Vehicle and equipment stores;
  - Workshops;
  - Wash bays;

- Fuel stores;
- Hazardous substance stores;
- Sensitive environmental features; and
- Any other activities, facilities and structures deemed relevant.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Site Establishment Method Statement. • Site Plan.	Pre-construction phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Approved method statement. • Evidence of site establishment in accordance with method statement (photographic records). • Pre-construction survey report. • Approved site plan.

12.2.4 Environmental Awareness Creation

Management Objective:

Ensure that the Contractor, construction workers and site personnel are aware of the relevant provisions of the EA and EMPr.

Target:

- All construction workers and employees are to have completed appropriate environmental training before being allowed on the construction site.
- A record of environmental training undertaken shall be kept on site.

Management Actions:

- Environmental Training and Awareness Programme shall be developed, which is to be approved by the DPM/ECO.
- The Contractor shall arrange that all of his employees and those of his sub-contractors go through the project specific environmental awareness training courses before the commencement of construction and as and when new staff or sub-contractors are brought on site.
- Environmental awareness training should include discussions on all sensitive environmental receptors within the project area to inform contractors and site staff of the presence of sensitive habitat features such as ridges and wetlands.

- The environmental training is compulsory for all employees and structured in accordance with their relevant rank, level and responsibility, as they apply to the works and site.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Environmental Training and Awareness Programme. • Induction course. • Refresher courses. • Daily toolbox talks. • Courses to be provided by suitably qualified persons and in a language and medium understood by the workers. • Erect signage and place posters.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Records of training and awareness creation (e.g. training material, training programme, completed attendance registers, etc.).

12.2.5 On-going Consultation with Community and Affected Parties

Management Objective:

- Establish and maintain a record of all complaints and claims against the Project and ensure that these are timeously and effectively verified and responded to.
- Adhere to agreements made with stakeholders (including affected and adjoining landowners) regarding communication, as relevant.

Target:

- All complaints and claims shall be acknowledged within 5 working days and shall be responded to within 10 working days of receipt, unless additional information and / or clarification are required.
- No deviations from agreements made with individual landowners and community members.

Management Actions:

- Develop Grievance Redress Mechanism (GRM).
- Establish lines of communications with community members.
- Existing communication channels shall be duly respected and adhered to when engaging with communities.
- Establish processes and procedures to effectively verify and address complaints and claims received.

- Complaints or liaison with community members with regard to environmental aspects, shall be recorded, reported to the correct person and a record of the response shall be entered in the complaints register.
- Provide the relevant contact details to community members for queries / raising of issues or complaints.
- Provide all information, especially technical findings, in a language that is understandable to the general public.
- Promptly deal with any raised expectations amongst communities regarding perceived benefits associated with the project, through a process of communication and consultation.
- Where necessary always provide prompt and clear feedback to communities.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	Develop and implement GRM.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Documented and functional GRM. • Proof of communication. • Related entries into Public Complaints Register.

12.2.6 Management of Security

Management Objective:

The safety and security of the public is of paramount importance and shall not be compromised by the activities associated with the construction phase.

Target:

- No security related incidents associated with the labour force and construction activities.

Management Actions:

- Involve the local Community Policing Forum or other security associations (as relevant).
- Ensure suitable management of the labour force to prevent security-related issues or disturbance to community members. This is to be established in line with the IFC Performance requirements.
- A security policy shall be developed which amongst others requires that permission be obtained prior to entering any property and provisions controlling trespassing by contractor staff.
- Only security staff shall be allowed to reside at the construction camp.

- The camp site for the project and the longitudinal construction sub-site laid down areas should be fenced for the duration of construction.
- The Contractor shall establish crime awareness programmes at the site camp.
- See requirements in EMPr for *Management of Labour Force* and *Management of Health and Safety* and *Management of Access* and *Fencing Arrangements*.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Security Policy. • Training and awareness creation.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Records of training and awareness creation. • Proof of communication. • Related entries into Public Complaints Register. • Visual inspections (photographic records) (e.g. fencing).

12.2.7 Site Clearing

Management Objective:

- Manage environmental impacts associated with site clearing.
- Ensure that only areas that are specifically required for the construction purposes are cleared.

Target:

No damage shall be caused to sensitive environmental features outside of the demarcated construction domain, including 300m buffer applicable to the Abe Bailey Nature Reserve, structures and infrastructure (as relevant).

Management Actions:

- A Method Statement shall be developed, which will provide the details of how site clearing will be executed.
- Restrict site clearing activities to the construction domain.
- Maintain barricading around the 300m buffer applicable to the Abe Bailey Nature Reserve until the cessation of construction works.
- Avoid any disturbance to demarcated sensitive environmental features.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Method Statement for site clearing. • Barricading and signage.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Approved method statement. • Related entries into Public Complaints Register. • Visual inspections (photographic records) of cleared areas, barricading and signage.

12.2.8 Site Establishment

Management Objective:

Minimise negative environmental impacts associated with site establishment.

Target:

- No deviations from agreements made with the landowner of the PV site.
- No damage to sensitive environmental features outside demarcated construction areas during site establishment.
- No access or encroachment into no-go areas.
- No justifiable complaints regarding general disturbance and nuisance caused by site establishment.

Management Actions:

- See requirements in EMPr for *Construction Site Planning and Layout* and *Management of Flora.*
- Locate construction camp in area where sensitive environmental features will not be impacted on.
- Positioning of the storage and lay-down areas shall aim to minimise visual impacts.
- Maintain barricading and/or fencing around sensitive environmental features until the cessation of construction works.
- Control the movement of all vehicles and plant (including suppliers), such that they remain on designated routes and comply with relevant agreements.
- Ensure noise levels of construction activities and equipment are within their lawfully acceptable limits as per SANS 10103.
- Minimise public disturbance from lighting of the construction camp and site. For example, proper design of the placing (zones), height, type, direction (inward rather than outward) and intensity of floodlights, without compromising safety.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Site Plan. • Barricading and signage.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Related entries into Public Complaints Register. • Visual inspections (photographic records).

12.2.9 Management of Existing Services and Infrastructure

Management Objective:

- Prevent impacts to existing services and infrastructure.
- Adhere to agreements made with owners/custodians of the services and infrastructure.

Target:

- No unwarranted complaints regarding adverse impacts to existing services and infrastructure.
- No adverse impacts to existing services and infrastructure.
- All relevant approvals shall be obtained prior to working within existing servitudes (including roads, railway line, power lines, telephone lines, etc.).

Management Actions:

- Identify and record all existing services.
- Conform to requirements of relevant service providers. Agreements to be in place prior to construction in affected areas.
- Adhere to the requirements of the North West Department of Public Works and Roads (NW DPWR) for District Road D331 from which access to the PV Site will be obtained.
- 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.
- Notify landowners of any disruptions to essential services.
- Adequate reinstatement and rehabilitation of affected environment.
- See requirements in EMPr for *Management of Waste*, and *Management of Access and Traffic.*

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Site Plan. • Wayleaves. • Record of disturbances and remedial actions. • Method statement for rehabilitation.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Approved method statement. • Related entries into Public Complaints Register. • Visual inspections (photographic records).

12.2.10 Management of Access and Traffic

Management Objective:

- Ensure that all construction vehicles use only dedicated access routes to construction sites.
- Ensure proper access control.
- Prevent unlawful access to the construction domain.
- Ensure the safety of all road users by implementing proper signage and traffic control measures.

Target:

- No reports of construction vehicles using other unauthorised routes.
- No complaints regarding blocking of access to properties.
- No transporting of unsafe loads. Permits are to be obtained for abnormal loads.
- No speeding.
- No accidents.

Management Actions:

- Obtain approval from the NW DPWR for gaining access to the Solar PV Plant from the D331.
- Selective upgrade of the relevant access roads shall ensure that they are capable of accommodating the type of vehicles and/or mechanical plant using these roads.
- The preferred route should be surveyed to identify problem areas (e.g., intersections with limited turning radius and sections of the road with sharp horizontal curves or steep gradients, which may require modification). After the road modifications have been implemented, it is recommended to undertake a “dry-run” with the largest abnormal load vehicle, prior to the transportation of any components, to ensure that delivery will occur without disruptions. This process is to be undertaken by the haulage company transporting the components and the contractor, who will modify the road and intersections to accommodate abnormal vehicles. The “dry-run” should be undertaken within the same month that components are expected to arrive.

The haulage company is to provide evidence that the route has been surveyed and deemed acceptable for the transportation of the abnormal load.

- Temporary access roads constructed shall be suitably rehabilitated.
- Ensure temporary accommodation of traffic where any public or private roads are to be affected by construction activities.
- Strict adherence to speed limits by construction vehicles on the public and private access roads.
- Appropriate speed limits shall be posted on all access and internal construction roads.
- All vehicles speed must be restricted to 40 km/h, to avoid roadkill.
- The Contractor is to ensure that all drivers entering the site adhere to the traffic laws.
- Vehicular movements within the site boundary are the responsibility of the respective Contractor and the Contractor must ensure that all construction road traffic signs and road markings (where applicable) are in place. It should be noted that traffic violations on public roads is the responsibility of Law Enforcement, and the public should report all transgressions to Law Enforcement and the Contractor.
- The payloads delivered by heavy vehicles shall be recorded and audited to prevent overloading of heavy vehicles.
- Abnormal load permits shall be acquired, as relevant.
- Traffic shall be accommodated according to the South-African Road Traffic Signs Manual standards where any construction affects an existing road.
- Time restrictions for delivery vehicles through built-up and socially sensitive areas.
- The delivery of components to the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.
- Staff and general trips should occur outside of peak traffic periods as far as possible.
- The use of mobile batch plants and quarries near the site would decrease the traffic impact on the surrounding road network, if available and feasible.
- Access roads shall be maintained in a suitable condition.
- Clearly mark pedestrian-safe access routes within the construction areas.
- Suitable erosion protective measures shall be implemented for access roads during the construction phase.
- Traffic safety measures (e.g. traffic warning signs, flagmen) shall be implemented where applicable.
- Implement appropriate safety and traffic calming measures for vehicles leaving and accessing the D331.
- If required, low hanging overhead lines (lower than 5.1m) e.g., Eskom and Telkom lines, along the proposed routes will have to be moved (to be arranged by haulage company) to accommodate the abnormal load vehicles. The Contractor and the Developer is to ensure that the haulage company is aware of this requirement.
- The haulage company is to provide evidence to the Contractor and the Developer that any affected overhead lines have been moved or raised.
- Clearly demarcate all construction access roads.
- Proper access control shall be maintained to prevent livestock from accessing construction domain.

- Dust suppression of gravel roads located within the site boundary, including the main access road to the site and the site access roads, during the construction phase, if required.
- A continuous condition survey of the local roads to be used during the construction phase must be made.
- Delivery routes shall be defined and adhered to during the construction phase.
- Maintenance of local roads shall take place during the construction phase, ensuring that the local roads used by the contractor are left in the same or better condition than they were prior to the start of construction.
- The Contractor needs to ensure that the gravel sections of the haulage routes (i.e., the site access road and the main access road to the site) remain in good condition and will need to be maintained during the additional loading of the construction phase and reinstated after construction is completed.
- Regular maintenance of gravel roads located within the site boundary, including the access roads to the site, by the Contractor during the construction phase.
- See requirements in EMPr for *Fencing Arrangements* and *Construction Site Planning and Layout.*

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Site Plan. • Condition survey of roads. • Notification of NW DPWR. • Traffic and access related signage. • Training and awareness creation. • Method statement for traffic safety.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Approved method statement. • Related entries into Public Complaints Register. • Visual inspections (photographic records). • Approvals from NW DPWR. • Proof of training.

12.2.11 Fencing Arrangements

Management Objective:

- Protect and maintain existing fences.
- Fencing arrangements to adequately protect livestock and wild animals from construction activities.

Target:

- No deviations from agreements made regarding fencing.
- No direct harm to public / livestock / wild animals due to inadequate fencing arrangements.
- Disturbed or damaged fencing to be reinstated / replaced to meet pre-existing conditions.

Management Actions:

- Any damaged fencing shall be replaced to meet pre-existing conditions.
- All fences erected for construction purposes (e.g. fences around camp sites, fencing around trenches, etc.) shall be inspected on a daily basis to detect whether any damage has occurred. Damaged fences / barricading shall be repaired immediately.
- Erect fences according to appropriate specifications.
- Fence failures during the construction phase shall be fixed immediately.
- Ecologist to advise on fencing requirements for wetland area and associated buffers.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Site Plan. • Fence inspections. • Training and awareness creation.	Construction phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Fencing register. • Related entries into Public Complaints Register. • Visual inspections (photographic records). • Proof of training.

12.2.12 Management of Labour Force

Management Objective:

- Ensure suitable management of the labour force to prevent security-related issues or disturbance to landowners and community members.
- Optimise the use of local labour.
- Provide a work environment that is conducive to effective labour relations.

Target:

- No complaints from landowners and community members regarding trespassing or misconduct by construction workers.
- All unskilled labour to be sourced from local area.

Management Actions:

- See requirements in EMPr for *Management of Security.*
- Develop a Code of Conduct in terms of behaviour of construction staff.
- Prohibit trespassing of construction workers on private property.
- Workers shall be provided with identity cards and must wear identifiable clothing.
- Creating nuisances and disturbances in or near communities shall be prohibited.
- Machine / vehicle operators shall receive clear instructions to remain within demarcated access routes and construction areas.
- Ensure that operators and drivers are properly trained and make them aware, through regular toolbox talks, of any risk they may pose to the community. Place specific emphasis on the vulnerable sector of the population such as children and the elderly.
- Designated smoking areas shall be provided, with special bins for discarding of cigarette butts.
- Establish a 'labour and employment desk' in consultation with local authorities, which shall not to be situated at the site.
- 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.
- Develop a grievance procedure, which also needs to address gender matters.
- Local SMMEs shall be given an opportunity to participate in the construction of the project through the supply of services, material or equipment.
- A procurement policy promoting the use of local business where possible shall be put in place and applied throughout the construction and operational phases of the project.
- The main contractor must employ non-core labour from the regional study area as far as possible during the construction phase.
- Prioritise and articulate gender inclusivity and equity in the project documents by including specific strategies and guidelines for implementation.
- 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 phase.
- Gender sensitive workplace practises should be planned for and adopted on site. Employment practises should be demonstrated free of coercion or harassment.
- Sensitise staff with respect of gender issues that are pertinent to the workplace.
- Ensure gender inclusivity and equity with respect to all compensation.
- 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.
- 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.
- Where possible use labour-intensive methods of construction.
- Implement applicable training of labour to benefit individuals beyond the completion of the project.

- Liaise with the South African Police Services (SAPS) and Community Policing Forums to ensure that the construction site is monitored.
- Prevent loitering within the vicinity of the construction camp as well as construction sites.
- Communicate the limitation of opportunities created by the project through the Ward Councillor.
- Draw up a recruitment policy in conjunction with the Ward Councillor of the area and ensure compliance with this policy.
- Include a section in the induction programme for incoming construction workers that cover local traditions and practices.
- Ensure the infrastructure and social facilities within the host communities will not be compromised with the arrival of additional people into the area.
- All employment of locally sourced labour shall be controlled on a contractual basis. If possible, and if the relevant Ward Councillor deems it necessary, the employment process must 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 must be allowed on site (except for security personnel).
- Influx of workers could lead to increased diseases and HIV/AIDSs & STI as well as STD infections, therefore awareness programmes should be implemented through the local educational institutions and for the workers as well.
- Spaza shops may open next to the site as a consequence of construction. These must be controlled by the contractor to limit their footprint and to ensure that the Local Municipality – Informal Trading By-Laws, are complied with.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Code of Conduct. • GRM. • Security Policy. • Recruitment Policy. • Training and awareness creation.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Documented GRM. • Proof of communication. • Related entries into Public Complaints Register. • Proof of training.

12.2.13 Management of Construction Camps

Management Objective:

Minimise environmental impacts associated with construction camp and eating areas.

Target:

- No environmental contamination associated with construction camp and eating areas.
- Minimise visual impact associated with construction camp and eating areas.
- Prevent socio-economic impacts associated with the construction camp.

Management Actions:

- Erect suitable fencing around the construction camp.
- Provide essential services (including showers, appropriate sanitation and drinking water facilities) at the construction camp. Maintain essential services in a functional state.
- Provide safe potable water for food preparation, drinking and bathing.
- Provide adequate parking for site staff and visitors.
- Open uncontrolled fires will be forbidden at the site camp. Rather, 'contained' cooking mechanisms shall be used (e.g. gas stoves or an enclosed braai facility).
- The cooking area shall be positioned such that no vegetation is in close proximity thereto, including overhanging trees. An area around the cooking area shall be cleared such that any escaping embers will not start an uncontrolled fire.
- Eating areas shall be designated and demarcated.
- The feeding, or leaving of food for animals, is strictly prohibited.
- Allow areas for social interaction.
- Sufficient vermin / weatherproof bins shall be used for all waste material.
- Dish washing facilities shall be provided.
- Ensure that wastewater is appropriately disposed of.
- Locate all storage areas and material laydown sites within predetermined zones, as per the approved site plan.
- Keep the camp and all its storage and laydown areas secure and neat at all times.
- Employ appropriate access control measures.
- Suitable security shall be provided at the construction camp at all times.
- Manage storm water from construction camp to avoid environmental contamination and erosion.
- Failure to comply with the general code of conduct, or the rules and procedures implemented at the construction camp will result in disciplinary actions.
- Prohibit the felling of trees for firewood.
- Provide medical and first aid facilities at the camp area.
- Prepare de-establishment plan for construction camp for approval by the DPM.
- Provide firefighting equipment at the camp area.
- See requirements in EMPr for *Management of Waste, Management of Water, Management of Labour Force, Management of Ablution Facilities, Management of Storage and Handling of*

Non-Hazardous Material, Management of Workshop and Equipment, Management of Flora, and Management of Fauna etc.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Site Plan. • Fence inspections. • Training and awareness creation. • De-establishment plan for construction camp.	Construction phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Fencing register. • Waste disposal records. • Related entries into Public Complaints Register. • Visual inspections (photographic records). • Proof of training.

12.2.14 Management of Ablution Facilities

Management Objective:

Minimise environmental impacts associated with ablution facilities.

Target:

- No environmental contamination associated with ablution facilities.
- Minimise visual impact associated with ablution facilities.

Management Actions:

- Provide sufficient ablution facilities (e.g. mobile / portable / VIP toilets) at the construction camp and within the construction domain, which shall conform to all relevant health and safety standards and codes.
- No pit latrines, french drain systems or soak away systems shall be allowed. Install and maintain conservancy tanks for any site offices, which must comply with any relevant local by-laws and must be serviced by a suitable contractor, as appropriate. The location of conservancy tanks shall be approved by the DPM.
- Toilets shall not be situated within 50m of any water body.
- A sufficient number of toilets shall be provided to accommodate the number of personnel working in any given area. Toilets may not be further than 100m from any working area.
- Toilet facilities supplied by the Contractor for the workers shall occur at a maximum ratio of 1 toilet per 15 workers.
- There must be separate toilets for men and women.

- All temporary / portable / mobile toilets shall be secured to the ground to prevent them from toppling over due to wind or any other cause.
- Ensure the proper utilisation, maintenance and management of toilet, wash and waste facilities.
- The entrances to the toilets shall be adequately screened from public view.
- Ablution facilities shall be maintained in a hygienic state and serviced regularly.
- Toilet paper shall be provided.
- The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that a licensed service provider removes the contents from site. Disposal of such waste is only acceptable at a licensed waste disposal facility (proof of disposal to be provided).
- Should shower facilities be provided for use by staff on site, the following controls shall be imposed:
  - Proper positioning of the shower, and specifically its discharge point, shall be carried out to ensure that erosion and build-up of detergents does not occur;
  - All discharge from the shower and other washing facilities shall be managed to prevent environmental contamination; and
  - Use of the shower facilities shall be limited to staff or authorised persons only.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Schedule for cleaning toilets. • Service agreements with sanitation service providers. • Training and awareness creation.	Construction phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Maintenance register for ablution facilities. • Waste disposal records. • Related entries into Public Complaints Register. • Visual inspections (photographic records). • Proof of training.

12.2.15 Management of Visual Aspects

Management Objective:

- Minimise impacts to the aesthetics / visual quality of the surrounding area.
- Ensure that the visual appearance of the construction site is not an eyesore the adjacent areas.

Target:

No verified complaints regarding impacts to visual quality.

Management Actions:

- 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.
- 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.
- Retain/maintain natural vegetation within and around the development footprint where possible.
- Limit the construction footprint to only the development area.
- Carefully plan to minimize the construction duration.
- Plant indigenous vegetation and/or sow seeds from indigenous vegetation types from the surrounding the site where possible.
- Implement dust suppression activities.
- Regulate the speed of vehicles on site in accordance with specialist recommendations.
- All infrastructure should be always kept in a presentable condition.
- Choose lighting types that reduce spill light and glare.
- Only focus light where it is needed.
- Advertising and lighting shall be in accordance with relevant standards.
- Undertake on-going housekeeping to maintain a tidy construction area.
- After the construction phase, the areas disturbed that are not earmarked for operational purposes (part of infrastructure footprint) shall be suitably rehabilitated.
- See requirements in EMPr for *Management of Reinstatement and Rehabilitation*.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Method statement for rehabilitation. • Training.	Construction phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Approved method statement. • Related entries into Public Complaints Register. • Visual inspections (photographic records). • Proof of training.

12.2.16 Management of Water

During the construction stage, water will be required for various purposes, such as concrete batching, washing of plant and equipment in dedicated areas, dust suppression, potable use by construction workers, etc.

Management Objective:

- Minimise environmental impacts associated with stormwater as well as water services for construction workers.

Target:

- No visual evidence of erosion caused by wastewater or stormwater practices.
- No environmental contamination associated with wastewater or stormwater practices.
- No water wastage (water conservation).

Management Actions:

- The necessary negotiations should be undertaken with the local municipality or landowners to obtain water from approved sources.
- Any water to be sourced directly from natural watercourses or groundwater will require the necessary authorisation in terms of Section 21 of the NWA, as relevant.
- Prevent leakages from pipes or taps.
- Establish a dedicated vehicle maintenance area and wash-bay, where suitable storm water management measures are in place to prevent pollution.
- Develop a method statement for the management of stormwater and erosion.
- Manage stormwater from construction site to avoid environmental contamination and erosion.
- Erosion protection measures to be installed where there are possibilities of surface water sheet flow causing erosion.
- Stormwater runoff from workshops, vehicle maintenance area, wash-bay and other potential pollution sources shall be collected and treated in hydrocarbon separation pits/tanks before being discharged in to drains and/or waterways.
- All wastewater discharges shall comply with legal requirements associated with the NWA.
- Wastewater discharges to be monitored.
- Prevent erosion on access roads due to construction traffic.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Monitoring of water abstraction volumes. • Monitoring of treated wastewater discharges. • Inspection of water abstraction point. • Training and awareness creation. • Method statement for managing stormwater.	Construction phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Proof of registration from DWS, if relevant. • Monitoring records of water use. • Visual inspections (photographic records). • Approved method statement. • Proof of training.

12.2.17 Management of Topsoil & Soil

Management Objective:

Ensure suitable removal, storage and transportation of topsoil for re-use during rehabilitation.

Target:

- At least 95% of recovered topsoil from disturbed areas is to be stored for future use.
- No visual evidence of erosion from topsoil stockpiles.
- No visual evidence of erosion from areas where topsoil has been reinstated.

Management Actions:

- Stabilisation of cleared areas to prevent and control erosion.
- Determine the average depth of the topsoil prior to excavations.
- Topsoil from the construction activities shall be stored for post-construction rehabilitation work.
- Identify suitable areas to store topsoil.
- Remove topsoil from areas to be affected by construction activities.
- Establish and demarcate topsoil stockpiling areas, in order to prevent the mixing of topsoil with subsoil and spoil material.
- Topsoil shall be adequately protected from contamination from construction activities and material.
- Protect stored topsoil from compaction.
- Topsoil shall be stored in such a way that does not compromise its plant-support capacity.
- Wind and water erosion-control measures shall be implemented to prevent loss of topsoil.
- Following the construction phase, the topsoil shall be placed as the final soil layer prior to seeding.
- An ecologically-sound stormwater management plan shall be implemented during construction and appropriate water diversion systems shall be put in place.
- Topsoil stripped must be stored in such a way that it can be replaced at the same location to limit the mixing of plant species between habitats, as far as practically possible.
- See requirements in EMPr for *Management of Flora*, and *Management of Reinstatement and Rehabilitation*.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Site plan. • Inspection of topsoil stockpile areas. • Method statements for: o Managing topsoil. o Rehabilitation. • Training and awareness creation.	Construction phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Approved method statements. • Visual inspections (photographic records). • Proof of training.

12.2.18 Management of Excavations

Management Objective:

Minimise environmental impacts associated with excavations.

Target:

- No damage to sensitive environmental features outside construction area during excavations.
- No harm to people or animals as a result of excavations.

Management Actions:

- Construction activities shall remain within the designated construction area.
- Suitable barricading shall be erected around open excavations, as per the Construction Regulations (2014) or the prevailing legislation.
- Provide signage as a warning of open excavations.
- Divert runoff away from excavations, where necessary.
- Inspect excavations at least daily to ensure that animals have not become trapped. Such animals will be safely removed and released, where possible. Special equipment for handling of venomous snakes shall be available on site to ensure safe removal.
- Make adequate provision for subsidence.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Method statements for: o Managing excavations. o Managing spoil material.	Construction phase.

	o Rehabilitation. • Barricading and signage. • Training and awareness creation.	

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Approved method statement. • Updated Excavation Register. • Visual inspections (photographic records). • Proof of training.

12.2.19 Management of Storage and Handling of Non-Hazardous Material

Management Objective:

Effective and safe management of materials on site, in order to minimise the impact of non-hazardous materials on the environment.

Target:

- No pollution due to handling, use and storage of non-hazardous material.

Management Actions:

- Materials shall be suitably stored to prevent environmental contamination and visual impacts. Storage requirements to be determined based on chemical qualities of material and Material Safety Data Sheet (MSDSs).
- Where required, stored material shall be protected from rain and run-off to avoid environmental contamination.
- Materials shall be appropriately transported to avoid environmental contamination.
- Loose loads (e.g., sand, stone chip, refuse, paper and cement) shall be covered when vehicles travel on public roads.
- Suitable remedial measures, depending on the nature of the contaminant and the receiving environment, shall be instituted for spillages.
- Materials shall be suitably used to prevent environmental contamination.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Site plan. • Inspection of storage areas. • MSDS register. • Barricading and signage. • Training and awareness creation.	Construction phase

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Records (e.g., copies of MSDS). • Visual inspections (photographic records). • Proof of training.

12.2.20 Management of Storage and Handling of Hazardous Material

Management Objective:

Ensure the protection of the natural environment and the safety of personnel on site, as well as the community, by the correct management and handling of hazardous substances.

Target:

- No pollution due to handling, use and storage of hazardous material.
- In the event of a spill, appropriate containment, clean up and disposal of contaminated material. Spills to be cleaned within 24 hours or sooner (depending on the nature of the spill).

Management Actions:

- An Hazardous Chemical Substance (HCS) control sheet must be drawn up and kept up to date.
- 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 MSDSs.
- Appropriate signage shall be displayed at storage areas for hazardous substances.
- Where flammable liquids are being used, applied or stored the workplace will be effectively ventilated.
- No person shall smoke in any place in which flammable liquid is used or stored.
- Install an adequate number of fire-fighting equipment in suitable locations around the flammable liquids store.
- Where flammable liquids are decanted, the metal containers shall be bonded or earthed.
- No flammable material (e.g. paper, cleaning rags or similar material) shall be stored together with flammable liquids.
- Staff that will be handling hazardous materials will be trained to do so.
- Any hazardous materials (apart from fuel) shall be stored within a lockable store with a sealed floor. Suitable ventilation shall be provided.
- All storage tanks containing hazardous materials shall be placed in bunded containment areas with impermeable surfaces. These bunded areas must be able to contain 110% of the total volume of the stored hazardous material.
- MSDSs, which contain the necessary information pertaining to a specific hazardous substance, shall be present for all hazardous materials stored on the site.

- Spill kits will be available for the cleanup of hazardous material spillages.
- Provide secondary containment where a risk of spillage exists.
- Drip trays shall be placed under parked heavy vehicles, equipment and other receptacles of hazardous material to prevent spillages.
- In the event of spillages of hazardous substances the appropriate clean up and disposal measures shall be implemented. Any major incidents to be reported to the DFFE as per the requirements of Section 30 of NEMA.
- Spill reporting procedures shall be displayed at all locations where hazardous substances are being stored.
- Hazardous materials will be disposed of at registered sites or handed to registered hazardous waste disposal facilities for disposal / recycling. Proof of adequate disposal shall be provided.
- Proper and timeous notification will be undertaken of any pollution incidents associated with hazardous materials.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Site plan. • Method statement for managing hazardous substances. • HCS Control Sheet & registers for MSDS. • Personal Protective Equipment (PPE) register. • Signage. • Fire-fighting equipment. • Training and awareness creation. • Inspection of storage areas.	Construction phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Approved method statement. • Records (e.g., HCS Control Sheet, copies of MSDS, PPE register, spills). • Visual inspection of storage areas, signage, spill kits, etc. (photographic records). • Disposal records. • Proof of training.

12.2.21 Management of Waste

Management Objective:

- Minimise negative environmental impacts associated with waste.
- Apply waste management principles to prevent, minimise, recycle or re-use material, with disposal as a last option.

Target:

- No littering on construction site.
- Maintain a clean and tidy construction site.
- A 100% record of all waste generated and disposed of at waste disposal facilities.
- Valid disposal certificates for all waste disposed.
- Provision of adequate waste containers that are easily accessible and maintained.
- Waste bins to be removed and cleaned weekly.

Management Actions:

- Waste management activities shall comply with the NEM:WA.
- The storage of general or hazardous waste in a waste storage facility shall comply with the norms and standards in GN No. R. 926 of 29 November 2013.
- Vermin / weatherproof bins shall be provided in sufficient numbers and capacity to store domestic waste. These bins shall be kept closed to reduce odour build-up and emptied regularly to avoid overfilling and other associated nuisances.
- Where possible, waste shall be separated at source (e.g., containers for glass, paper, metals, plastics, organic waste and hazardous wastes).
- Establish and monitor recycling targets.
- Provide waste skips at the construction areas. These skips shall be sufficient in number, the skip storage area shall be kept clean, and skips shall be emptied and replaced before overflowing or spillage occurs.
- Ensure suitable housekeeping.
- The Contractor shall ensure that no burying, dumping or burning of waste materials, vegetation, litter or refuse occurs. All waste will be disposed of at suitable licensed disposal sites, based on the waste type (general versus hazardous).
- Ensure that waste is transported so as to avoid waste spills *en-route*.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Method statement for waste management. • Service agreements with waste service providers. • Training and awareness creation.	Construction phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Approved method statement. • Waste management and disposal records. • Visual inspections of waste management facilities (photographic records). • Related entries into Public Complaints Register.

		• Proof of training.

12.2.22 Management of Blasting

Management Objective:

Minimise environmental impacts associated with blasting (if required).

Target:

- Compliance with blasting-related legislation and standards.
- No blasting-related impacts to existing structures and infrastructure, private property, livestock, fauna or human health.
- Blasting operations to be controlled to ensure sound pressure levels are kept below the generally accepted 'no damage' level.

Management Actions:

- Prior to commencing with blasting activities, the blasting Contractor shall submit a Method Statement which shall comply with the Explosives Regulations (2003) and all relevant SANS standards and health and safety standards for mitigating blasting.
- Prior notice should be given to surrounding communities of noisy event such as blasting.
- 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 shall employ industry standard methods to control the impact of blasting and limit the risk of damage to buildings and structures by reducing blast vibrations induced in the rock mass, eliminating fly rock and limiting air-blast and noise to acceptable levels.
- Blast mats shall be used wherever there is a risk that fly-rock may result in damage to any infrastructure or where it could result in death or injury of animals, livestock, game, or where damage could be caused to sensitive environmental features.
- All explosives shall be transported, stored and handled in accordance with applicable laws and good design engineering and constructions practices.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Compliance with blasting-related legislation and standards. • Method statement for blasting. • Notifications. • Noise and vibration levels. • Training and awareness creation.	Prior to blasting up to safe completion of blasting.

Monitoring:

Responsible	Frequency	Evidence of compliance

person		
dEO & ECO	Monthly	• Approved method statement. • Proof of notification of landowners. • Related entries into Public Complaints Register. • Visual inspections (photographic records). • Proof of training.

12.2.23 Management of Workshop and Equipment

Management Objective:

Minimise environmental impacts associated with workshops and equipment use.

Target:

No environmental contamination associated with workshops and equipment use.

Management Actions:

- Maintenance of equipment and vehicles will be performed in such a manner so as to avoid any environmental contamination (e.g., use of drip trays).
- Construction plant (heavy machinery and large equipment used on construction site) to be washed in dedicated areas.
- Drip trays will be provided for the stationary plant and for the "parked" plant.
- All vehicles and equipment shall be kept in good working order and serviced regularly. Leaking equipment will be repaired immediately or removed from the site.
- Suitable storage and disposal of hydraulic fluids and other vehicle oils (see requirements in the EMPr for *Management of Storage and Handling of H*azardous *Material*).
- Wastewater from workshop shall be disposed in accordance with the requirements in the EMPr for *Management of Water*.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Vehicle & Equipment maintenance programme. • Training and awareness creation.	Construction phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Updated maintenance schedule. • Visual inspection of workshop, storage areas, signage, spill kits, plant, etc. (photographic records). • Disposal records. • Proof of training.

12.2.24 Management of Pollution Generation Potential

Management Objective:

Ensure that all possible causes of pollution are mitigated as far as possible to minimise impacts to the surrounding environment.

Target:

1. No verified complaints regarding pollution.
2. No measurable signs of pollution.
3. Dust fallout -
    a. Fence line sites = Industrial Band (600 to 1200 mg/m^2/day);
    b. Community sites = Residential Band (< 600 mg/m^2/day);
    c. Comply with ASTM D1739; *SANS 1929, SANS 69.*
2. Noise (ambient noise levels) -
    a. Adhere to standards for L_{Aeq} (equivalent continuous sound level) during daytime hours (06:00 to 22:00);
    b. Adhere to standards for L_{Aeq} during night-time hours (22:00 to 06:00); and
    c. Comply with SANS 10103:2008.
3. 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.
4. Blasting operations to be controlled to ensure sound pressure levels are kept below the generally accepted 'no damage' level.
5. Water quality – construction activities may not cause an adverse impact that results in more than a 10% change in baseline values.
6. All water discharges to comply with legal requirements associated with the NWA, including GN No. 399.

Management Actions:

- **Noise** -
    - The provisions of SANS 10103:2008 will apply to all areas at the perimeter of the site, within audible distance of residents. Noise shall be monitored at the nearest sensitive receptor and where the noise is generated.
    - Construction work shall take place during working hours, which need to be agreed upon with the DPM. Should overtime work be required that will generate noise, consultation with the affected community shall take place.
    - No amplified music will be allowed on the site. The use of radios, tape recorders, compact disc players, television sets etc. will not be permitted unless at a level that does not serve as an intrusion to adjacent community.

- The Contractor will implement preventative measures (e.g., screening, muffling, timing, pre-notification of affected parties) to minimise complaints regarding noise and vibration nuisances from sources such as power tools.
- Proper design and maintenance of silencers on diesel-powered equipment, systematic maintenance of all forms of equipment, training of personnel to adhere to operational procedures that reduce the occurrence and magnitude of individual noisy events.
- If generators are to be used these must be soundproofed. Reduce the decibel level of a generator with 15-30 decibels.
- Environmental noise monitoring shall be carried out regularly to detect deviations from pre-construction noise levels and to enable corrective measures to be taken, where warranted.

- **Dust** -
  - Appropriate dust suppression measures or temporary stabilising mechanisms shall be used when dust generation is unavoidable (e.g., dampening with water, chemical soil binders, straw, brush packs, chipping, etc.), particularly during prolonged periods of dry weather.
  - Dust suppression shall be undertaken for all bare areas, including construction area, access roads, site yard, etc.
  - Note that all dust suppression requirements shall be based on the results from the dust monitoring and the proximity of construction activities to sensitive receptors.
- **Lights** -
  - Prior to construction the position and type of lighting will be planned to ensure that unnecessary light pollution will be eliminated.
  - All lighting installed on site must not lead to unacceptable light pollution to the surrounding community and natural environment (e.g., use of down-lighters).
- **Erosion** -
  - Protect areas of the construction site that are susceptible to erosion through suitable measures (e.g., watering, planting, retaining structures, commercial anti-erosion compounds, etc.).
  - Any erosion channels caused by construction activities shall be suitably stabilised and rehabilitated.
  - Reasonable efforts must be made to prohibit ponding on surface and to ensure stormwater runoff is channelled from the site. The method used will be appropriate to the expected stormwater flows and the topography and geology of the site.

- **Cement and Concrete Batching** -
  - Cement mixing shall take place on an impervious surface (e.g., cement mixing pit).
  - Batching operations shall take place in a designated area, which will be kept clean at all times.
  - The location of batching plant will be approved by the DPM, with due consideration of the relevant management measures contained in the EMPr (see requirements in the EMPr for *Site Clearing*, *Site Establishment*, *Management of Water*, *Management of Waste*, etc.).
  - Ensure separation of clean and dirty water from batching plant.

- Wastewater from batching operations shall be disposed in accordance with the EMPr section on *Management of Water*. Contaminated water will not be discharged to the environment. Prevent overflow from contaminated wastewater storage area.
- Waste concrete and cement sludge shall be removed on a regular basis (to prevent overflowing) and shall be disposed of at a suitable facility.
- Unused cement bags will be stored in an area not exposed to the weather and packed neatly to prevent leakage of cement.
- Used cement bags will be stored so as to prevent windblown dust and potential water contamination. Used bags will be disposed of adequately at a licenced waste disposal facility.
- Concrete transportation will not result in spillage.
- Cleaning of equipment and flushing of mixers will not result in pollution, with all contaminated wash water entering the wastewater collection system.
- To prevent spillage onto roads, ready mix trucks will rinse off the delivery shoot into a suitable sump prior to leaving the site.
- Suitable screening and containment will be in place to prevent windblown contamination from cement storage, mixing, loading and batching operations.
- All visible remains of excess concrete will be physically removed on completion of the plastering or concrete pouring and disposed of in an acceptable manner.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Noise and dust monitoring. • Dust suppression schedule. • Code of Conduct. • Method statement for managing batching plants. • Inspection of batching areas and cement storage areas. • Training and awareness creation.	Construction phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Results from noise and dust monitoring. • Updated dust suppression schedule. • Approved method statement. • Related entries into Public Complaints Register. • Visual inspections (photographic records). • Disposal records. • Proof of training.

12.2.25 Management of Flora

Management Objective:

- Manage impacts to protected flora species within the construction domain.
- Preserve protected flora species outside of the construction domain.
- Prevent the direct and indirect loss and disturbance of floral species and communities (including any potential SCC).
- Control alien invasive plants and noxious weeds.

Target:

- No unpermitted disturbance to protected flora species.
- Ongoing eradication of alien invasive plants and noxious weeds. 100% alien invasive plants controlled within areas affected by construction activities.

Management Actions:

- Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should not be fragmented or disturbed.
- Restrict impact to development footprint only and limit disturbance in surrounding areas.
- Vegetation clearance should remain within the approved development layout.
- The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas.
- Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities.
- All vehicles and personnel must make use of existing roads and walking paths, especially construction/operational vehicles.
- All laydown, chemical toilets etc. should be restricted to 'Low' sensitivity areas, as demarcated in the Terrestrial Biodiversity Compliance Statement appended to the EIA Report.
- Any materials may not be stored for extended periods of time and must be removed from the project area once the construction/closure phase has been concluded.
- Areas that are denuded during construction that are not within the proposed footprint area need to be re-vegetated with indigenous vegetation to prevent erosion during flood events and strong winds and to support the adjacent habitat. This will also reduce the likelihood of encroachment by alien invasive plant species.
- If feasible, 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 fossorial and epigeic biodiversity.
- Indigenous vegetation should be maintained under the solar panels, where feasible, to ensure biodiversity is maintained and to prevent soil erosion.
- It should be made an offence for any staff to take/bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken

from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.

- Leaking equipment and vehicles must be repaired immediately or be removed from project area to facilitate repair.
- 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.
- Consult a fire expert and compile and implement a fire management plan to minimise the risk of veld fires around the project site.
- An Alien Invasive Management Plan should be developed prior to the commencement of construction which highlights control priorities and areas and provides a programme for long-term control, including monitoring specifications.
- An Alien Invasive Plant Management Plan should be implemented for the duration of the construction phase.
- Undertake regular monitoring to detect alien invasions early so that they can be controlled.
- Ensure that the control of exotic or invasive plants is undertaken by suitable contractors using appropriate methods such hoeing, hand pulling, digging, mowing or herbicide applications.
- See requirements in EMPr for additional control measures for the protection of flora –
  - *Construction Site Planning and Layout*;
  - *Environmental Awareness Creation*;
  - *Site Clearing*;
  - *Site Establishment*;
  - *Management of Topsoil*;
  - *Management of Water*;
  - *Management of Storage and Handling of Hazardous Material;*
  - *Management of Pollution Generation Potential;*
  - *Management of Fauna*; and
  - *Management of Reinstatement and Rehabilitation*.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Compile reports capturing findings of pre-construction survey. • Method Statement for managing SCC. • Method Statement for managing alien invasive species. • Applications for permits. • Daily register of herbicide usage. • Barricading and signage. • Training and awareness creation.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance

dEO & ECO	Monthly	• Pre-construction survey report. • Permits on record. • Records of herbicide usage. • Visual inspections (photographic records), including relocated species and presence of alien invasive species. • Approved method statement. • Proof of training.

12.2.26 Management of Fauna

Management Objective:

- Ensure the protection of fauna.
- Reduce the negative fragmentation effects of the development and enable the safe movement of faunal species.
- Prevent the direct and indirect loss and disturbance of faunal species and communities (including any potential SCC).

Target:

- No direct / indirect harm to fauna from construction activities.

Management Actions:

- No trapping, killing, or poisoning of any wildlife is to be allowed. Signs must be put up to enforce this. These actions are illegal in terms of provincial environmental legislation.
- The area must be walked though by a qualified ecologist prior to construction to ensure that no faunal species remain in the habitat and get killed. Should animals not move out of the area on their own relevant specialists must be contacted to advise on how the species can be relocated.
- Any holes/deep excavations must be dug in a progressive manner in order to allow burrowing animals time to move off and to prevent trapping.
- The proposed area to be developed must be disturbed by walking the area, prior to clearing of the area. This will allow fauna to move off from the area.
- Prior to commencing work each day, two individuals should traverse the working area in order to disturb any avifauna and so they have a chance to vacate the area.
- Any avifauna threatened by the construction activities that does not vacate the area should be removed safely by an appropriately qualified environmental officer or removal specialist.
- Create corridors during construction phase for faunal species to move through artificial barriers.
- The areas to be developed (or activity areas) must be specifically demarcated to prevent the movement of staff or equipment/vehicles into the surrounding environments. Signs must be put up to enforce this.
- The duration of the construction should be minimized to as short a term as possible, to reduce the period of disturbance on fauna.
- Outside lighting should be designed and limited to minimize impacts on fauna. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (yellow) lights should be used wherever possible.

- All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited. Speed bumps should be built to force slow speeds.
- No construction activity is to occur at night, as nocturnal species are highly dependent on sound and/or vocalisations for behavioural processes.
- The air space used by the gridlines /tie in lines must be minimised by placing them underground as far as possible to minimise bird collisions.
- The following fencing mitigations should be implemented to minimise bird collisions and fatalities:
  - Top 2 strands must be smooth wire.
  - Routinely retention loose wires.
  - Minimum distance between wires is 300 mm.
  - Place markers on fences.
- Only use environmentally friendly dust suppressant products.
- No dogs or other domestic pets are allowed on site.
- Prepare an emergency response procedure for dealing with snake bites, as venomous species may occur in the area.
- Photographs of protected and sensitive fauna species must be displayed in the construction camp to heighten awareness.
- Educate personnel about venomous snakes, scorpions and spiders and that these species are not to be harmed. Should any such species be encountered they are to be safely moved outside of the construction domain by a suitably qualified person.
- See requirements in EMPr for additional control measures for the protection of fauna –
  - *Construction Site Planning and Layout*;
  - *Environmental Awareness Creation*;
  - *Site Clearing*;
  - *Site Establishment*;
  - *Management of Access and Traffic*;
  - *Management of Storage and Handling of Hazardous Material;*
  - *Management of Pollution Generation Potential;*
  - *Management of Flora*; and
  - *Management of Reinstatement and Rehabilitation*.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Compile reports capturing findings of pre-construction survey. • Method Statement for managing SCC. • Applications for permits. • Barricading and signage. • Training and awareness creation.	Pre-construction & construction phases

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Pre-construction survey report. • Permits on record. • Records of herbicide usage. • Visual inspections (photographic records), including relocated species and presence of alien invasive species. • Approved method statement. • Proof of training.

12.2.27 Management of Surface Water

Management Objective:

- Ensure that the watercourses (streams, natural channels, drainage lines, wetlands) are protected and incur minimal negative impact to their resource quality (flow, water quality, habitat and aquatic biota).
- To prevent the occurrence of concentrated stormwater flow and erosion.

Target:

- Unaltered downstream flow regime for watercourses.
- No visible evidence of erosion caused by wastewater or stormwater practices.
- No dewatering of sediment-laden or cement laden water into natural water resources.

Management Actions:

- Design and implement a suitable stormwater drainage system on the PV Sites. A construction phase stormwater management plan should be developed and implemented for the duration of the construction phase.
- Provide permeable surfaces to reduce increased runoff volumes at source.
- Attenuate flows within the drainage system to reduce runoff velocity and concentrated stormwater flow.
- All surface runoff generated as a result of the activity must be managed prior to entering the buffer zone and should be retained outside of the demarcated buffer zone and subsequently released to simulate natural hydrological conditions.
- 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.

- Hold off on the clearing of vegetation as long as possible, ensuring that all environmental and water use authorisations are in place, the site construction materials are in place and the PV infrastructure is sourced and ready prior to clearing.
- Take every measure to ensure that the bulk of the site clearing and earth moving activities take place in winter when rainfall is lowest (and the grass sward is thinnest) to minimize environmental damage, erosion, sedimentation and contamination (based on technical viability).
- Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash.
- Scrape the area where mixing and storage of sand and concrete occurred to clean and re-grass once finished.
- Revegetate all accidentally cleared areas beyond the buildings as soon as possible.
- Promptly remove all alien and invasive plant species that may emerge during construction (i.e. weedy annuals and other alien forbs).
- Appropriately stockpile topsoil cleared from the site.
- Minimize unnecessary clearing of vegetation beyond the infrastructure footprints.
- Lightly till any disturbed soil around the development to avoid compaction, where required.
- Stormwater leaving the site should not be concentrated in a single exit drain but spread across multiple drains around the site each fitted with energy dissipaters (e.g. slabs of concrete with rocks cemented in).
- Minimise the extent of concreted / paved / gravel areas.
- Avoid excessively compacting the ground beneath the solar panels.
- Release only clean water into the environment.
- See requirements in EMPr for additional measures to manage impacts to watercourses, including -
  - *Construction Site Planning and Layout;*
  - *Management of Water;*
  - *Management of Pollution Generation Potential; and*
  - *Management of Reinstatement and Rehabilitation.*

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Site plan • Method Statement for managing stormwater • Barricading and signage • Training and awareness creation	Pre-construction & construction phases

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Visual inspections (photographic records) • Approved method statement • Approved drawings

Responsible person	Frequency	Evidence of compliance
		• Visible signage • Barricading • Proof of training

12.2.28 Management of Cultural Heritage & Palaeontological Features

Management Objective:

Comply with legislative requirements with regards to cultural heritage and palaeontological features.

Target:

No cultural heritage and palaeontological features to be damaged during construction.

Management Actions:

- The contractors and workers should be notified that archaeological sites might be exposed during the construction activities.
- Site staff should be trained in terms of the procedure to follow when any human remains and/or other archaeological, palaeontological and historical material are uncovered.
- The following Chance Find Procedure should be implemented in the event any palaeontological material is uncovered:
  - If a chance find is made the person responsible for the find must immediately stop working and all work that could impact that finding must cease in the immediate vicinity of the find.
  - The person who made the find must immediately report the find to his/her direct supervisor which in turn must report the find to his/her manager and the ESO or site manager. The ESO or site manager must report the find to the relevant Heritage Agency (South African Heritage Research Agency, SAHRA). (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates.
  - A preliminary report must be submitted to the Heritage Agency within 24 hours of the find and must include the following: 1) date of the find; 2) a description of the discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates.
  - Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found.
  - Upon receipt of the preliminary report, the Heritage Agency will inform the ESO (or site manager) whether a rescue excavation or rescue collection by a palaeontologist is necessary.
  - The site must be secured to protect it from any further damage. No attempt should be made to remove material from their environment. The exposed finds must be stabilized and

covered by a plastic sheet or sand bags. The Heritage agency will also be able to advise on the most suitable method of protection of the find.
  - If the fossil cannot be stabilized the fossil may be collected with extreme care by the ESO. Fossils finds must be stored in tissue paper and in an appropriate box while due care must be taken to remove all fossil material from the rescue site.
  - Once the Heritage Agency has issued the written authorization, the developer may continue with the development on the affected area.
- All work must cease immediately, if any human remains and/or other archaeological, palaeontological and historical material are uncovered. Such material, if exposed, must be reported to the nearest museum, archaeologist/ palaeontologist (or the South African Police Services), so that a systematic and professional investigation can be undertaken. Sufficient time must be allowed to remove/collect such material before development recommences.
- Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site.
- Contractors and workers should be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA, Section 51(1).
- See requirements in EMPr for additional measures to manage impacts to cultural heritage and palaeontological features, including -
  - *Construction Site Planning and Layout; and*
  - *Environmental Awareness Creation*.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Compile reports capturing findings of pre-construction survey. • Implement Chance Finds Procedure. • Barricading and signage. • Training and awareness creation.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Pre-construction survey report. • Inspection of barricading and visible signage (photographic records). • Visual inspections (photographic records). • Records of chance finds. • Proof of training.

12.2.29 Management of Emergency Procedures

Management Objective:

Minimise environmental impacts associated with emergency procedures.

Target:

- Approved emergency response procedures.
- No site fires to be caused by construction activities and workers.

Management Actions:

- Compile an Emergency Response Action Plan (ERAP) prior to the commencement of construction for approval by the DPM and ECO. This plan must deal with accidents, potential spillages and fires in line with relevant legislation.
- All staff must be made aware of emergency procedures as part of environmental training and awareness creation.
- Prepare and display a list of emergency contact numbers.
- **Fire** -
  - Comply with the National Veld and Forest Fire Act (No. 101 of 1998) and National Veld and Forest Fire Bill (B122B of 1998).
  - Work closely with the local Fire Protection Association. Determine requirements and add to list of emergency telephone numbers.
  - Keep a fire danger index displayed on site and comply with requirements.
  - Fire breaks will be agreed with neighbours and the local Fire Protection Association.
  - Proper emergency response procedure shall be in place for dealing with fires.
  - Identify ignition risks and prevent risk of fires from these sources.
  - Manage construction domain to prevent the build-up of combustible material.
  - Burning of waste is not permitted.
  - Suitable precautions will be taken (e.g., suitable fire extinguishers, water bowsers, welding curtains) when working with welding or grinding equipment.
  - Provide adequate fire control mechanisms (fire-fighting equipment).
  - All fire control mechanisms (fire-fighting equipment) will be routinely inspected by a qualified investigator for efficacy thereof and shall be approved by local fire services.
  - All staff on site will be made aware of general fire prevention and control methods, and the name of the responsible person to alert to the presence of a fire. The contact details of the emergency services must be displayed and easily accessible on site.
  - No fires are allowed on site.
  - Firebreaks shall be made for construction areas, as required.
  - Dedicated smoking areas to be provided.
- **Accidental Leaks and Spillages** -
  - Proper emergency response procedure shall be in place for dealing with spills and leaks.

- Ensure that the necessary materials and equipment for dealing with spills and leaks are available on site, where practicable.
- Remediation of the spill areas will be undertaken to the satisfaction of the Engineer.
- In the event of a hydrocarbon spill, the source of the spillage will be isolated and contained. The area will be cordoned off and secured. The Contractor will ensure that there is always a supply of an appropriate absorbent material readily available to absorb, breakdown and where possible, encapsulate a minor hydrocarbon spillage.
- All staff on site will be made aware of actions to be taken in case of a spillage.
- Provide contact details of person and emergency services to be notified in a case of spillages – signage to be displayed at strategic points within the construction domain (e.g., workshop, fuel storage area, hazardous material containers).
- All major incidents (i.e., uncontrolled release of a hazardous substance, including from a major emission, fire or explosion, that causes, has caused or may cause significant harm to the environment, human life or property) to be reported to DEFF and/or other relevant authorities.

- **Loss of vegetation due to fuel and chemical spills**
  - Appropriate measures must be implemented in order to prevent potential soil pollution through fuel, oil leaks and spills.
  - Ensure construction vehicles are maintained and serviced to prevent oil and fuel leaks.
  - An emergency response contingency plan will be implemented to address clean-up measures should a spill and/or a leak occur.
  - All plant and machinery must be inspected every day, serviced and maintained regularly, and any leaking plant/machinery must be removed from site for repair.
  - Implement measures to avoid leakages and spillages on to bare ground.
  - Emergency on-site maintenance must be done over appropriate drip trays and all oil or fuel must be disposed of according to regulatory requirements. Safe disposal certificates must always be obtained from the registered waste disposal site, and proof of disposal kept on site.
  - Drip-trays must be placed under vehicles and equipment during maintenance or repairs.
  - Washing and cleaning of equipment must be done within bunded areas, in order to trap any cement and prevent excessive soil erosion. These sites must be re-vegetated after construction has been completed.
  - Spill prevention and emergency spill response plan, as well as dust suppression, and fire prevention plans will be implemented during the construction phase.
  - Spill kits will be made available on site for clean-up of spills and leaks of contaminants.
  - The site must have a suitable area for the safe cleaning of cement contaminated tools and equipment. Cleaning such tools/equipment results in water contaminated with cement, which is hazardous to the environment. Cement contaminated water must not be released or otherwise disposed of into the environment, including stormwater drains. The contaminated water must be contained and allowed to evaporate. The remaining residue can be disposed of as building rubble once dry.

- Plant and machinery must be issued with a drip tray on site. The drip tray must be placed underneath the plant/machinery when it has shutdown. Drip trays must be in good working order and must be able to hold liquid adequately if/when needed.
- The contents of drip trays, including rainwater, must not be disposed of into the environment, but decanted into suitable, sealable, containers. These containers must be labelled and the contents disposed of as hazardous waste. Proof of disposal at a licenced waste disposal site must be obtained.

- See requirements in EMPr for additional control measures related to potential emergency event:
  - *Management of Construction Camp*;
  - *Management of Labour Force*;
  - *Environmental Awareness Creation*;
  - *Management of Storage and Handling of Hazardous Material;*
  - *Management of Workshop and Equipment; and*
  - *Management of Pollution Generation Potential.*

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• ERAP. • Emergency contact list. • Document all fire control mechanisms with an inspection and maintenance schedule. • Signage. • Training and awareness creation.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Compliance with approved ERAP. • Emergency contact list displayed. • Updated maintenance schedule for fire-fighting equipment. • Visual inspections (photographic records). • Records of incidents and corrective measures taken. • Proof of training.

12.2.30 Management of Health and Safety

Management Objective:

Provide a safe working environment to construction workers and the public.

Target:

- Approved Health and Safety Plan.
- No incidents.
- Compliance with the Occupational Health and Safety Act (Act No. 85 of 1993), Construction Regulations (2014) and other relevant regulations.

Management Actions:

- Contractor to submit a Health and Safety Plan, prepared in accordance with the Health and Safety Specification, for approval prior to the commencement of work. These requirements are aligned with the Construction Regulations (2014).
- 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.
- Fencing and barriers will be in place in accordance with the Occupational Health and Safety Act (Act No. 85 of 1993).
- Applicable notice boards and hazard warning notices will be put in place and secured.
- Night hazards will be suitably indicated (e.g., reflectors, lighting and traffic signage).
- Emergency contact details will be prominently displayed.

- Two-Way Radio Systems shall be used where cell phone coverage is poor.
- All construction personnel shall be clearly identifiable. All employees will also be issued with employee cards for identification purposes.
- All workers will be supplied with the required Personal Protective Equipment as per the Occupational Health and Safety Act (Act No. 85 of 1993).
- Maintain access control to prevent access of the public to the construction domain, as far as practicable.
- Use approved communication channels to inform the community of Occupational Health and Safety measures to prevent incidents involving community members.
- Contractors shall establish HIV/AIDs awareness programmes at their site camps.
- Put in place a monitoring system to monitor health risks throughout the life of the project.
- 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.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Occupational Health and Safety system. • Risk Assessment. • Health and Safety Plan. • Signage. • Training and awareness creation.	Pre-construction & construction phases.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Visual inspections (photographic records). • Records of incidents and corrective measures taken. • Proof of training.

12.2.31 Management of Reinstatement and Rehabilitation

Management Objective:

- Adequate reinstatement and rehabilitation of construction domain.
- Conduct concurrent or progressive rehabilitation of areas affected by construction activities.

Target:

- Complete site clean-up.
- Reinstate and rehabilitate areas disturbed by construction activities.

Management Actions:

- Rehabilitation Method Statement to be developed, which will include additional measures identified during construction to supplement the reinstatement and rehabilitation provisions included in the EMPr. Targets to be specified for re-growth.
- Ensure that rehabilitation is in line with the surrounding natural environment and pre-construction state of the affected area.
- Cordon off areas that are under rehabilitation as no-go areas.
- **Removal of structures and infrastructure** -
  - Clear and completely remove from site all construction plant, equipment, storage containers, temporary fencing, temporary services and fixtures.
  - Ensure that all temporary access roads utilised during construction and which are not earmarked for use during the operational phase, are returned to a usable state and/or a state no worse than prior to construction.
- **Inert waste and rubble** -
  - Clear the site of all inert waste and rubble, including surplus rock, foundations and batching plant aggregates. After the material has been removed, the site shall be re-instated and rehabilitated.
  - Load and haul excess spoil and inert rubble to fill in borrow pits/dongas or to dump sites indicated/approved by the DPM.
  - All remaining combustible biomass from bush clearing operations must be removed from the area, unless it is to be used in rehabilitation measures.
- **Domestic waste** -
  - Remove from site all domestic waste and dispose of in the approved manner at a registered waste disposal site.
- **Hazardous waste and pollution control** -
  - Remove from site all pollution containment structures.
  - Remove from site all temporary sanitary infrastructure and wastewater disposal systems. Take care to avoid leaks, overflows and spills and dispose of any waste in the approved manner.
  - Comply with relevant provisions under the following EMPr sections –
    - *Management of Storage and Handling of* H*azardous Material*;
    - *Management of Water*;
    - *Management of Waste*; and
    - *Management of Pollution Generation Potential.*
- **Topsoil replacement and soil amelioration** -

- Execute top soiling activity prior to the rainy season or any expected wet weather conditions.
- Execute topsoil placement only after all construction work has ceased.
- Replace and redistribute stockpiled topsoil together with herbaceous vegetation, overlying grass and other fine organic matter in all disturbed areas of the construction site, including temporary access routes. Replace topsoil to the original depth.
- Place topsoil in the same area from where it was stripped, as far as practically possible. If there is insufficient topsoil available from a particular soil zone to produce the minimum specified depth, topsoil of similar quality may be brought from other areas of similar quality. The soil brought in must not come from areas infested by alien and invasive plant species. The suitability of substitute material must be determined.
- Do not use topsoil suspected to be contaminated with the seed of alien vegetation. Alternatively, the soil is to be appropriately treated.
- Ensure that stormwater run-off is not channelled alongside the gentle mounding, but that it is taken diagonally across it.
- Shape remaining stockpiled topsoil not utilised elsewhere in an acceptable manner so as to blend in with the local surrounding area.

- **Ripping and scarifying** -
  - Rip and/or scarify all areas following the application of topsoil to facilitate mixing of the upper most layers. Whether ripping and/or scarifying is necessary it will be based on the site conditions immediately before these works commence.
  - Rip and/or scarify all disturbed (and other specified) areas of the construction site, including temporary access routes and roads, compacted during the execution of the works.
  - Do not rip and/or scarify areas under wet conditions, as the soil will not break up.

- **Planting** -
  - All plant species to be used for rehabilitation must be approved by a suitably qualified specialists prior to use on site.
  - Revegetation must match the vegetation type which previously existed, unless otherwise indicated by a suitably qualified specialist.
  - Although the use of indigenous vegetation is promoted, where there is a risk of soil erosion a suitable specialist must be consulted to determine the most appropriate stabilisation measures.

- **Grassing** -
  - Suitably trained personnel must undertake grassing by making use of the appropriate equipment and indigenous grass species, as specified by a suitably qualified specialist.
  - Sodding may be done at any time of the year, but seeding must be done by sowing appropriate seed mixtures at the most suitable time under the guidance of a suitably qualified specialist.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Contractor & cEO	• Rehabilitation Method Statement. • Pre-construction survey – established baseline. • Signage. • Training.	Throughout construction period, as relevant to the concurrent or progressive reinstatement and rehabilitation of affected areas. Up to end of defects liability period.

Monitoring:

Responsible person	Frequency	Evidence of compliance
dEO & ECO	Monthly	• Approved method statement. • Pre-construction survey report. • Visible signage. • Related entries into Public Complaints Register. • Visual inspections (photographic records). • Proof of training.

12.3 Operational Phase

Where relevant, all management actions are to be carried forward from the construction phase to the operational phase. Specific management measures for the operational phase follow:

12.3.1 Management of Access, Routine Maintenance Inspections and Maintenance Works

Management Objective:

- Manage environment impacts associated with operation and maintenance activities.
- Restrict operation and maintenance activities to the development footprint.
- Safeguarding of sensitive environmental features and existing services.
- Ensure proper access control.

Target:

- No damage to be caused to sensitive environmental features (including heritage resources, protected flora and fauna, watercourses, existing structures and infrastructure, etc.) outside of the development footprint.
- No reports of operation and maintenance vehicles using unauthorised access points and routes.
- No verified complaints regarding poor practices during operation and maintenance.

Management Actions:

- Restrict operation and maintenance activities to the development footprint. Where this is not possible, the landowners need to be notified and adequate arrangements made in advance.
- During maintenance related activities, damage to access roads as well as existing structures and infrastructure, will be restored to its original condition.
- Maintain access control to the PV Plant.
- Strict adherence to speed limits by operation and maintenance vehicles.
- All vehicles must adhere to a speed limit of maximum of 40 km/h to avoid collisions with faunal species. Appropriate speed control measures and signs must be erected.
- All roads used for maintenance inspections and maintenance works shall be maintained and repaired where necessary.
- The internal gravel roads will require grading with a grader to obtain a camber of between 3% and 4% (to facilitate drainage) and regular maintenance blading will also be required.
- Monitoring to be conducted to detect erosion.
- Protect all areas susceptible to erosion resultant from operation and maintenance activities.
- Maintenance work shall be undertaken as per the provisions of the EMPr for the pre-construction and construction phases, as relevant.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Operator	• Compliance with relevant management actions. • Training.	Operational Phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
Operator's designated person	Varies from daily to *ad hoc.*	• Evidence of erosion. • Verified damage to existing structures and infrastructure. • Concern or complaint raised as part of GRM. • Visual inspections (photographic records). • Proof of training.

12.3.2 Management of Wastewater & Stormwater

Management Objective:

- Manage site drainage.
- Minimise environmental impacts associated with stormwater.

Target:

- No visual evidence of erosion caused by stormwater practices.
- No environmental contamination associated with wastewater or stormwater practices.

Management Actions:

- An Operational Phase Stormwater Management Plan should be developed and implemented.
- The Operational Stormwater Management Plan should include measures to address:
  - Concentrated stormwater flow and the promotion of sheet flow.
  - Attenuate flows within the drainage system, to reduce runoff velocity.
- Manage stormwater from the Solar PV Plant to avoid environmental contamination and erosion.
- Provide permeable surfaces to address increased runoff at source.
- All stormwater infrastructure should be maintained to ensure their structural integrity and function. Stormwater infrastructure should be cleaned of build-up of any waste material and silt.
- Footpaths, tracks and gravel roads should be monitored for the onset of erosion. Erosion that formed should be repaired in a timely manner. Implement protective measures for areas that are susceptible to erosion due to surface water flow.
- Separate clean and dirty water, as necessary.
- All wastewater discharges shall comply with legal requirements associated with the NWA.
- Wastewater discharges to be monitored.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Operator	• Monitoring of treated wastewater discharges. • Training and awareness creation. • Inspect stormwater system.	Operational Phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
Operator's designated person	Varies from daily to *ad hoc.*	• Visual inspections (photographic records). • Proof of training.

12.3.3 Management of Storage and Handling of Hazardous Material

Management Objective:

Ensure the protection of the natural environment and the safety of operational staff, as well as the community, by the correct management and handling of hazardous substances.

Target:

- No pollution due to handling, use and storage of hazardous material.
- In the event of a spill, appropriate containment, clean up and disposal of contaminated material. Spills to be cleaned within 24 hours or sooner (depending on the nature of the spill).

Management Actions:

- 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 MSDSs.
- Appropriate signage shall be displayed at storage areas for hazardous substances.
- Where flammable liquids are being used, applied or stored the workplace will be effectively ventilated.
- No person shall smoke in any place in which flammable liquid is used or stored.
- Install an adequate number of fire-fighting equipment in suitable locations around the flammable liquids store.
- No flammable material (e.g., paper, cleaning rags or similar material) shall be stored together with flammable liquids.
- Operational staff that will be handling hazardous materials will be trained to do so.

- All storage tanks containing hazardous materials shall be placed in bunded containment areas with impermeable surfaces. These bunded areas must be able to contain 110% of the total volume of the stored hazardous material.
- MSDSs, which contain the necessary information pertaining to a specific hazardous substance, shall be present for all hazardous materials stored on the site.
- Spill kits will be available for the cleanup of hazardous material spillages.
- Provide secondary containment where a risk of spillage exists.
- In the event of spillages of hazardous substances the appropriate clean up and disposal measures shall be implemented. Any major incidents to be reported to the DFFE as per the requirements of Section 30 of NEMA.
- Spill reporting procedures shall be displayed at all locations where hazardous substances are being stored.
- Hazardous materials will be disposed of at registered sites or handed to registered hazardous waste disposal facilities for disposal / recycling. Proof of adequate disposal shall be provided.
- Proper and timeous notification will be undertaken of any pollution incidents associated with hazardous materials.
- Use environmentally friendly cleaning products for PV panels and other facilities at the Solar PV plant.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Operator	• Compliance with relevant management actions. • Designated person. • ERAP. • Inspection of storage areas for hazardous material. • MSDS register. • PPE register. • Signage. • Training and awareness creation. • BESS specifications.	Operational Phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
Operator's designated person	Varies from daily to *ad hoc.*	• Updated inspection register. • Records (e.g., copies of MSDS, PPE register, spills). • Visual inspection of storage areas, signage, etc. (photographic records). • Disposal records. • Records of incidents and corrective measures taken. • Proof of training.

12.3.4 Management of Waste

Management Objective:

- Minimise negative environmental impacts associated with waste.
- Apply waste management principles to prevent, minimise, recycle or re-use material, with disposal as a last option.

Target:

- No littering at the Solar PV Plant.
- Maintain a clean and tidy facility.
- Provision of adequate waste receptacles that are easily accessible and maintained.

Management Actions:

- Waste management activities shall comply with the NEM:WA.
- The storage of general or hazardous waste in a waste storage facility shall comply with the norms and standards in GN No. R. 926 of 29 November 2013.
- Where possible, waste shall be separated at source (e.g., containers for glass, paper, metals, plastics, organic waste and hazardous wastes).
- Establish and monitor recycling targets.
- Provide waste receptacles at the facility.
- Ensure suitable housekeeping.
- No burying, dumping or burning of waste materials, vegetation, litter or refuse will be permitted.
- All waste will be disposed of at suitable licensed disposal sites, based on the waste type (general versus hazardous).
- Ensure that waste is transported so as to avoid waste spills *en-route*.
- Waste generated during maintenance or replacement of panels and inverters will be sent to suitable disposal sites.
- With regards to the BESS, used batteries will be removed by the suppliers who will be responsible for ensuring compliance with all relevant legal requirements

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Operator	• Service agreements with waste service providers. • Training and awareness creation.	Operational Phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
Operator's designated person	Varies from daily to *ad hoc.*	• Waste management and disposal records. • Visual inspections of waste management facilities (photographic records). • Related entries into Public Complaints Register.

		• Proof of training.

12.3.5 Management of Emergency Procedures and Risk to BESS

Management Objective:

Minimise environmental impacts associated with emergency procedures during operational phase.

Target:

- Approved emergency response procedure for operational phase.
- No fires caused by the Solar PV Plant.
- No loss of sensitive environmental features as a result of environmental incidents.

Management Actions:

- Compile an ERAP for the operational phase. This plan must deal with *inter alia* accidents, potential spillages and fires in line with relevant legislation.
- All operational staff must be made aware of emergency procedures as part of environmental training and awareness creation.
- Prepare and display a list of emergency contact numbers at the facility.
- Develop and communicate an appropriate emergency evacuation procedure.
- Establish suitable communication system for emergencies.
- **Fire** -
  - The Solar PV Plant will operate under the general principle of fire avoidance.
  - The ERAP must include a standard operating procedure for dealing with fires at the Solar PV Plant.
  - Designated person to be appointed to monitor conditions at and surrounding the facility related to fire management. This person needs to be given site specific training to carry out the monitoring role.
  - Comply with the National Veld and Forest Fire Act (No. 101 of 1998), National Veld and Forest Fire Bill (B122B of 1998) and OHS Act.
  - Ensure compliance with requirements of the local fire service authority.
  - Obtain a hot work permit for welding, cutting and grinding activities that are undertaken on site, as relevant.
  - Work closely with the local Fire Protection Association. Determine requirements and add to list of emergency telephone numbers.
  - Maintain a fire break around the Solar PV Plant. Fire breaks will be used to prevent naturally occurring fires from damaging buildings and infrastructure.
  - Proper emergency response procedure shall be in place for dealing with fires.
  - Identify ignition risks and prevent risk of fires from these sources.
  - The BESS surfaces may not have reflective surfaces which can lead to veld fires.

- Manage Solar PV Plant to prevent the build-up of combustible material. Ensure proper housekeeping to reduce waste and dry vegetation.
- Burning of waste is not permitted.
- Provide adequate fire control mechanisms (fire-fighting equipment).
- Portable fire extinguishers must be located in easily identifiable locations throughout the facility. Ensure that their locations and suitability for use take into consideration the various types of fires that may be encountered (e.g., electrical, flammable liquids, ordinary combustibles).
- All fire control mechanisms (fire-fighting equipment) will be routinely inspected by a qualified investigator for efficacy thereof and shall be approved by local fire services.
- All staff on site will be made aware of general fire prevention and control methods, and the name of the responsible person to alert to the presence of a fire. The contact details of the emergency services must be displayed and easily accessible on site.
- No fires are allowed on site.
- Dedicated smoking areas to be provided.
- Undertake fire drills at regular intervals, in accordance with legal requirements and best practices.
- Regularly inspect operational vehicles.
- The BESS must incorporate adequate explosion prevention protection.
- Provide signage that identifies the contents of the BESS to alert first responders to the potential hazards associated with the installation.
- Use of perimeter fence around BESS facility.
- Earthing system installed at BESS as per normal electrical facilities.
- Separation distances between battery packs in accordance with manufacturer recommendations
- 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. Adhere to specifications of the BESS supplier.
- Use of appropriately qualified maintenance personnel for BESS.

- **Accidental Leaks and Spillages** -
  - The ERAP must include a standard operating procedure for dealing with spills and leaks (e.g., transformer oils) at the Solar PV Plant.
  - Ensure that the necessary materials and equipment for dealing with spills and leaks are available at the Solar PV Plant, where practicable.
  - Remediation of the spill areas will be undertaken.
  - All staff on site will be made aware of actions to be taken in case of a spillage.
  - All major incidents (i.e., uncontrolled release of a hazardous substance, including from a major emission, fire or explosion, that causes, has caused or may cause significant harm to the environment, human life or property) to be reported to DFFE and/or other relevant authorities.

Table 12: 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

No.	Risk	Possible Consequences	Control Measures
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

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Operator	• Compliance with relevant management actions. • Designated person. • ERAP. • Emergency contact list. • Document all fire control mechanisms with an inspection and maintenance schedule. • Inspection of ignition sources. • Signage. • Training and awareness creation. • BESS specifications.	Operational Phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
Operator's designated person	Varies from daily to *ad hoc.*	• Compliance with ERAP. • Emergency contact list displayed. • Updated maintenance schedule for fire-fighting equipment. • Visual inspections (photographic records). • Records of incidents and corrective measures taken. • Proof of training.

12.3.6 Management of Flora and Fauna

Management Objective:

- Control alien invasive plant species within the Solar PV plant.
- Ensure the protection of animals.

Target:

- No direct / indirect harm to animals from operation and maintenance activities.
- Ongoing eradication of alien invasive plants and noxious weeds. 100% alien invasive plants controlled within areas affected by construction activities.

Management Actions:

- All personnel must undergo environmental awareness training that includes educating on not poaching/persecuting avifauna species and collecting eggs.
- All personnel must undergo environmental induction with regards to awareness about speed limits and roadkill.
- An Operational Alien Invasive Species Management and Monitoring Plan should be developed by an appropriate specialist and implemented.
- Implement eradication programme for alien invasive plants and noxious weeds at the facility.

- Regular monitoring for alien invasive plant encroachment during the operation phase must be undertaken to ensure that no alien invasion problems have developed as result of the disturbance. This should be every 3 months during the first two years of the operation phase and every six months for the life of the project.
- Alien invasive plants and noxious weeds should be removed/controlled using the appropriate techniques as indicated in the Operational Alien Invasive Species Management and Monitoring Plan.
- Prevent contamination of natural vegetation by any maintenance activities.
- As much vegetation growth as possible must be promoted post construction within the permanent development footprint. This will serve to reduce the percentage of the surface area which is left as bare ground, and may also screen the facility. Indigenous vegetation is to be used for this purpose.
- Vegetation should be kept under solar panels to ensure that additional reflection is not taking place from the surface below the panels, where feasible.
- No hunting/trapping/snaring or collecting of faunal species is allowed.
- Vehicles to use the facility's access roads as far as possible.
- Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas.
- Prevent disturbance of natural areas during operation and maintenance activities.
- Post-construction monitoring of bird collision with infrastructure should follow the BirdLife South Africa best practice guidelines for solar energy facilities. If monitoring results indicate excessive bird fatalities, then adaptive mitigations should be implemented. Before implementation, these should be discussed with the avifaunal specialist and ECO and could include the retrofitting/incorporation of additional visual cues/diverters to existing PV panels/infrastructure.
- Insulation where energised parts and/or grounded parts are covered with materials appropriate for providing incidental contact protection to birds. It is best to use suspended insulators and vertical disconnectors, if upright insulators or horizontal disconnectors are present, these should be covered.
- Perch discouragers can be used such as perch guards or spikes. Considerable success achieved by providing artificial bird safe perches, which are placed at a safe distance from the energised parts.
- Only environmentally friendly and biodegradable products should be used for cleaning of the solar panels.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Operator	• Eradication programme for alien invasive plants and noxious weeds. • Training and awareness creation.	Operational Phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
Operator's designated person	Varies from daily to *ad hoc.*	• Compliance with Eradication programme. • Visual inspections (photographic records). • Records of incidents related to flora and fauna. • Proof of training.

12.3.7 Groundwater Management and Monitoring

Management Objective:

- To monitor ground water level fluctuations and establish physical characteristics to identify operational impacts on groundwater resources.
- To establish any contamination of groundwater resources.

Target:

- No significant changes in groundwater levels.
- No contamination trend of groundwater.

Management Actions:

- Groundwater should be monitored for water level fluctuations. The boreholes within the 1km buffer zone should as a minimum be monitored for drawdown, water levels, flow, and abstraction volumes. This should take place annually through a hydrocensus.
- Groundwater should alternatively be monitored as per the requirements of the Water Use License (WUL)/General Authorisation (GA) issued for any new groundwater abstraction that may be required by the project.
- The proposed monitoring type, frequencies and sample analysis are detailed in **Table 13** below.

Table 13: Proposed groundwater monitoring type, frequencies and sample analysis

Site Type	Frequency	Type	Field Measurements	Laboratory Analyses
Borehole	**Operational Phase:** • Physical characteristics annually.	Field assessment and laboratory.	• Water level • Flow • Abstraction • Drawdown • In field measurements of physical groundwater quality parameters	Field measurements of the following physical groundwater quality parameters should be undertaken: • pH; • Electrical Conductivity (EC) • Total Dissolved Solids (TDS) • Temperature. If field measurements indicate a contaminant trend, it is advised that a sample be submitted for analytical testing. The following should typically be screened:

Site Type	Frequency	Type	Field Measurements	Laboratory Analyses
				• pH, Conductivity, Total dissolved solids (TDS), and total suspended solids (TSS) • Biological oxygen demand (BOD). • Calcium, Magnesium, Sodium, Potassium, Carbonate, Bicarbonate, Chloride, Sulphate, Nitrate, Iron, Manganese, Fluoride, Aluminium, Total Alkalinity (TALK), Ammonia, Ammonium. • Total coliforms, E. Coli, Faecal coliforms
Sewer lines	Quarterly visual assessments of maintenance holes and sewer mains intakes and offtakes.	Visual assessment Sample spillage if applicable.	None	As per above.

12.3.8 Management of Socio-Economic Environment

Management Objective:

- Minimise impacts to the socio-economic environment.
- Establish and maintain a record of all complaints against the project and ensure that these are timeously and effectively verified and responded to..

Target:

- No justifiable complaints.
- No direct harm to public / livestock / fauna due to inadequate fencing arrangements.
- Disturbed or damaged perimeter fencing to be reinstated / replaced.

Management Actions:

- Establish lines of communications with stakeholders.
- Implement GRM in operational phase.
- Prevent unauthorised access to the facility.
- Prevent livestock from entering the facility.
- Maintain the facility's perimeter fencing.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Operator	• Compliance with relevant management actions. • Develop and implement GRM. • Inspection of fencing. • Training and awareness creation.	Operational Phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
Operator's designated person	Varies from daily to *ad hoc*	• Documented and functional GRM. • Proof of communication. • Visual inspections (photographic records). • Records of incidents to members of the public / livestock. • Proof of training.

12.3.9 Management of Visual Aspects

Management Objective:

- Minimise impacts to the aesthetics / visual quality of the surrounding area.
- Ensure that the visual appearance of the construction site is not an eyesore the adjacent areas.

Target:

No verified complaints regarding impacts to visual quality.

Management Actions:

- 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.
  - Eradicate invasive alien plant species.

Implementation:

Responsible person	Method of implementation	Timeframe for implementation
Operator	• Compliance with relevant management actions. • Develop and implement GRM. • Training and awareness creation.	Operational Phase.

Monitoring:

Responsible person	Frequency	Evidence of compliance
Operator's designated person	Varies from daily to *ad hoc*	• Documented and functional GRM. • Related entries into Public Complaints Register. • Visual inspections (photographic records). • Proof of training.

APPENDIX H2: Generic EMPr: Substation Infrastructure

GENERIC ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) FOR THE DEVELOPMENT AND EXPANSION OF SUBSTATION INFRASTRUCTURE FOR THE TRANSMISSION AND DISTRIBUTION OF ELECTRICITY

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

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INTRODUCTION

1. Background

The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) requires that an environmental management programme (EMPr) be submitted where an environmental impact assessment (EIA) has been identified as the environmental instrument to be utilised as the basis for a decision on an application for environmental authorisation (EA). The content of an EMPr must either contain the information set out in Appendix 4 of the Environmental Impact Assessment Regulations, 2014, as amended (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 EA, 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 (CA).

2. Purpose

This document constitutes a generic EMPr relevant to applications for the development or expansion of substation infrastructure for the transmission and distribution of electricity, and all listed and specified activities necessary for the realisation of such infrastructure.

3. Objective

The objective of this generic EMPr is to prescribe and pre-approve generally accepted impact management outcomes and impact management actions, which can commonly and repeatedly be used for the avoidance, management and mitigation of impacts and risks associated with the development or expansion of substation infrastructure for the transmission and distribution of electricity. The use of a generic EMPr is intended to reduce the need to prepare and review individual EMPrs for applications of a similar nature.

4. Scope

The scope of this generic EMPr applies to the development or expansion of substation infrastructure for the transmission and distribution of electricity requiring EA in terms of NEMA. This generic EMPr applies to activities requiring EA, mainly activity 11 and 47 of the Environmental Impact Assessment Regulations Listing Notice 1 of 2014, as amended, and activity 9 of the Environmental Impact Assessment Regulations Listing Notice 2 of 2014, as amended, and all associated listed or specified activities necessary for the realization of such infrastructure.

5. Structure of this document

This document is structured in three parts with an Appendix as indicated in the table below:

Part	Section	Heading	Content
A		Provides general guidance and information and is **not legally binding**	Definitions, acronyms, roles & responsibilities and documentation and reporting.
B	1	Pre-approved generic EMPr template	Contains generally accepted impact management outcomes and impact management actions required for the avoidance, management and mitigation of impacts and risks associated with the development or expansion of substation infrastructure for the transmission and distribution of electricity, which are presented in the form of a template that has been pre-approved. The template in this section is to be completed by the contractor, with each completed page signed and dated by the holder of the EA prior to commencement of the activity. Where an impact management outcome is not relevant, the words "not applicable" can be inserted in the template under the "responsible persons" column. Once completed and signed, the template represents the EMPr for the activity approved by the CA and is legally binding. The template **is not required** to be submitted to the CA as once the generic EMPr is gazetted for implementation, it has been approved by the CA. To allow interested and affected parties access to the pre-approved EMPr template for consideration through the decision-making process, the EAP on behalf of the applicant /proponent must make the hard copy of this EMPr available at a public location and where the applicant has a website, the EMPr should also be made available on such publicly accessible website.
	2	Site specific information	Contains preliminary infrastructure layout and a declaration that the applicant/holder of the EA

Part	Section	Heading	Content
			will comply with the pre-approved generic EMPr template contained in Part B: Section 1, and understands that the impact management outcomes and impact management actions are **legally binding**. The preliminary infrastructure layout must be finalized to inform the final EMPr that is to be submitted with the basic assessment report (BAR) or environmental impact assessment report (EIAR), ensuring that all impact management outcomes and impact management actions have been either pre-approved or approved in terms of Part C. This section **must be** submitted to the CA together with the final BAR or EIAR. The information submitted to the CA will be considered to be incomplete should a signed copy of Part B: section 2 not be submitted. Once approved, this Section forms part of the EMPr for the development and is legally binding.
C		Site specific sensitivities/ attributes	If any specific environmental sensitivities/ attributes are present on the site which require site specific impact management outcomes and impact management actions, not included in the pre-approved generic EMPr, to manage impacts, these specific impact management outcomes and impact management actions must be included in this section. These specific environmental attributes must be referenced spatially and impact management outcomes and impact management actions must be provided. These specific impact management outcomes and impact management actions must be presented in the format of the pre-approved EMPr template (Part B: section 1) This section will not be required should the site contain no specific environmental sensitivities or attributes. However, if Part C is applicable to the site, it **is required** to be submitted together with the BAR or EIAR, for consideration of, and decision on, the application for EA. The

Part	Section	Heading	Content
			information in this section must be prepared by an EAP and must contain his/her name and expertise including a curriculum vitae. Once approved, Part C forms part of the EMPr for the site and is legally binding. This section applies only **to additional** impact management outcomes and impact management actions that are necessary for the avoidance, management and mitigation of impacts and risks associated with the specific development or expansion and which are not already included in Part B: section 1.
Appendix 1			Contains the method statements to be prepared prior to commencement of the activity. The method statements are **not required** to be submitted to the competent authority.

6. Completion of part B: section 1: the pre-approved generic EMPr template

The template is to be completed prior to commencement of the activity, by providing the following information for each environmental impact management action:

- For implementation
  - a 'responsible person',
  - a method for implementation,
  - a timeframe for implementation
- For monitoring
  - a responsible person
  - frequency
  - evidence of compliance.

The completed template must be signed and dated by the holder of the EA prior to commencement of the activity. The method statements prepared and agreed to by the holder of the EA must be appended to the template as Appendix 1. Each method statement must be signed and dated on each page by the holder of the EA. This template once signed and dated is legally binding. The holder of the EA will remain responsible for its implementation.

7. Amendments of the impact management outcomes and impact management actions

Once the activity has commenced, a holder of an EA may make amendments to the impact management outcomes and impact management actions in the following manner:

- Amendment of the impact management outcomes: in line with the process contemplated in Regulation 37 of the EIA Regulations; and
- Amendment of the impact management actions: in line with the process contemplated in Regulation 36 of the EIA Regulations.

8. Documents to be submitted as part of part B: section 2 site specific information and declaration

Part B: Section 2 has three distinct sub-sections. The first and third sub-sections are in a template format. Sub-section two requires a map to be produced.

Sub-section 1 contains the project name, the applicant's name and contact details, the site information, which includes coordinates of the property or farm in which the proposed substation infrastructure is proposed as well as the 21-digit Surveyor General code of each cadastral land parcel and, where available, the farm name.

Sub-section 2 is to be prepared by an EAP and must contain his/her name and expertise including a curriculum vitae. This sub-section must include a map of the site sensitivity overlaid with the preliminary infrastructure layout using the national web based environmental screening tool, when available for compulsory use at: https://screening.environment.gov.za/screeningtool. The sensitivity map shall identify the nature of each sensitive feature e.g. threatened plant species, archaeological site, etc. Sensitivity maps shall identify features both within the planned working area and any known sensitive features and within 50 m from the development footprint.

Sub-section 3 is the declaration that the applicant (s)/proponent (s) or holder of the EA in the case of a change of ownership must complete which confirms that the applicant/EA holder will comply with the pre-approved 'generic EMPr' template in Section 1 and understands that the impact management outcomes and impact management actions are legally binding.

(a) Amendments to Part B: Section 2 – site specific information and declaration

Should the EA be transferred, Part B: Section 2 must be completed by the new applicant/proponent and submitted with the application for an amendment of the EA in terms of regulations 29 or 31 of the EIA Regulations, whichever applies. The information submitted as part of such an application for an amendment to an EA will be considered to be incomplete should a signed copy of Part B: Section 2 not be submitted. Once approved, Part B: Section 2 forms part of the EMPr for the development and the EMPr becomes legally binding to the new EA holder.

PART A – GENERAL INFORMATION

1. DEFINITIONS

In this EMPr any word or expression to which a meaning has been assigned in the NEMA or EIA Regulations has that meaning, and unless the context requires otherwise –

"clearing" means the clearing and removal of vegetation, whether partially or in whole, including trees and shrubs, as specified;

"construction camp" is the area designated for key construction infrastructure and services, including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management;

"contractor" - The Contractor has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract, are in line with the Environmental Management Programme and that Method Statements are implemented as described.

"**hazardous substance**" is a substance governed by the Hazardous Substances Act, 1973 (Act No. 15 of 1973) as well as the Hazardous Chemical and Substances Regulations, 1995;

"method statement" means a written submission by the Contractor to the Project Manager in response to this EMPr or a request by the Project Manager and ECO. The method statement must set out the equipment, materials, labour and method(s) the Contractor proposes using to carry out an activity identified by the Project Manager when requesting the Method Statement. This must be done in such detail that the Project Manager and ECO is able to assess whether the Contractor's proposal is in accordance with this specification and/or will produce results in accordance with this specification;

The method statement must cover as a minimum applicable details with regard to:

(i) Construction procedures;
(ii) Plant, materials and equipment to be used;
(iii) Transporting the equipment to and from site;
(iv) How the plant/ material/ equipment will be moved while on site;
(v) How and where the plant/ material/ equipment will be stored;
(vi) The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
(vii) Timing and location of activities;
(viii) Compliance/ non-compliance; and
(ix) Any other information deemed necessary by the Project Manager.

"slope" means the inclination of a surface expressed as one unit of rise or fall for so many horizontal units;

"solid waste" means all solid waste, including construction debris, hazardous waste, excess cement/ concrete, wrapping materials, timber, cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers);

"spoil" means excavated material which is unsuitable for use as material in the construction works or is material which is surplus to the requirements of the construction works;

"topsoil" means a varying depth (up to 300 mm) of the soil profile irrespective of the fertility, appearance, structure, agricultural potential, fertility and composition of the soil;

"works" means the works to be executed in terms of the Contract

2. ACRONYMS and ABBREVIATIONS

CA	Competent Authority
cEO	Contractors Environmental Officer
dEO	Developer Environmental Officer
DPM	Developer Project Manager
DSS	Developer Site Supervisor
EAR	Environmental Audit Report
ECA	Environmental Conservation Act No. 73 of 1989
ECO	Environmental Control Officer
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
ERAP	Emergency Response Action Plan
EMPr	Environmental Management Programme Report
EAP	Environmental Assessment Practitioner
FPA	Fire Protection Agency
HCS	Hazardous chemical Substance
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act ,2004 (Act No. 10 of 2004)
NEMWA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
MSDS	Material Safety Data Sheet
RI&AP's	Registered Interested and affected parties

3. ROLES AND RESPONSIBILITIES FOR ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) IMPLEMENTATION

The effective implementation of this generic EMPr is dependent on established and clear roles, responsibilities and reporting lines within an institutional framework. This section of the EMPr gives guidance to the various environmental roles and reporting lines, however, project specific requirements will ultimately determine the need for the appointment of specific person(s) to undertake specific roles and or responsibilities. As such, it must be noted that in the event that no specific person, for example, an environmental control officer (ECO) is appointed, the holder of the EA remains responsible for ensuring that the duties indicated in this document for action by the ECO are undertaken.

Table 1: *Guide to roles and responsibilities for implementation of an EMPr*

Responsible Person(s)	**Role and Responsibilities**
Developer's Project Manager (DPM)	<u>Role</u> The Project Developer is accountable for ensuring compliance with the EMPr and any conditions of approval from the competent authority (CA). Where required, an environmental control officer (ECO) must be contracted by the Project Developer to objectively monitor the implementation of the EMPr according to relevant environmental legislation, and the conditions of the environmental authorisation (EA). The Project Developer is further responsible for providing and giving mandate to enable the ECO to perform responsibilities, and he must ensure that the ECO is integrated as part of the project team while remaining independent. <u>Responsibilities</u> - Be fully conversant with the conditions of the EA; - Ensure that all stipulations within the EMPr are communicated and adhered to by the Developer and its Contractor(s); - Issuing of site instructions to the Contractor for corrective actions required; - Monitor the implementation of the EMPr throughout the project by means of site inspections and meetings. Overall management of the project and EMPr implementation; and - Ensure that periodic environmental performance audits are undertaken on the project implementation.

Responsible Person(s)	Role and Responsibilities
Developer Site Supervisor (DSS)	Role The DSS reports directly to the DPM, oversees site works, liaises with the contractor(s) and the ECO. The DSS is responsible for the day to day implementation of the EMPr and for ensuring the compliance of all contractors with the conditions and requirements stipulated in the EMPr. Responsibilities - Ensure that all contractors identify a contractor's Environmental Officer (cEO); - Must be fully conversant with the conditions of the EA. Oversees site works, liaison with Contractor, DPM and ECO; - Must ensure that all landowners have the relevant contact details of the site staff, ECO and cEO; - Issuing of site instructions to the Contractor for corrective actions required; - Will issue all non-compliances to contractors; and - Ratify the Monthly Environmental Report.
Environmental Control Officer (ECO)	Role The ECO should have appropriate training and experience in the implementation of environmental management specifications. The primary role of the ECO is to act as an independent quality controller and monitoring agent regarding all environmental concerns and associated environmental impacts. In this respect, the ECO is to conduct periodic site inspections, attend regular site meetings, pre-empt problems and suggest mitigation and be available to advise on incidental issues that arise. The ECO is also required to conduct compliance audits, verifying the monitoring reports submitted by the cEO. The ECO provides feedback to the DSS and Project Manager regarding all environmental matters. The Contractor, cEO and dEO are answerable to the Environmental Control Officer for non-compliance with the Performance Specifications as set out in the EA and EMPr. The ECO provides feedback to the DSS and Project Manager, who in turn reports back to the Contractor and potential and Registered Interested &Affected Parties' (RI&AP's), as required. Issues of non-compliance raised by the ECO must be taken up by the Project Manager, and resolved with the Contractor as per the conditions of his contract. Decisions regarding environmental procedures, specifications and requirements which have a cost implication (i.e. those that are deemed to be a

Responsible Person(s)	Role and Responsibilities
	variation, not allowed for in the Performance Specification) must be endorsed by the Project Manager. The ECO must also, as specified by the EA, report to the relevant CA as and when required. <u>Responsibilities</u> The responsibilities of the ECO will include the following: - Be aware of the findings and conclusions of all EA related to the development; - Be familiar with the recommendations and mitigation measures of this EMPr; - Be conversant with relevant environmental legislation, policies and procedures, and ensure compliance with them; - Undertake regular and comprehensive site inspections / audits of the construction site according to the generic EMPr and applicable licenses in order to monitor compliance as required; - Educate the construction team about the management measures contained in the EMPr and environmental licenses; - Compilation and administration of an environmental monitoring plan to ensure that the environmental management measures are implemented and are effective; - Monitoring the performance of the Contractors and ensuring compliance with the EMPr and associated Method Statements; - In consultation with the Developer Site Supervisor order the removal of person(s) and/or equipment which are in contravention of the specifications of the EMPr and/or environmental licenses; - Liaison between the DPM, Contractors, authorities and other lead stakeholders on all environmental concerns; - Compile a regular environmental audit report highlighting any non-compliance issues as well as satisfactory or exceptional compliance with the EMPr; - Validating the regular site inspection reports, which are to be prepared by the contractor Environmental Officer (cEO); - Checking the cEO's record of environmental incidents (spills, impacts, legal transgressions etc.) as well as corrective and preventive actions taken; - Checking the cEO's public complaints register in which all complaints are recorded, as well as action taken;

Responsible Person(s)	Role and Responsibilities
	- Assisting in the resolution of conflicts; - Facilitate training for all personnel on the site – this may range from carrying out the training, to reviewing the training programmes of the Contractor; - In case of non-compliances, the ECO must first communicate this to the Senior Site Supervisor, who has the power to ensure this matter is addressed. Should no action or insufficient action be taken, the ECO may report this matter to the authorities as non-compliance; - Maintenance, update and review of the EMPr; - Communication of all modifications to the EMPr to the relevant stakeholders.
developer Environmental Officer (dEO)	<u>Role</u> The dEOs will report to the Project Manager and are responsible for implementation of the EMPr, environmental monitoring and reporting, providing environmental input to the Project Manager and Contractor's Manager, liaising with contractors and the landowners as well as a range of environmental coordination responsibilities. <u>Responsibilities</u> - Be fully conversant with the EMPr; - Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures; - Ensure that all stipulations within the EMPr are communicated and adhered to by the Employees, Contractor(s) ; - Confine the development site to the demarcated area; - Conduct environmental internal audits with regards to EMPr and authorisation compliance (on cEO); - Assist the contractors in addressing environmental challenges on site; - Assist in incident management: - Reporting environmental incidents to developer and ensuring that corrective action is taken, and lessons learnt shared; - Assist the contractor in investigating environmental incidents and compile investigation reports; - Follow-up on pre-warnings, defects, non-conformance reports;

Responsible Person(s)	Role and Responsibilities
	- Measure and communicate environmental performance to the Contractor; - Conduct environmental awareness training on site together with ECO and cEO; - Ensure that the necessary legal permits and / or licenses are in place and up to date; - Acting as Developer's Environmental Representative on site and work together with the ECO and contractor;
Contractor	<u>Role</u> The Contractor appoints the cEO and has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract are in line with the EMPr and that Method Statements are implemented as described. External contractors must ensure compliance with this EMPr while performing the onsite activities as per their contract with the Project Developer. The contractors are required, where specified, to provide Method Statements setting out in detail how the impact management actions contained in the EMPr will be implemented during the development or expansion of substation infrastructure for the transmission and distribution of electricity activities. <u>Responsibilities</u> - project delivery and quality control for the development services as per appointment; - employ a suitably qualified person to monitor and report to the Project Developer's appointed person on the daily activities on-site during the construction period; - ensure that safe, environmentally acceptable working methods and practices are implemented and that equipment is properly operated and maintained, to facilitate proper access and enable any operation to be carried out safely; - attend on site meeting(s) prior to the commencement of activities to confirm the procedure and designated activity zones; - ensure that contractors' staff repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in EMPr, to the satisfaction of the ECO.

Responsible Person(s)	Role and Responsibilities
contractor Environmental Officer (cEO)	<u>Role</u> Each Contractor affected by the EMPr should appoint a cEO, who is responsible for the on-site implementation of the EMPr (or relevant sections of the EMPr). The Contractor's representative can be the site agent; site engineer; a dedicated environmental officer; or an independent consultant. The Contractor must ensure that the Contractor's Representative is suitably qualified to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the Environmental Control Officer and the public. As a minimum the cEO shall meet the following criteria: <u>Responsibilities</u> - Be on site throughout the duration of the project and be dedicated to the project; - Ensure all their staff are aware of the environmental requirements, conditions and constraints with respect to all of their activities on site; - Implementing the environmental conditions, guidelines and requirements as stipulated within the EA, EMPr and Method Statements; - Attend the Environmental Site Meeting; - Undertaking corrective actions where non-compliances are registered within the stipulated timeframes; - Report back formally on the completion of corrective actions; - Assist the ECO in maintaining all the site documentation; - Prepare the site inspection reports and corrective action reports for submission to the ECO; - Assist the ECO with the preparing of the monthly report; and - Where more than one Contractor is undertaking work on site, each company appointed as a Contractor will appoint a cEO representing that company.

4. ENVIRONMENTAL DOCUMENTATION REPORTING AND COMPLIANCE

To ensure accountable and demonstrated implementation of the EMPr, a number of reporting systems, documentation controls and compliance mechanisms must be in place for all substation infrastructure projects as a minimum requirement.

4.1 Document control/Filing system

The holder of the EA is solely responsible for the upkeep and management of the EMPr file. As a minimum, all documentation detailed below will be stored in the EMPr file. A hard copy of all documentation shall be filed, while an electronic copy may be kept where relevant. A duplicate file will be maintained in the office of the DSS (where applicable). This duplicate file must remain current and up-to-date. The filing system must be updated and relevant documents added as required. The EMPr file must be made available at all times on request by the CA or other relevant authorities. The EMPr file will form part of any environmental audits undertaken as prescribed in the EIA Regulations.

4.2 Documentation to be available

At the outset of the project the following preliminary list of documents shall be placed in the filing system and be accessible at all times:

- Full copy of the signed EA from the CA in terms of NEMA, granting approval for the development or expansion;
- Copy of the generic and site specific EMPr as well as any amendments thereof;
- Copy of declaration of implementing generic EMPr and subsequent approval of site specific EMPr and amendments thereof;
- All method statements;
- Completed environmental checklists;
- Minutes and attendance register of environmental site meetings;
- An up-to-date environmental incident log;
- A copy of all instructions or directives issued;
- A copy of all corrective actions signed off. The corrective actions must be filed in such a way that a clear reference is made to the non-compliance record;
- Complaints register.

4.3 Weekly Environmental Checklist

The ECOs are required to complete a Weekly Environmental Checklist, the format of which is to be agreed prior to commencement of the activity. The ECOs are required to sign and date the checklist, retain a copy in the EMPr file and submit a copy of the completed checklist to the DSS on a weekly basis.

The checklists will form the basis for the Monthly Environmental Reports. Copies of all completed checklists will be attached as Annexures to the Environmental Audit Report as required in terms of the EIA Regulations.

4.4 Environmental site meetings

Minutes of the environmental site meetings shall be kept. The minutes must include an attendance register and will be attached to the Monthly Report that is distributed to attendees. Each set of minutes must clearly record "Matters for Attention" that will be reviewed at the next meeting.

4.5 Required Method Statements

The method statement will be done in such detail that the ECOs are enabled to assess whether the contractor's proposal is in accordance with the EMPr.

The method statement must cover applicable details with regard to:

- development procedures;
- materials and equipment to be used;
- getting the equipment to and from site;
- how the equipment/ material will be moved while on site;
- how and where material will be stored;
- the containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
- timing and location of activities;
- compliance/ non-compliance with the EMPr; and
- any other information deemed necessary by the ECOs.

Unless indicated otherwise by the Project Manager, the Contractor shall provide the following method statements to the Project Manager no less than 14 days prior to the commencement date of the activity:

- Site establishment – Camps, Lay-down or storage areas, satellite camps, infrastructure;
- Batch plants;
- Workshop or plant servicing;
- Handling, transport and storage of Hazardous Chemical Substance's;
- Vegetation management – Protected, clearing, aliens, felling;
- Access management – Roads, gates, crossings etc.;
- Fire plan;
- Waste management – transport, storage, segregation, classification, disposal (all waste streams);
- Social interaction – complaints management, compensation claims, access to properties etc.;
- Water – use (source, abstraction and disposal), access and all related information, crossings and mitigation;
- Emergency preparedness – Spills, training, other environmental emergencies;
- Dust and noise management methodologies;
- Fauna interaction and risk management – only if the risk was identified – wildlife interaction especially on game farms; and
- Heritage and palaeontology management.

The ECOs shall monitor and ensure that the contractors perform in accordance with these method statements. Completed and agreed method statements between the holder of the EA and the contractor shall be captured in Appendix 1.

4.6 Environmental Incident Log (Diary)

The ECOs are required to maintain an up-to-date and current Environmental Incident Log (environmental diary). The Environmental Incident Log is a means to record all environmental incidents and/or all non-compliance notice would not be issued. An environmental incident is defined as:

- Any deviation from the listed impact management actions (listed in this EMPr) that may be addressed immediately by the ECOs. (For example a contractor's staff member littering or a drip tray that has not been emptied);
- Any environmental impact resulting from an action or activity by a contractor in contravention of the environmental stipulations and guidelines listed in the EMPr which as a single event would have a minor impact but which if cumulative and continuous would have a significant effect (for example no toilet paper available in the ablutions for an afternoon); and
- General environmental information such as road kills or injured wildlife.

The ECOs are to record all environmental incidents in the Environmental Incident Log. All incidents regardless of severity must be reported to the Developer. The Log is to be kept in the EMPr file and at a minimum the following will be recorded for each environmental incident:

- The date and time of the incident;
- Description of the incident;
- The name of the Contractor responsible;
- The incident must be listed as significant or minor;
- If the incident is listed as significant, a non-compliance notice must be issued, and recorded in the log;
- Remedial or corrective action taken to mitigate the incident; and
- Record of repeat minor offences by the same contractor or staff member.

The Environmental Incident Log will be captured in the EAR.

4.7 Non-compliance

A non-compliance notice will be issued to the responsible contractor by the ECOs via the DSS or Project Manager. The non-compliance notice will be issued in writing; a copy filed in the EMPr file and will at a minimum include the following:

- Time and date of the non-compliance;
- Name of the contractor responsible;
- Nature and description of the non-compliance;
- Recommended / required corrective action; and
- Date by which the corrective action to be completed.
- The contractors shall act immediately when a notice of non-compliance is received and correct whatever is the cause for the issuing of the notice.

Complaints received regarding activities on the development site pertaining to the environment shall be recorded in a dedicated register and the response noted with the date and action taken. The ECO should be made aware of any complaints. Any non-compliance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define the manner by which the environment is managed. Failure to redress the cause shall be reported to the relevant CA for them to deal with the transgression, as it deems fit. The contractor is deemed not to have complied with the EMPr if, inter alia, There is a deviation from the environmental conditions, impact management outcomes and impact management actions activities, as approved in generic and site specific EMPr as relevant as set out in the EMPr, which deviation has, or may cause, an environmental impact.

4.8 Corrective action records

For each non-compliance notice issued, a documented corrective action must be recorded. On receiving a non-compliance notice from the DSS, the contractor's cEO will ensure that the corrective actions required take place within the stipulated timeframe. On completion of the corrective action the cEO is to issue a Corrective Action Report in writing to the ECOs. If satisfied that the corrective action has been completed, the ECOs are to sign-off on the Corrective Action Report, and attach the report to the non-compliance notice in the EMPr file. A corrective action is considered complete once the report has signed off by the ECOs.

4.9 Photographic record

A digital photographic record will be kept. The photographic record will be used to show before, during and post rehabilitation evidence of the project as well used in cases of damages claims if they arise. Each image must be dated and a brief description note attached.

The Contractor shall:

1. Allow the ECOs access to take photographs of all areas, activities and actions.

The ECOs shall keep an electronic database of photographic records which will include:

1. Pictures of all areas designated as work areas, camp areas, development sites and storage areas taken before these areas are set up;
2. All bunding and fencing;
3. Road conditions and road verges;
4. Condition of all farm fences;
5. Topsoil storage areas;
6. All areas to be cordoned off during construction;
7. Waste management sites;
8. Ablution facilities (inside and out);
9. Any non-conformances deemed to be "significant";
10. All completed corrective actions for non-compliances;
11. All required signage;
12. Photographic recordings of incidents;
13. All areas before, during and post rehabilitation; and

14. Include relevant photographs in the Final Environmental Audit Report.

4.10 Complaints register

The ECOs shall keep a current and up-to-date complaints register. The complaints register is to be a record of all complaints received from communities, stakeholders and individuals. The Complaints Record shall:

1. Record the name and contact details of the complainant;
2. Record the time and date of the complaint;
3. Contain a detailed description of the complaint;
4. Where relevant and appropriate, contain photographic evidence of the complaint or damage (ECOs to take relevant photographs); and
5. Contain a copy of the ECOs written response to each complaint received and keep a record of any further correspondence with the complainant. The ECO's written response will include a description of any corrective action to be taken and must be signed by the Contractor, ECO and affected party. Where a damage claim is issued by the complainant, the ECOs shall respond as described in (**section 4.11**) below.

4.11 Claims for damages

In the event that a Claim for Damages is submitted by a community, landowner or individual, the ECOs shall:

1. Record the full detail of the complaint as described in (**section 4.10**) above;
2. The DPM will evaluate the claim and associated damage and submit the evaluation to the Senior Site Representative for approval;
3. Following consideration by the DPM, the claim is to be resolved and settled immediately, or the reason for not accepting the claim communicated in writing to the claimant. Should the claimant not accept this, the ECO shall, in writing report the incident to the Developer's negotiator and legal department; and
4. A formal record of the response by the ECOs to the claimant as well as the rectification of the method of making payments not amount will be recorded in the EMPr file.

4.12 Interactions with affected parties

Open, transparent and good relations with affected landowners, communities and regional staff are an essential aspect to the successful management and mitigation of environmental impacts.

The ECOs shall:

1. Ensure that all queries, complaints and claims are dealt within an agreed timeframe;
2. Ensure that any or all agreements are documented, signed by all parties and a record of the agreement kept in the EMPr file;
3. Ensure that a complaints telephone numbers are made available to all landowners and affected parties; and

4. Ensure that contact with affected parties is courteous at all times;

4.13 Environmental audits

Internal environmental audits of the activity and implementation of the EMPr must be undertaken. The findings and outcomes included in the EMPr file and submitted to the CA at intervals as indicated in the EA.

The ECOs must prepare a monthly EAR. The report will be tabled as the key point on the agenda of the Environmental Site Meeting. The Report is submitted for acceptance at the meeting and the final report will be circulated to the Project Manager and filed in the EMPr file. At a frequency determined by the EA, the ECOs shall submit the monthly reports to the CA. At a minimum the monthly report is to cover the following:

- Weekly Environmental Checklists;
- Deviations and non-compliances with the checklists;
- Non-compliances issued;
- Completed and reported corrective actions;
- Environmental Monitoring;
- General environmental findings and actions; and
- Minutes of the Bi-monthly Environmental Site Meetings.

4.14 Final environmental audits

On final completion of the rehabilitation and/or requirements of the EA a final EAR is to be prepared and submitted to the CA. The EAR must comply with Appendix 7 of the EIA Regulations.

PART B: SECTION 1: Pre-approved generic EMPr template

5. IMPACT MANAGEMENT OUTCOMES AND IMPACT MANAGEMENT ACTIONS

This section provides a pre-approved generic EMPr template with aspects that are common to the development of substation infrastructure for the transmission and distribution of electricity. There is a list of aspects identified for the development or expansion of substation infrastructure for the transmission and distribution of electricity, and for each aspect a set of prescribed impact management outcomes and associated impact management actions have been identified. Holders of EAs are responsible to ensure the implementation of these outcomes and actions for all projects as a minimum requirement, in order to mitigate the impact of such aspects identified for the development or expansion of substation infrastructure for the transmission and distribution of electricity.

The template provided below is to be completed by providing the information under each heading for each environmental impact management action.

The completed template must be signed and dated on each page by both the contractor and the holder of the EA prior to commencement of the activity. The method statements prepared and agreed to by the holder of the EA must be appended to the template as Appendix 1. Each method statement must also be duly signed and dated on each page by the contactor and the holder of the EA. This template, once signed and dated, is legally binding. The holder of the EA will remain responsible for its implementation.

5.1 Environmental awareness training

Impact management outcome: All onsite staff are aware and understands the individual responsibilities in terms of this EMPr.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All staff must receive environmental awareness training prior to commencement of the activities; – The Contractor must allow for sufficient sessions to train all personnel with no more than 20 personnel attending each course; – Refresher environmental awareness training is available as and when required; – All staff are aware of the conditions and controls linked to the EA and within the EMPr and made aware of their individual roles and responsibilities in achieving compliance with the EA and EMPr; – The Contractor must erect and maintain information posters at key locations on site, and the posters must include the following information as a minimum: a) Safety notifications; and b) No littering. – Environmental awareness training must include as a minimum the following: a) Description of significant environmental impacts, actual or potential, related to their work activities; b) Mitigation measures to be implemented when carrying out specific activities;	**Contractor & cEO**	**Contractor to provide Training Programme** **Induction course** **Refresher** **Daily toolbox talks** **Courses to be provided by suitably qualified persons and in a language and medium understood by the workers** **Erect signage and place posters**	**From pre-construction and throughout the duration of the construction period**	**dEO & ECO**	**Monthly**	**Records of training and awareness creation (e.g. training material, training programme, completed attendance registers, etc.)**

c) Emergency preparedness and response procedures; d) Emergency procedures; e) Procedures to be followed when working near or within sensitive areas; f) Wastewater management procedures; g) Water usage and conservation; h) Solid waste management procedures; i) Sanitation procedures; j) Fire prevention; and k) Disease prevention. – A record of all environmental awareness training courses undertaken as part of the EMPr must be available; – Educate workers on the dangers of open and/or unattended fires; – A staff attendance register of all staff to have received environmental awareness training must be available. – Course material must be available and presented in appropriate languages that all staff can understand.						

5.2 Site Establishment development

Impact management outcome: Impacts on the environment are minimised during site establishment and the development footprint are kept to demarcated development area.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– A method statement must be provided by the contractor prior to any onsite activity that includes the layout of the construction camp in the form of a plan showing the location of key infrastructure and services (where applicable), including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous materials storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management; – Location of camps must be within approved area to ensure that the site does not impact on sensitive areas identified in the environmental assessment or site walk through; – Sites must be located where possible on previously disturbed areas; – The camp must be fenced in accordance with ***Section 5.5: Fencing and gate installation***; and – The use of existing accommodation for contractor staff, where possible, is encouraged.	**Contractor**	**Site Establishment Method Statement to be provided by the Contractor**	**Pre-construction & construction phases**	**dEO & ECO**	**Monthly**	**Approved method statement** **Evidence of site establishment in accordance with method statement (photographic records)**

5.3 Access restricted areas

Impact management outcome: Access to restricted areas prevented.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identification of access restricted areas is to be informed by the environmental assessment, site walk through and any additional areas identified during development; – Erect, demarcate and maintain a temporary barrier with clear signage around the perimeter of any access restricted area, colour coding could be used if appropriate; and – Unauthorised access and development related activity inside access restricted areas is prohibited.	**Contractor & cEO**	**Report capturing findings of site walk through (pre-construction survey)** **Training** **Method Statement for barricading**	**Pre-construction & construction phases**	**dEO & ECO**	**Monthly**	**Pre-construction survey report** **Approved method statement** **Inspection of barricading (photographic records)** **Visible signage (photographic records)** **Proof of training**

5.4 Access roads

Impact management outcome: Minimise impact to the environment through the planned and restricted movement of vehicles on site.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– An access agreement must be formalised and signed by the DPM, Contractor and landowner before commencing with the activities; – All private roads used for access to the servitude must be maintained and upon completion of the works, be left in at least the original condition – All contractors must be made aware of all these access routes. – Any access route deviation from that in the written agreement must be closed and re-vegetated immediately, at the contractor's expense; – Maximum use of both existing servitudes and existing roads must be made to minimize further disturbance through the development of new roads; – In circumstances where private roads must be used, the condition of the said roads must be recorded in accordance with ***section 4.9: photographic record***; prior to use and the condition thereof agreed by the landowner, the DPM, and the contractor; – Access roads in flattish areas must follow fence lines and tree belts to avoid fragmentation of vegetated areas or	**DPM & Contractor**	**Signed agreements with landowners** **Mapped access roads** **Inspection of conditions of private roads** **Rehabilitation Method Statement to include temporary access roads** **Training**	**Pre-construction & construction phases**	**dEO & ECO**	**Monthly**	**Visible signage (photographic records)** **Proof of training** **Related entries into Public Complaints Register** **Inspection of access roads (photographic records)** **Approved method statement**

croplands – Access roads must only be developed on a pre-planned and approved roads.						

5.5 Fencing and Gate installation

Impact management outcome: Minimise impact to the environment and ensure safe and controlled access to the site through the erection of fencing and gates where required.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Use existing gates provided to gain access to all parts of the area authorised for development, where possible; – Existing and new gates to be recorded and documented in accordance with **section *4.9: photographic record***; – All gates must be fitted with locks and be kept locked at all times during the development phase, unless otherwise agreed with the landowner; – At points where the line crosses a fence in which there is no suitable gate within the extent of the line servitude, on the instruction of the DPM, a gate must be installed at the approval of the landowner; – Care must be taken that the gates must be so erected that there is a gap of no more than 100 mm between the bottom of the gate and the ground;	**DPM & Contractor**	**Signed agreements with landowners** **Mapped access roads and gates** **Inspection of access gates** **Method statement for fencing and gate installation** **Training**	**Pre-construction & construction phases**	**dEO & ECO**	**Monthly**	**Inspection of access gates (photographic records)** **Related entries into Public Complaints Register** **Approved method statement**

– Where gates are installed in jackal proof fencing, a suitable reinforced concrete sill must be provided beneath the gate; – Original tension must be maintained in the fence wires; – All gates installed in electrified fencing must be re-electrified; – All demarcation fencing and barriers must be maintained in good working order for the duration of the development activities; – Fencing must be erected around the camp, batching plants, hazardous storage areas, and all designated access restricted areas, where applicable; – Any temporary fencing to restrict the movement of life-stock must only be erected with the permission of the land owner. – All fencing must be developed of high quality material bearing the SABS mark; – The use of razor wire as fencing must be avoided; – Fenced areas with gate access must remain locked after hours, during weekends and on holidays if staff is away from site. Site security will be required at all times; – On completion of the development phase all temporary fences are to be removed; – The contractor must ensure that all fence uprights are appropriately removed, ensuring that no uprights are cut at ground level but rather removed completely.						

5.6 Water Supply Management

Impact management outcome: Undertake responsible water usage.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All abstraction points or bore holes must be registered with the DWS and suitable water meters installed to ensure that the abstracted volumes are measured on a daily basis; – The Contractor must ensure the following: a. The vehicle abstracting water from a river does not enter or cross it and does not operate from within the river; b. No damage occurs to the river bed or banks and that the abstraction of water does not entail stream diversion activities; and c. All reasonable measures to limit pollution or sedimentation of the downstream watercourse are implemented. – Ensure water conservation is being practiced by: a. Minimising water use during cleaning of equipment; b. Undertaking regular audits of water systems; and c. Including a discussion on water usage and conservation during environmental awareness training. d. The use of grey water is encouraged.	**Contractor & cEO**	**Monitoring of water abstraction volumes** **Inspection of water abstraction point (if applicable)** **Training**	**From registration of use with DWS (if applicable) and throughout the period during which water is abstracted**	**dEO & ECO**	**Daily (dEO) & Monthly (ECO)**	**Proof of registration from DWS (if applicable)** **Monitoring records of water use** **Visual inspections (photographic records)**

5.7 Storm and waste water management

Impact management outcome: Impacts to the environment caused by storm water and wastewater discharges during construction are avoided.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Runoff from the cement/ concrete batching areas must be strictly controlled, and contaminated water must be collected, stored and either treated or disposed of off-site, at a location approved by the project manager; – All spillage of oil onto concrete surfaces must be controlled by the use of an approved absorbent material and the used absorbent material disposed of at an appropriate waste disposal facility; – Natural storm water runoff not contaminated during the development and clean water can be discharged directly to watercourses and water bodies, subject to the Project Manager's approval and support by the ECO; – Water that has been contaminated with suspended solids, such as soils and silt, may be released into watercourses or water bodies only once all suspended solids have been removed from the water by settling out these solids in settlement ponds. The release of settled water back into the environment must be subject to the Project Manager's approval and support by the ECO.	**Contractor & cEO**	**Method statement for managing storm water and runoff** **Inspection of cement/ concrete batching areas and settlement ponds** **Training**	**Pre-construction & construction phases**	**ECO**	**Monthly**	**Approved method statement** **Visual inspections (photographic records)** **Disposal records** **Proof of training**

5.8 Solid and hazardous waste management

Impact management outcome: Wastes are appropriately stored, handled and safely disposed of at a recognised waste facility.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All measures regarding waste management must be undertaken using an integrated waste management approach; – Sufficient, covered waste collection bins (scavenger and weatherproof) must be provided; – A suitably positioned and clearly demarcated waste collection site must be identified and provided; – The waste collection site must be maintained in a clean and orderly manner; – Waste must be segregated into separate bins and clearly marked for each waste type for recycling and safe disposal; – Staff must be trained in waste segregation; – Bins must be emptied regularly; – General waste produced onsite must be disposed of at registered waste disposal sites/ recycling company; – Hazardous waste must be disposed of at a registered waste disposal site; – Certificates of safe disposal for general, hazardous and recycled waste must be maintained.	**Contractor & cEO**	**Method statement for waste management** **Service agreements with waste service providers** **Training**	**Pre-construction & construction phases**	**dEO & ECO**	**Monthly**	**Approved method statement** **Waste management and disposal records** **Visual inspections of waste management facilities (photographic records)** **Proof of training**

5.9 Protection of watercourses and estuaries

Impact management outcome: Pollution and contamination of the watercourse environment and or estuary erosion are prevented.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All watercourses must be protected from direct or indirect spills of pollutants such as solid waste, sewage, cement, oils, fuels, chemicals, aggregate tailings, wash and contaminated water or organic material resulting from the Contractor's activities; – In the event of a spill, prompt action must be taken to clear the polluted or affected areas; – Where possible, no development equipment must traverse any seasonal or permanent wetland – No return flow into the estuaries must be allowed and no disturbance of the Estuarine functional Zone should occur; – Development of permanent watercourse or estuary crossing must only be undertaken where no alternative access to tower position is available; – There must not be any impact on the long term morphological dynamics of watercourses or estuaries; – Existing crossing points must be favored over the creation of new crossings (including temporary access) – When working in or near any watercourse or estuary, the following environmental controls and consideration must be	**Contractor & cEO**	**Inspections of watercourses** **Rehabilitation Method Statement to include watercourses** **Training**	**Pre-construction & construction phases**	**dEO & ECO**	**Monthly**	**Visual inspections of watercourses (photographic records)** **Approved method statement** **Proof of training**

taken: a) Water levels during the period of construction; No altering of the bed, banks, course or characteristics of a watercourse b) During the execution of the works, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g. including ensuring that construction equipment is well maintained; c) Where earthwork is being undertaken in close proximity to any watercourse, slopes must be stabilised using suitable materials, i.e. sandbags or geotextile fabric, to prevent sand and rock from entering the channel; and d) Appropriate rehabilitation and re-vegetation measures for the watercourse banks must be implemented timeously. In this regard, the banks should be appropriately and incrementally stabilised as soon as development allows.						

5.10 Vegetation clearing

Impact management outcome: Vegetation clearing is restricted to the authorised development footprint of the proposed infrastructure.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
General: – Indigenous vegetation which does not interfere with the development must be left undisturbed; – Protected or endangered species may occur on or near the development site. Special care should be taken not to damage such species; – Search, rescue and replanting of all protected and endangered species likely to be damaged during project development must be identified by the relevant specialist and completed prior to any development or clearing; – Permits for removal must be obtained from the relevant CA prior to the cutting or clearing of the affected species, and they must be filed; – The Environmental Audit Report must confirm that all identified species have been rescued and replanted and that the location of replanting is compliant with conditions of approvals; – Trees felled due to construction must be documented and	**Contractor & cEO**	**Report capturing findings of site walk through (pre-construction survey)** **Method Statement for managing Species of Conservation Concern (SCC)** **Method Statement for managing alien invasive species** **Management programme for managing alien invasive species during the operational phase**	**Pre-construction, construction & operational phases**	**dEO & ECO**	**Daily (dEO) & Monthly (ECO)**	**Pre-construction survey report** **Permits on record (if applicable)** **Records of felled trees** **Records of herbicide usage** **Visual inspections (photographic records), including relocated species**

form part of the Environmental Audit Report; – Rivers and watercourses must be kept clear of felled trees, vegetation cuttings and debris; – Only a registered pest control operator may apply herbicides on a commercial basis and commercial application must be carried out under the supervision of a registered pest control operator, supervision of a registered pest control operator or is appropriately trained; – A daily register must be kept of all relevant details of herbicide usage; – No herbicides must be used in estuaries; – All protected species and sensitive vegetation not removed must be clearly marked and such areas fenced off in accordance to ***Section 5.3: Access restricted areas***. Alien invasive vegetation must be removed and disposed of at a licensed waste management facility.		**Applications for permits (if applicable)** **Identification of felled trees** **Daily register of herbicide usage** **Training**				**Approved method statement** **Proof of training**

5.11 Protection of fauna

Impact management outcome: Disturbance to fauna is minimised.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– No interference with livestock must occur without the landowner's written consent and with the landowner or	**Contractor &**	**Agreements with landowners**	**Pre-construction, construction and**	**dEO & ECO**	**Monthly**	**Pre-construction**

a person representing the landowner being present; – The breeding sites of raptors and other wild birds species must be taken into consideration during the planning of the development programme; – Breeding sites must be kept intact and disturbance to breeding birds must be avoided. Special care must be taken where nestlings or fledglings are present; – Special recommendations of the avian specialist must be adhered to at all times to prevent unnecessary disturbance of birds; – No poaching must be tolerated under any circumstances. All animal dens in close proximity to the works areas must be marked as Access restricted areas; – No deliberate or intentional killing of fauna is allowed; – In areas where snakes are abundant, snake deterrents to be deployed on the pylons to prevent snakes climbing up, being electrocuted and causing power outages; and – No Threatened or Protected species (ToPs) and/or protected fauna as listed according NEMBA (Act No. 10 of 2004) and relevant provincial ordinances may be removed and/or relocated without appropriate authorisations/permits.	**cEO**	**Report capturing findings of site walk through (pre-construction survey)** **Method Statement for managing SCC** **Applications for permits (if applicable)** **Training**	**operational phases**			**survey report** **Permits on record (if applicable)** **Related entries into Public Complaints Register** **Visual inspections (photographic records)** **Proof of training**

5.12 Protection of heritage resources

Impact management outcome: Impact to heritage resources is minimised.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identify, demarcate and prevent impact to all known sensitive heritage features on site in accordance with the No-Go procedure in ***Section 5.3: Access restricted areas***; – Carry out general monitoring of excavations for potential fossils, artefacts and material of heritage importance; – All work must cease immediately, if any human remains and/or other archaeological, palaeontological and historical material are uncovered. Such material, if exposed, must be reported to the nearest museum, archaeologist/ palaeontologist (or the South African Police Services), so that a systematic and professional investigation can be undertaken. Sufficient time must be allowed to remove/collect such material before development recommences.	**Contractor & cEO**	**Report capturing findings of site walk through (pre-construction survey)** **Barricading & signage** **Applications for permits (if applicable)** **Training**	**Pre-construction & construction phases**	**dEO & ECO**	**Monthly**	**Pre-construction survey report** **Permits on record (if applicable)** **Inspection of barricading and visible signage (photographic records)** **Visual inspections (photographic records)** **Records of chance finds**

						Proof of training

5.13 Safety of the public

Impact management outcome: All precautions are taken to minimise the risk of injury, harm or complaints.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identify fire hazards, demarcate and restrict public access to these areas as well as notify the local authority of any potential threats e.g. large brush stockpiles, fuels etc.; – All unattended open excavations must be adequately fenced or demarcated; – Adequate protective measures must be implemented to prevent unauthorised access to and climbing of partly constructed towers and protective scaffolding; – Ensure structures vulnerable to high winds are secured; – Maintain an incidents and complaints register in which all incidents or complaints involving the public are logged.	**Contractor & cEO**	**Barricading & signage** **Training** **Method Statement for managing excavations**	**Pre-construction, construction and operational phases**	**dEO & ECO**	**Monthly**	**Inspection of barricading and visible signage (photographic records)** **Related entries into Public Complaints Register** **Visual inspections (photographic records)** **Approved**

						method statement **Proof of training**

5.14 Sanitation

Impact management outcome: Clean and well maintained toilet facilities are available to all staff in an effort to minimise the risk of disease and impact to the environment.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Mobile chemical toilets are installed onsite if no other ablution facilities are available; – The use of ablution facilities and or mobile toilets must be used at all times and no indiscriminate use of the veld for the purposes of ablutions must be permitted under any circumstances; – Where mobile chemical toilets are required, the following must be ensured: a) Toilets are located no closer than 100 m to any watercourse or water body; b) Toilets are secured to the ground to prevent them from toppling due to wind or any other cause;	**Contractor & cEO**	**Schedule for cleaning toilets** **Service agreements with sanitation service providers** **Training**	**Pre-construction & construction phases**	**dEO & ECO**	**Monthly**	**Disposal records** **Visual inspections (photographic records)** **Proof of training**

c) No spillage occurs when the toilets are cleaned or emptied and the contents are managed in accordance with the EMPr; d) Toilets have an external closing mechanism and are closed and secured from the outside when not in use to prevent toilet paper from being blown out; e) Toilets are emptied before long weekends and workers holidays, and must be locked after working hours; f) Toilets are serviced regularly and the ECO must inspect toilets to ensure compliance to health standards; – A copy of the waste disposal certificates must be maintained.						

5.15 Prevention of disease

Impact Management outcome: All necessary precautions linked to the spread of disease are taken.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Undertake environmentally-friendly pest control in the camp area; – Ensure that the workforce is sensitised to the effects of sexually transmitted diseases, especially HIV AIDS; – The Contractor must ensure that information posters on AIDS are displayed in the Contractor Camp area;	**Contractor & cEO**	**Posters** **Training**	**Pre-construction & construction phases**	**dEO & ECO**	**Monthly**	**Visual inspections of facilities and posters (photographic records)**

– Information and education relating to sexually transmitted diseases to be made available to both construction workers and local community, where applicable; – Free condoms must be made available to all staff on site at central points; – Medical support must be made available; – Provide access to Voluntary HIV Testing and Counselling Services.						**Proof of training**

5.16 Emergency procedures

Impact management outcome: Emergency procedures are in place to enable a rapid and effective response to all types of environmental emergencies.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Compile an Emergency Response Action Plan (ERAP) prior to the commencement of the proposed project; – The Emergency Plan must deal with accidents, potential spillages and fires in line with relevant legislation; – All staff must be made aware of emergency procedures as part of environmental awareness training; – The relevant local authority must be made aware of a fire as soon as it starts; – In the event of emergency necessary mitigation measures to	**Contractor & cEO**	**Emergency Response Action Plan** **Emergency contact list** **Training**	**Pre-construction, construction and operational phases**	**dEO & ECO**	**Monthly**	**Approved Emergency Response Action Plan on record** **Emergency contact list displayed** **Proof of**

contain the spill or leak must be implemented (see ***Hazardous Substances section 5.17***).						**training**

5.17 Hazardous substances

Impact management outcome: Safe storage, handling, use and disposal of hazardous substances.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The use and storage of hazardous substances to be minimised and non-hazardous and non-toxic alternatives substituted where possible; – All hazardous substances must be stored in suitable containers as defined in the Method Statement; – Containers must be clearly marked to indicate contents, quantities and safety requirements; – All storage areas must be bunded. The bunded area must be of sufficient capacity to contain a spill / leak from the stored containers; – Bunded areas to be suitably lined with a SABS approved liner; – An Betabetical Hazardous Chemical Substance (HCS) control sheet must be drawn up and kept up to date on a continuous basis; – All hazardous chemicals that will be used on site must have	**Contractor & cEO**	**Method statement for managing hazardous substances** **HCS Control Sheet & registers for MSDS** **Provide Personal Protective Equipment (PPE)** **Signage** **Fire-fighting equipment** **Training**	**Construction phase**	**dEO & ECO**	**Monthly**	**Approved method statement** **Records (e.g. HCS Control Sheet, copies of MSDS, PPE register, spills)** **Visual inspection of storage areas, signage, spill kits, etc. (photographic records)** **Disposal**

Material Safety Data Sheets (MSDS); – All employees working with HCS must be trained in the safe use of the substance and according to the safety data sheet; – Employees handling hazardous substances / materials must be aware of the potential impacts and follow appropriate safety measures. Appropriate personal protective equipment must be made available; – The Contractor must ensure that diesel and other liquid fuel, oil and hydraulic fluid is stored in appropriate storage tanks or in bowsers; – The tanks/ bowsers must be situated on a smooth impermeable surface (concrete) with a permanent bund. The impermeable lining must extend to the crest of the bund and the volume inside the bund must be 130% of the total capacity of all the storage tanks/ bowsers (110% statutory requirement plus an allowance for rainfall); – The floor of the bund must be sloped, draining to an oil separator; – Provision must be made for refueling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained; – All empty externally dirty drums must be stored on a drip tray or within a bunded area; – No unauthorised access into the hazardous substances storage areas must be permitted; – No smoking must be allowed within the vicinity of the hazardous storage areas; – Adequate fire-fighting equipment must be made available at all hazardous storage areas;		**Inspection of storage areas**				**records** **Proof of training**

– Where refueling away from the dedicated refueling station is required, a mobile refueling unit must be used. Appropriate ground protection such as drip trays must be used; – An appropriately sized spill kit kept onsite relevant to the scale of the activity/s involving the use of hazardous substance must be available at all times; – The responsible operator must have the required training to make use of the spill kit in emergency situations; – An appropriate number of spill kits must be available and must be located in all areas where activities are being undertaken; – In the event of a spill, contaminated soil must be collected in containers and stored in a central location and disposed of according to the National Environmental Management: Waste Act 59 of 2008. Refer to ***Section 5.7*** for procedures concerning ***storm and waste water management*** and ***5.8*** for ***solid and hazardous waste management.***						

5.18 Workshop, equipment maintenance and storage

Impact management outcome: Soil, surface water and groundwater contamination is minimised.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where possible and practical all maintenance of vehicles and equipment must take place in the workshop area; – During servicing of vehicles or equipment, especially where emergency repairs are effected outside the workshop area, a suitable drip tray must be used to prevent spills onto the soil. The relevant local authority must be made aware of a fire as soon as it starts; – Leaking equipment must be repaired immediately or be removed from site to facilitate repair; – Workshop areas must be monitored for oil and fuel spills; – Appropriately sized spill kit kept onsite relevant to the scale of the activity taking place must be available; – The workshop area must have a bunded concrete slab that is sloped to facilitate runoff into a collection sump or suitable oil / water separator where maintenance work on vehicles and equipment can be performed; – Water drainage from the workshop must be contained and managed in accordance Section ***5.7: Storm and waste water management***.	**Contractor & cEO**	**Vehicle & Equipment maintenance programme** **Training**	**Construction phase**	**dEO & ECO**	**Monthly**	**Updated Maintenance Schedule** **Visual inspection of storage areas, signage, spill kits, etc. (photographic records)** **Disposal records** **Proof of training**

5.19 Batching plants

Impact management outcome: Minimise spillages and contamination of soil, surface water and groundwater.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Concrete mixing must be carried out on an impermeable surface; – Batching plants areas must be fitted with a containment facility for the collection of cement laden water. – Dirty water from the batching plant must be contained to prevent soil and groundwater contamination – Bagged cement must be stored in an appropriate facility and at least 10 m away from any water courses, gullies and drains; – A washout facility must be provided for washing of concrete associated equipment. Water used for washing must be restricted; – Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licenced disposal facility; – Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site; – Sand and aggregates containing cement must be kept damp to prevent the generation of dust (Refer to ***Section 5.20: Dust emissions***) – Any excess sand, stone and cement must be removed or	**Contractor & cEO**	**Method statement for managing batching plants** **Inspection of batching areas and cement storage areas** **Training**	**Construction phase**	**dEO & ECO**	**Monthly**	**Approved method statement** **Visual inspections (photographic records)** **Proof of training**

reused from site on completion of construction period and disposed at a registered disposal facility; – Temporary fencing must be erected around batching plants in accordance with Section ***5.5: Fencing and gate installation***.						

5.20 Dust emissions

Impact management outcome: Dust prevention measures are applied to minimise the generation of dust.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Take all reasonable measures to minimise the generation of dust as a result of project development activities to the satisfaction of the ECO; – Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces must be re- vegetated or stabilised as soon as is practically possible; – Excavation, handling and transport of erodible materials must be avoided under high wind conditions or when a visible dust plume is present; – During high wind conditions, the ECO must evaluate the situation and make recommendations as to whether dust-damping measures are adequate, or whether working will cease altogether until the wind speed drops to an acceptable level;	**Contractor & cEO**	**Dust monitoring** **Dust suppression schedule** **Signage displaying speed limits** **Training**	**Pre-construction & construction phases**	**dEO & ECO**	**Monthly**	**Updated dust suppression schedule** **Dust monitoring results** **Related entries into Public Complaints Register** **Visual inspections (photographic records)**

– Where possible, soil stockpiles must be located in sheltered areas where they are not exposed to the erosive effects of the wind; – Where erosion of stockpiles becomes a problem, erosion control measures must be implemented at the discretion of the ECO; – Vehicle speeds must not exceed 40 km/h along dust roads or 20 km/h when traversing unconsolidated and non-vegetated areas; – Straw stabilisation must be applied at a rate of one bale/10 m² and harrowed into the top 100 mm of top material, for all completed earthworks; – For significant areas of excavation or exposed ground, dust suppression measures must be used to minimise the spread of dust.						**Proof of training**

5.21 Blasting

Impact management outcome: Impact to the environment is minimised through a safe blasting practice.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Any blasting activity must be conducted by a suitably licensed blasting contractor; and – Notification of surrounding landowners, emergency services site personnel of blasting activity 24 hours prior to such activity taking place on Site.	**Contractor & cEO**	**Compliance with blasting-related legislation and standards** **Method statement**	**Prior to blasting up to safe completion of blasting**	**dEO & ECO**	**Monthly**	**Approved method statement** **Proof of notification of**

		for blasting **Notifications** **Training**				**landowners** **Related entries into Public Complaints Register** **Visual inspections (photographic records)** **Proof of training**

5.22 Noise

Impact Management outcome: Prevent unnecessary noise to the environment by ensuring that noise from development activity is mitigated.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The Contractor must keep noise level within acceptable limits, Restrict the use of sound amplification equipment for communication and emergency only;	**Contractor & cEO**	**Code of Conduct** **Noise monitoring**	**Construction phase**	**dEO & ECO**	**Monthly**	**Noise monitoring results**

– All vehicles and machinery must be fitted with appropriate silencing technology and must be properly maintained; – Any complaints received by the Contractor regarding noise must be recorded and communicated. Where possible or applicable, provide transport to and from the site on a daily basis for construction workers; – Develop a Code of Conduct for the construction phase in terms of behaviour of construction staff. Operating hours as determined by the environmental authorisation are adhered to during the development phase. Where not defined, it must be ensured that development activities must still meet the impact management outcome related to noise management.		**Signage** **Training**				**Related entries into Public Complaints Register** **Visible signage** **Proof of training**

5.23 Fire prevention

Impact management outcome: Prevention of uncontrollable fires.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Designate smoking areas where the fire hazard could be regarded as insignificant; – Firefighting equipment must be available on all vehicles	**Contractor & cEO**	**Notification of FPA** **Emergency contact list**	**Pre-construction & construction phases**	**dEO & ECO**	**Monthly**	**Proof of notification of FPA**

located on site; – The local Fire Protection Agency (FPA) must be informed of construction activities; – Contact numbers for the FPA and emergency services must be communicated in environmental awareness training and displayed at a central location on site; – Two way swop of contact details between ECO and FPA.		**Training**				**Emergency contact list displayed** **Related entries into Public Complaints Register** **Proof of training**

5.24 Stockpiling and stockpile areas

Impact management outcome: Reduce erosion and sedimentation as a result of stockpiling.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All material that is excavated during the project development phase (either during piling (if required) or earthworks) must be stored appropriately on site in order to minimise impacts to watercourses, watercourses and water bodies; – All stockpiled material must be maintained and kept clear of weeds and alien vegetation growth by undertaking regular	**Contractor & cEO**	**Inspection of stockpile areas** **Training**	**Construction phase**	**dEO & ECO**	**Monthly**	**Updated inspection register** **Visual inspections (photographic records)**

weeding and control methods; – Topsoil stockpiles must not exceed 2 m in height; – During periods of strong winds and heavy rain, the stockpiles must be covered with appropriate material (e.g. cloth, tarpaulin etc.); – Where possible, sandbags (or similar) must be placed at the bases of the stockpiled material in order to prevent erosion of the material.						**Proof of training**

5.25 Civil works

Impact management outcome: Impact to the environment minimised during civil works to create the substation terrace.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where terracing is required, topsoil must be collected and retained for the purpose of re-use later to rehabilitate disturbed areas not covered by yard stone; – Areas to be rehabilitated include terrace embankments and areas outside the high voltage yards; – Where required, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled; – These areas can be stabilised using design structures or	**Contractor & cEO**	**Method statements for:** • **Managing topsoil** • **Managing spoil material** • **Rehabilitation**	**Construction phase**	**dEO & ECO**	**Monthly (during relevant construction activities)**	**Approved method statements** **Visual inspections (photographic records)**

vegetation as specified in the design to prevent erosion of embankments. The contract design specifications must be adhered to and implemented strictly; – Rehabilitation of the disturbed areas must be managed in accordance with ***Section 5.35: Landscaping and rehabilitation***; – All excess spoil generated during terracing activities must be disposed of in an appropriate manner and at a recognised landfill site; and – Spoil can however be used for landscaping purposes and must be covered with a layer of 150 mm topsoil for rehabilitation purposes.						

5.26 Excavation of foundation, cable trenching and drainage systems

Impact management outcome: No environmental degradation occurs as a result of excavation of foundation, cable trenching and drainage systems.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All excess spoil generated during foundation excavation	**Contractor &**	**Method statements for:**	**Construction phase**	**dEO & ECO**	**Monthly (during**	**Approved method**

must be disposed of in an appropriate manner and at a licensed landfill site, if not used for backfilling purposes; – Spoil can however be used for landscaping purposes and must be covered with a layer of 150 mm topsoil for rehabilitation purposes; – Management of equipment for excavation purposes must be undertaken in accordance with ***Section 5.18: Workshop, equipment maintenance and storage***; and – Hazardous substances spills from equipment must be managed in accordance with ***Section 5.17: Hazardous substances***.	**cEO**	• **Managing spoil material** • **Managing hazardous substances** • **Rehabilitation**			**relevant construction activities)**	**statements** **Visual inspections (photographic records)**

5.27 Installation of foundations, cable trenching and drainage systems

Impact management outcome: No environmental degradation occurs during the installation of foundation, cable trenching and drainage system.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Batching of cement to be undertaken in accordance with **Section *5.19: Batching plants***; and – Residual solid waste must be disposed of in accordance with **Section *5.8: Solid waste and hazardous management***.	**Contractor & cEO**	**Method statements for:** • **Managing batching plants** • **Managing**	**Construction phase**	**dEO & ECO**	**Monthly (during relevant construction activities)**	**Approved method statements** **Disposal records**

		hazardous waste				**Visual inspections (photographic records)**

5.28 Installation of equipment (circuit breakers, current Transformers, Isolators, Insulators, surge arresters, voltage transformers, earth switches)

Impact management outcome: No environmental degradation occurs as a result of installation of equipment.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Management of dust must be conducted in accordance with Section ***5. 20: Dust emissions***; – Management of equipment used for installation must be conducted in accordance with Section ***5.18: Workshop, equipment maintenance and storage***; – Management hazardous substances and any associated spills must be conducted in accordance with Section ***5.17: Hazardous substances***; and – Residual solid waste must be recycled or disposed of in accordance with ***Section 5.8: Solid waste and hazardous management***.	**Contractor & cEO**	**Method statements for:** • **Managing hazardous substances** • **Managing hazardous waste** **Dust monitoring** **Equipment maintenance programme** **Training**	**Construction phase**	**dEO & ECO**	**Monthly (during relevant construction activities)**	**Approved method statements** **Dust monitoring results** **Disposal records** **Visual inspections (photographic records)** **Proof of training**

5.29 Steelwork Assembly and Erection

Impact management outcome: No environmental degradation occurs as a result of steelwork assembly and erection.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– During assembly, care must be taken to ensure that no wasted/unused materials are left on site e.g. bolts and nuts – Emergency repairs due to breakages of equipment must be managed in accordance with ***Section 5. 18: Workshop, equipment maintenance and storage*** and ***Section 5.16: Emergency procedures***.	**Contractor & cEO**	**Emergency Response Action Plan** **Emergency contact list** **Equipment maintenance programme** **Training**	**Construction phase**	**dEO & ECO**	**Monthly (during relevant construction activities)**	**Approved Emergency Response Action Plan on record** **Emergency contact list displayed** **Visual inspections (photographic records)** **Proof of training**

5.30 Cabling and Stringing

Impact management outcome: No environmental degradation occurs as a result of stringing.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Residual solid waste (off cuts etc.) shall be recycled or disposed of in accordance with **Section 6.8: *Solid waste and hazardous Management***; – Management of equipment used for installation shall be conducted in accordance with **Section *5.18: Workshop, equipment maintenance and storage***; – Management hazardous substances and any associated spills shall be conducted in accordance with ***Section 5.17: Hazardous substances***.	**Contractor & cEO**	**Method statements for:** • **Managing hazardous substances** • **Managing hazardous waste** **Equipment maintenance programme** **Training**	**Construction phase**	**dEO & ECO**	**Monthly (during relevant construction activities)**	**Approved method statements** **Disposal records** **Visual inspections (photographic records)** **Proof of training**

5.31 Testing and Commissioning (all equipment testing, earthing system, system integration)

Impact management outcome: No environmental degradation occurs as a result of Testing and Commissioning.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Residual solid waste must be recycled or disposed of in accordance with ***Section 5.8: Solid waste and hazardous management***.	**Contractor & cEO**	**Method statement for managing hazardous waste** **Equipment maintenance programme** **Training**	**Construction phase**	**dEO & ECO**	**Monthly (during relevant construction activities)**	**Approved method statements** **Disposal records** **Visual inspections (photographic records)** **Proof of training**

5.32 Socio-economic

Impact management outcome: enhanced socio-economic development.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Develop and implement communication strategies to facilitate public participation; – Develop and implement a collaborative and constructive approach to conflict resolution as part of the external stakeholder engagement process; – Sustain continuous communication and liaison with neighboring owners and residents – Create work and training opportunities for local stakeholders; and – Where feasible, no workers, with the exception of security personnel, must be permitted to stay over-night on the site. This would reduce the risk to local farmers.	**Contractor & cEO**	**Grievance Redress Mechanism (GRM)** **Share contact details of ECO with stakeholders**	**Pre-construction, construction and operational phases**	**dEO & ECO**	**Monthly**	**Documented GRM** **Proof of communication** **Related entries into Public Complaints Register**

5.33 Temporary closure of site

Impact management outcome: Minimise the risk of environmental impact during periods of site closure greater than five days.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Bunds must be emptied (where applicable) and need to be undertaken in accordance with the impact management actions included in ***sections 5.17: Hazardous substances and 5.18: Workshop, equipment maintenance and storage***; – Hazardous storage areas must be well ventilated; – Fire extinguishers must be serviced and accessible. Service records to be filed and audited at last service; – Emergency and contact details displayed must be displayed; – Security personnel must be briefed and have the facilities to contact or be contacted by relevant management and emergency personnel; – Night hazards such as reflectors, lighting, traffic signage etc. must have been checked; – Fire hazards identified and the local authority must have been notified of any potential threats e.g. large brush stockpiles, fuels etc.; – Structures vulnerable to high winds must be secured; – Wind and dust mitigation must be implemented;	**Contractor & cEO**	**Method statement for temporary closure of site** **Training**	**Construction phase**	**dEO & ECO**	**Before and during site closure**	**Approved method statement** **Disposal records** **Visual inspections (photographic records)** **Proof of training**

– Cement and materials stores must have been secured; – Toilets must have been emptied and secured; – Refuse bins must have been emptied and secured; – Drip trays must have been emptied and secured.						

5.34 Dismantling of old equipment

Impact management outcome: Impact to the environment to be minimised during the dismantling, storage and disposal of old equipment commissioning.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All old equipment removed during the project must be stored in such a way as to prevent pollution of the environment; – Oil containing equipment must be stored to prevent leaking or be stored on drip trays; – All scrap steel must be stacked neatly and any disused and broken insulators must be stored in containers; – Once material has been scrapped and the contract has been placed for removal, the disposal Contractor must ensure that any equipment containing pollution causing substances is dismantled and transported in such a way as to prevent spillage and pollution of the environment; – The Contractor must also be equipped to contain and clean up any pollution causing spills; and	**Contractor & cEO**	**Method statement for dismantling, storage and disposal of old equipment** **Training**	**Construction phase**	**dEO & ECO**	**Before and during dismantling, storage and disposal of old equipment**	**Approved method statement** **Disposal records** **Visual inspections (photographic records)** **Proof of training**

– Disposal of unusable material must be at a licensed waste disposal site.						

5.35 Landscaping and rehabilitation

Impact management outcome: Areas disturbed during the development phase are returned to a state that approximates the original condition.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All areas disturbed by construction activities must be subject to landscaping and rehabilitation; All spoil and waste must be disposed of to a registered waste site; – All slopes must be assessed for contouring, and to contour only when the need is identified in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983 – All slopes must be assessed for terracing, and to terrace only when the need is identified in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983; – Berms that have been created must have a slope of 1:4 and be replanted with indigenous species and grasses that approximates the original condition; – Where new access roads have crossed cultivated farmlands, that lands must be rehabilitated by ripping which must be agreed to by the holder of the EA and the landowners; – Rehabilitation of access roads outside of farmland; – Indigenous species must be used for with species and/grasses to where it compliments or approximates the	**DPM, DSS, Contractor & cEO**	**Rehabilitation Method Statement** **Pre-construction survey – established baseline** **Signage** **Training**	**Throughout the duration of the construction period, as relevant to the concurrent or progressive reinstatement and rehabilitation of affected areas. Up to end of defects liability period. Rehabilitation will also extent into the operational phase.**	**dEO & ECO**	**Monthly**	**Approved method statement** **Pre-construction survey report** **Visible signage** **Related entries into Public Complaints Register** **Visual inspections (photographic records)**

original condition; – Stockpiled topsoil must be used for rehabilitation (refer to ***Section 5.24: Stockpiling and stockpiled areas***); – Stockpiled topsoil must be evenly spread so as to facilitate seeding and minimise loss of soil due to erosion; – Before placing topsoil, all visible weeds from the placement area and from the topsoil must be removed; – Subsoil must be ripped before topsoil is placed; – The rehabilitation must be timed so that rehabilitation can take place at the optimal time for vegetation establishment; – Where impacted through construction related activity, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled; – Sloped areas stabilised using design structures or vegetation as specified in the design to prevent erosion of embankments. The contract design specifications must be adhered to and implemented strictly; – Spoil can be used for backfilling or landscaping as long as it is covered by a minimum of 150 mm of topsoil. – Where required, re-vegetation including hydro-seeding can be enhanced using a vegetation seed mixture as described below. A mixture of seed can be used provided the mixture is carefully selected to ensure the following: a) Annual and perennial plants are chosen; b) Pioneer species are included; c) Species chosen must be indigenous to the area with the seeds used coming from the area; d) Root systems must have a binding effect on the soil; e) The final product must not cause an ecological imbalance in the area						**Proof of training**

6 ACCESS TO THE GENERIC EMPr

Once completed and signed, to allow the public access to the generic EMPr, the holder of the EA must make the EMPr available to the public in accordance with the requirements of Regulation 26(h) of the EIA Regulations.

PART B: SECTION 2

7 SITE SPECIFIC INFORMATION AND DECLARATION

7.1 Sub-section 1: contact details and description of the project

7.1.1 Details of the applicant:

Name of applicant:	Seelo Beta Solar PV (RF) Proprietary Limited
Tel No:	083 785 1492
Fax No:	-
Postal Address:	PO Box 762, Wilderness
Physical Address:	Third Floor, Sunclare Building, 21 Dreyer Street, Claremont, Cape Town

7.1.2 Details and expertise of the EAP:

Name of EAP:	Donavan Henning from Nemai Green
Tel No:	011 781 1730
Fax No:	011 781 1731
E-mail address:	donavanh@nemai.co.za

Expertise of the EAP (Curriculum Vitae included): *Refer to Appendix 2*

7.1.3 Project name: **Proposed Seelo Beta 240 MW Solar Photovoltaic (PV) & Battery Energy Storage Systems (BESS) Project near the town of Carletonville, North West Province.**

7.1.4 Description of the project:

Seelo Beta Solar PV (RF) (Pty) Ltd (the Applicant) has proposed the development of the Seelo Beta 240MW Solar PV Project and BESS near the town of Carletonville, in the North West Province (the "Project") (refer to **Figure 1** below). The electricity generated by the Project will be injected into the existing Eskom 132 kV distribution system.

The technical details of the proposed project are captured in **Table 2** below.

The Applicant intends to bid for the current and future Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) bid windows.

Table 2: *Technical details of the proposed PV Plant*

No.	Component	Description / Dimensions
1.	Location of the site	Portion 1 of Farm Rooipan 96 IQ
2.	Maximum generation capacity of facility	240MW
3.	Height of PV panels	± 1 – 6 m
4.	Area of Project (total disturbance footprint, including access road)	Total area of ± 386.5 ha
5.	Area of PV Arrays only	Total area of ± 345 ha
6.	No. of PV Modules	±500 000
7.	Number of inverters required	Approximately 55
8.	Area occupied by inverter / transformer stations / substations	▪ Area occupied by inverter stations (± 28 inverter stations) = ± 0.5 ha ▪ Area occupied by the facility transformer stations = ± 0.5 ha ▪ Area occupied by facility (step-up/switching) substation = ± 3 ha
9.	Capacity of on-site substation	33/132 kV
10.	Area occupied by both permanent and construction laydown areas	▪ Construction laydown areas = ± 2 ha ▪ Operation & Maintenance infrastructure = ± 1 ha ▪ Total combined = ± 3 ha
11.	BESS Footprint	▪ BESS = ± 3 ha
12.	Buildings	▪ ± 3 ha Including Operational Control Centre, Operation and Maintenance Area / Warehouse / Workshop and Office, Ablution Facilities and Substation Building
13.	Length of internal roads	± 11 km
14.	Width of roads	▪ The internal roads = 12 m reserve and road width of 6 m. ▪ Access roads = 14 m reserve and road width of 8 m.
15.	Proximity to grid connection	Approximately 12.5 km 132 kV transmission line from PV Site to existing Eskom's Carmel Main Transmission Substation
16.	Height of fencing	± 3.5 m
17.	Type of fencing	Type will vary (e.g., welded mesh, palisade and electric fencing).

The electricity generated by the Solar PV Plant will be injected into the existing Eskom 132 kV distribution system. The PV Site is located relatively close to the Eskom grid. The final grid connection will be assessed in a separate application for Environmental Authorisation.

7.1.5 Project location:

The locality map is provided below.

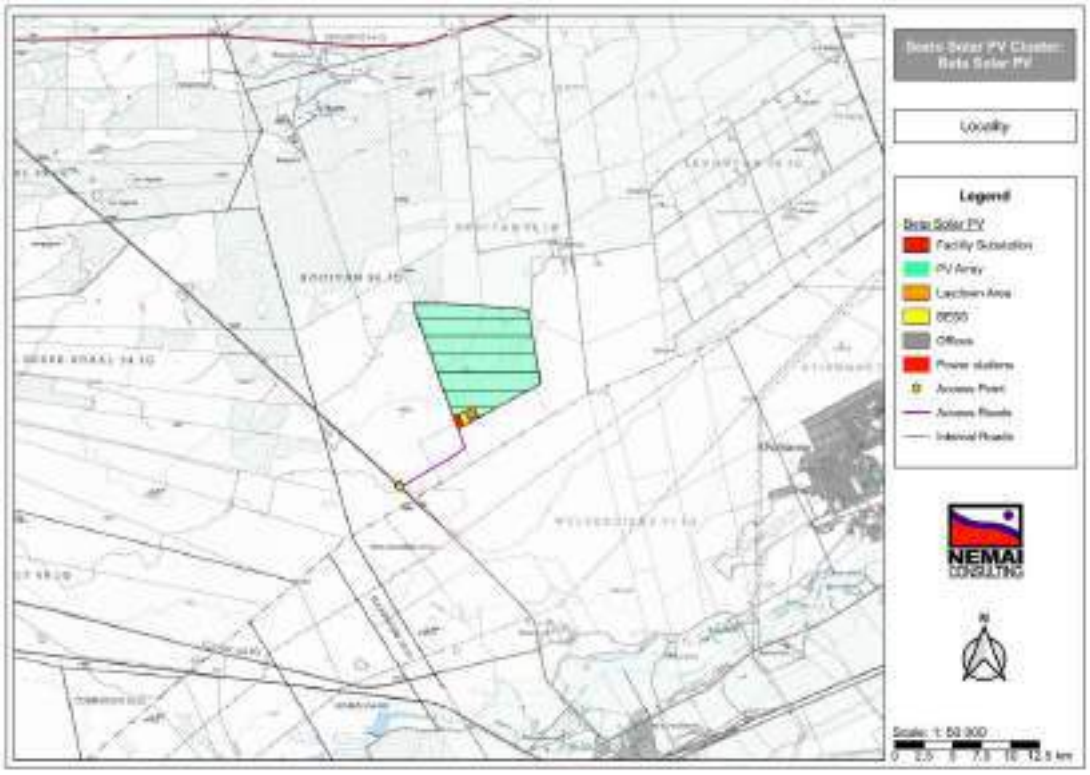


Figure 1: *Locality map of overall Project Area*

Figure 2: *Layout Map of the project*

The coordinates of the substation and affected property are tabulated below.

Table 3: *Coordinates and Property Details for Proposed Substation*

NO	FARM NAME(if applicable)	FARM NUMBER (if applicable)	PORTION NUMBER	LATITUDE	LONGITUDE	
1	Rooipan IQ	96	Portion 1	26°19'6.05"S	27°15'5.22"E	Corner point (NW)
2				26°19'13.37"S	27°15'7.86"E	Corner point (SW)
3				26°19'4.18"S	27°15'9.12"E	Corner point (NE)
4				26°19'11.26"S	27°15'11.85"E	Corner point (SE)

7.2 Sub-section 2: Development footprint site map

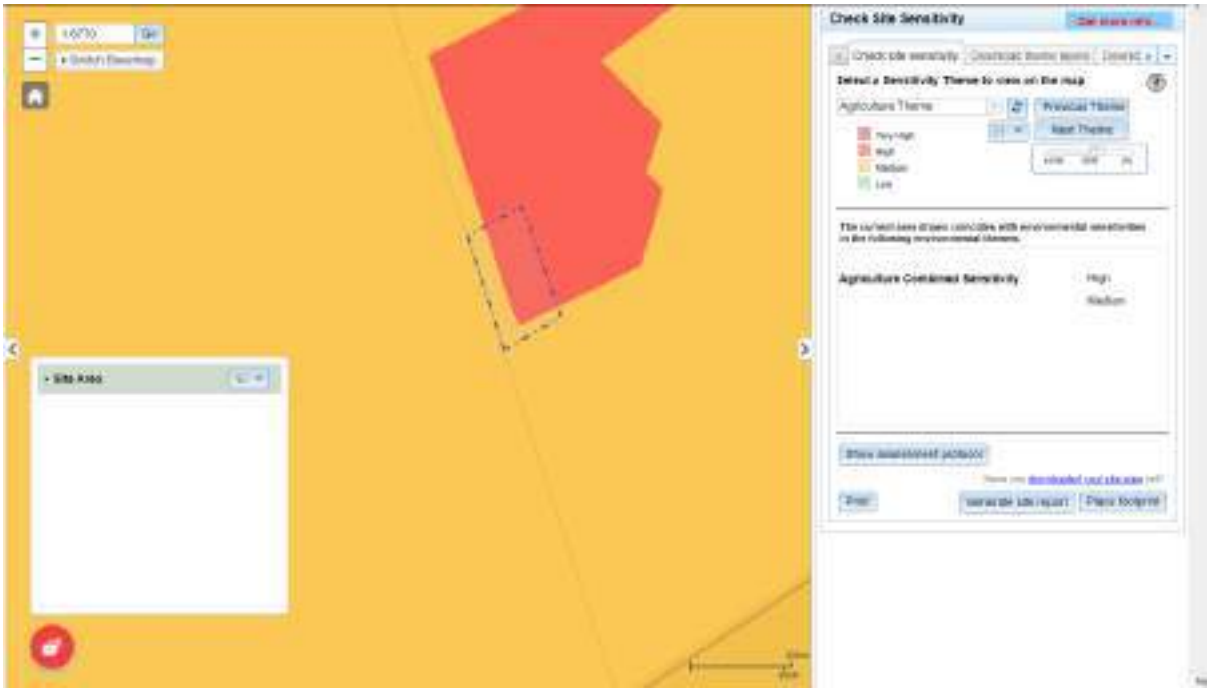
This sub-section must include a map of the site sensitivity overlaid with the preliminary infrastructure layout. The sensitivity map must be prepared from the national web based environmental screening tool, when available for compulsory use at: https://screening.environment.gov.za/screeningtool. The sensitivity map shall identify the nature of each sensitive feature e.g. threatened plant species, archaeological site, etc. Sensitivity maps shall identify features both within the planned working area and any known sensitive features within 50 m from the development footprint.

A summary of the proposed development site's environmental sensitivities is tabulated below, based on the national web based environmental screening tool. It is noted that these sensitivities are regarded as indicative, as the site's sensitivity was confirmed through the specialist studies undertaken as part of the EIA. Sensitivity maps for the substation follow.

Table 4: *Screened Environmental Sensitivity*

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X	X	
Animal Species Theme			X	
Aquatic Biodiversity Theme				X
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme			X	
Defence Theme				X
Paleontology Theme	X		X	
Plant Species Theme			X	X
Terrestrial Biodiversity Theme				X

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

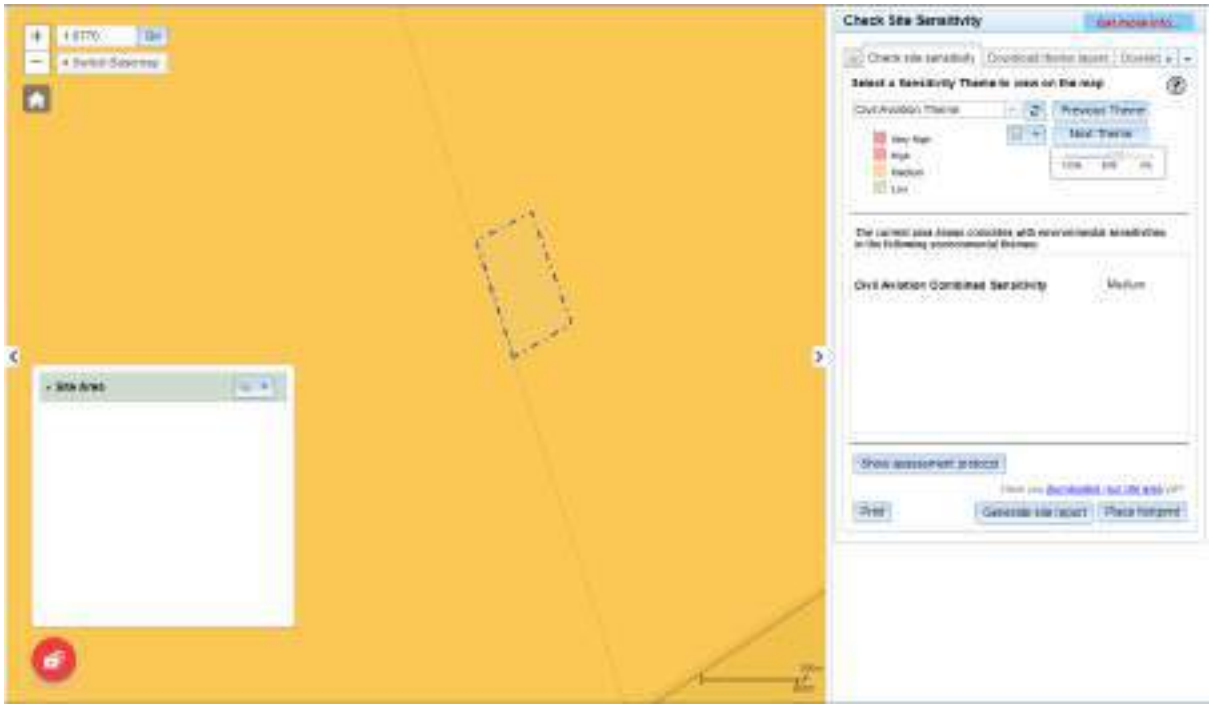


MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY

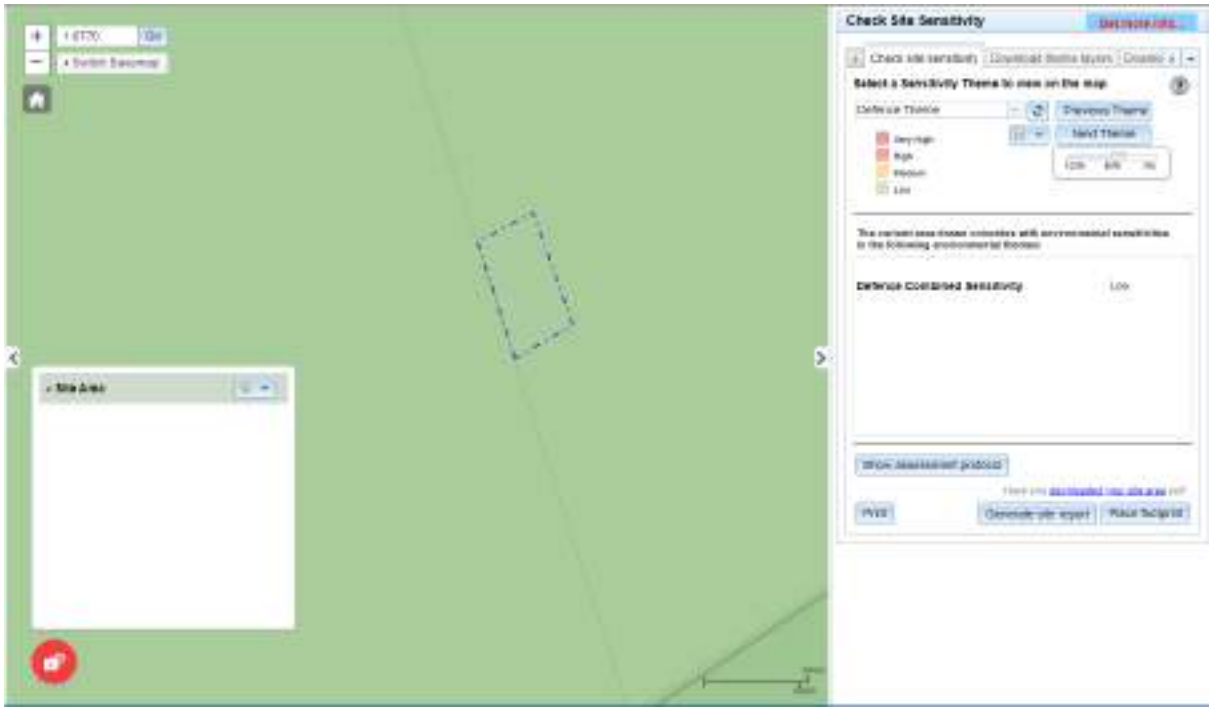
MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY

MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY

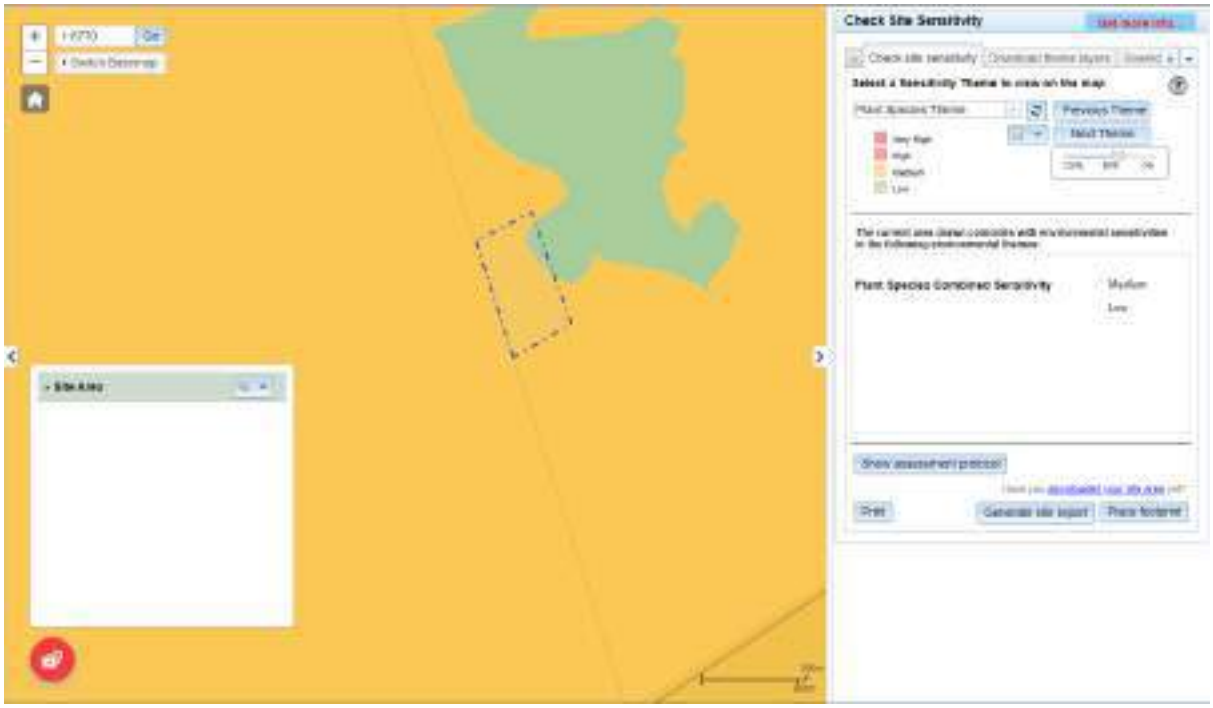


MAP OF RELATIVE DEFENCE THEME SENSITIVITY



MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY

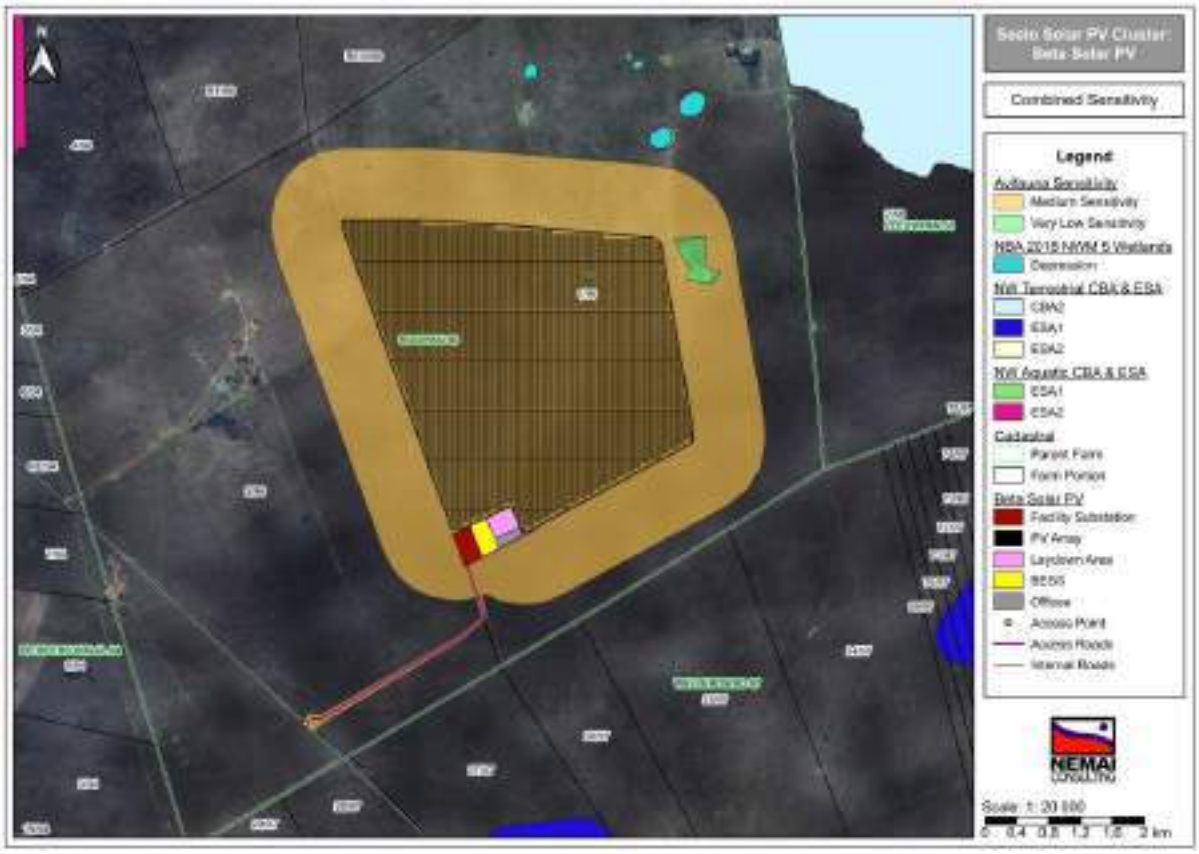


Figure 3: *Sensitivity map based on specialist studies*

7.3 Sub-section 3: Declaration

The proponent/applicant or holder of the EA affirms that he/she will abide and comply with the prescribed impact management outcomes and impact management actions as stipulated in part B: section 1 of the generic EMPr and have the understanding that the impact management outcomes and impact management actions are legally binding. The proponent/applicant or holder of the EA affirms that he/she will provide written notice to the CA 14 day prior to the date on which the activity will commence of commencement of construction to facilitate compliance inspections.

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Signature Proponent/applicant/ holder of EA Date:

7.4 Sub-section 4: amendments to site specific information (Part B; section 2)

Should the EA be transferred to a new holder, Part B: Section 2 must be completed by the new holder and submitted with the application for an amendment of the EA in terms of Regulations 29 or 31 of the EIA Regulations, whichever applies. The information submitted for an amendment to an environmental authorisation will be considered to be incomplete should a signed copy of Part B: Section 2 not be submitted. Once approved, Part B: Section 2 forms part of the EMPr f or the development and the EMPr becomes legally binding to the new EA holder.

PART C

8 SITE SPECIFIC ENVIRONMENTAL ATTRIBUTES

If any specific environmental sensitivities/attributes are present on the site which require more specific impact management outcomes and actions, not included in the pre-approved generic EMPr template, to manage impacts, those impact management outcomes and impact management actions must be included in this section. These specific management controls must be referenced spatially, and must include impact management outcomes and impact management actions. The management controls including impact management outcomes and impact management actions must be presented in the format of the pre-approved generic EMPr template. This applies only to additional impact management outcomes and impact management actions that are necessary.

If Part C is applicable to the development as authorised in the EA, it is required to be submitted to the CA together with the BAR or EIAR, for consideration of, and decision on, the application for EA. The information in this section must be prepared by an EAP and the name and expertise of the EAP, including the curriculum vitae are to be included. Once approved, Part C forms part of the EMPr for the site and is legally binding.

This section will **not be required** should the site contain no specific environmental sensitivities or attributes.

Note that sensitive features are addressed in the EMPr for the overall Solar PV Plant.

APPENDIX 1: METHOD STATEMENTS

To be prepared by the contractor prior to commencement of the activity. The method statements are **not required** to be submitted to the CA.

Method Statements to be prepared by the Contractor

APPENDIX 2: CV of EAP

APPENDIX I

OATH OF THE EAP

OATH OF ENVIRONMENTAL ASSESSMENT PRACTITIONER

PROPOSED SEELO BETA SOLAR PHOTOVOLTAIC (PV) PROJECT NEAR THE TOWN OF CARLETONVILLE, NORTH WEST PROVINCE

Draft Environmental Impact Assessment Report

I (name and surname) Donavan Henning

Of (address) 147 Bram Fisher Drive Ferndale, 2194

ID No. 7612065057080 *Contact No.* 0117811730

I hereby make an oath and state that:

In accordance with Appendix 3 of Government Notice No. R. 982 of 4 December 2014 (as amended), this serves as an affirmation by the Environmental Assessment Practitioner (EAP) in relation to:

1. *The correctness of the information provided in the reports;*
2. *The inclusion of comments and inputs from stakeholders and I&APs;*
3. *The inclusion of inputs and recommendations from the specialist reports where relevant; and*
4. *Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties..*

1. *I know and understand the contents of this declaration.*
2. *I do not have any objection in taking prescribed oath.*
3. *I consider the prescribed oath to be binding on my conscience.*

Signature _____ *Date:* 04/09/2020

I certify that the deponent has acknowledged that he/she knows and understands the contents of the statement and the deponent signature was placed there on in my presence.

_____ Ms. Colette Henning Practising Attorney

COMMISSIONER OF OATH FULL NAME DESIGNATION

Colette Henning
Commissioner of Oaths
Ex Officio - Practising Attorney
7 Katbos Avenue
Bassonia, Johannesburg
082 463 5547

APPENDIX J

COMMENT SHEET

P.O. Box 1673
SUNNINGHILL
2157

147 Bram Fischer Drive
Ferndale
2194

Tel: (011) 781 1730
Fax: (011) 781 1731
Email: donavanh@nemai.co.za

Proposed Seelo Beta 240MW Solar PV and BESS Project near the town of Carletonville, North West Province

COMMENT SHEET – Draft EIA Report

Official use	Date received:	Our reference:	Status:

1) GENERAL INFORMATION

Name of organisation (if applicable)	
Name & Surname	
Postal Address	
Physical Address (*please provide full farm description, if applicable*)	
Telephone No.	
Mobile No.	
Fax No.	
Email Address	
Manner in which the report was accessed (e.g. project website, library, etc.):	

Signature _____

Date _____

2) COMMENTS

(Note - additional pages may be included if the space provided is insufficient)