APPLICANT: ESKOM HOLDINGS SOC LTD.

PROPOSED SERE SOLAR PHOTOVOLTAIC PLANT PHASE 1A AND ASSOCIATED INFRASTRUCTURE, WESTERN CAPE

BASIC ASSESSMENT REPORT

DRAFT

July 2022

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TITLE AND APPROVAL PAGE

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EXECUTIVE SUMMARY

A. PROJECT BACKGROUND AND MOTIVATION

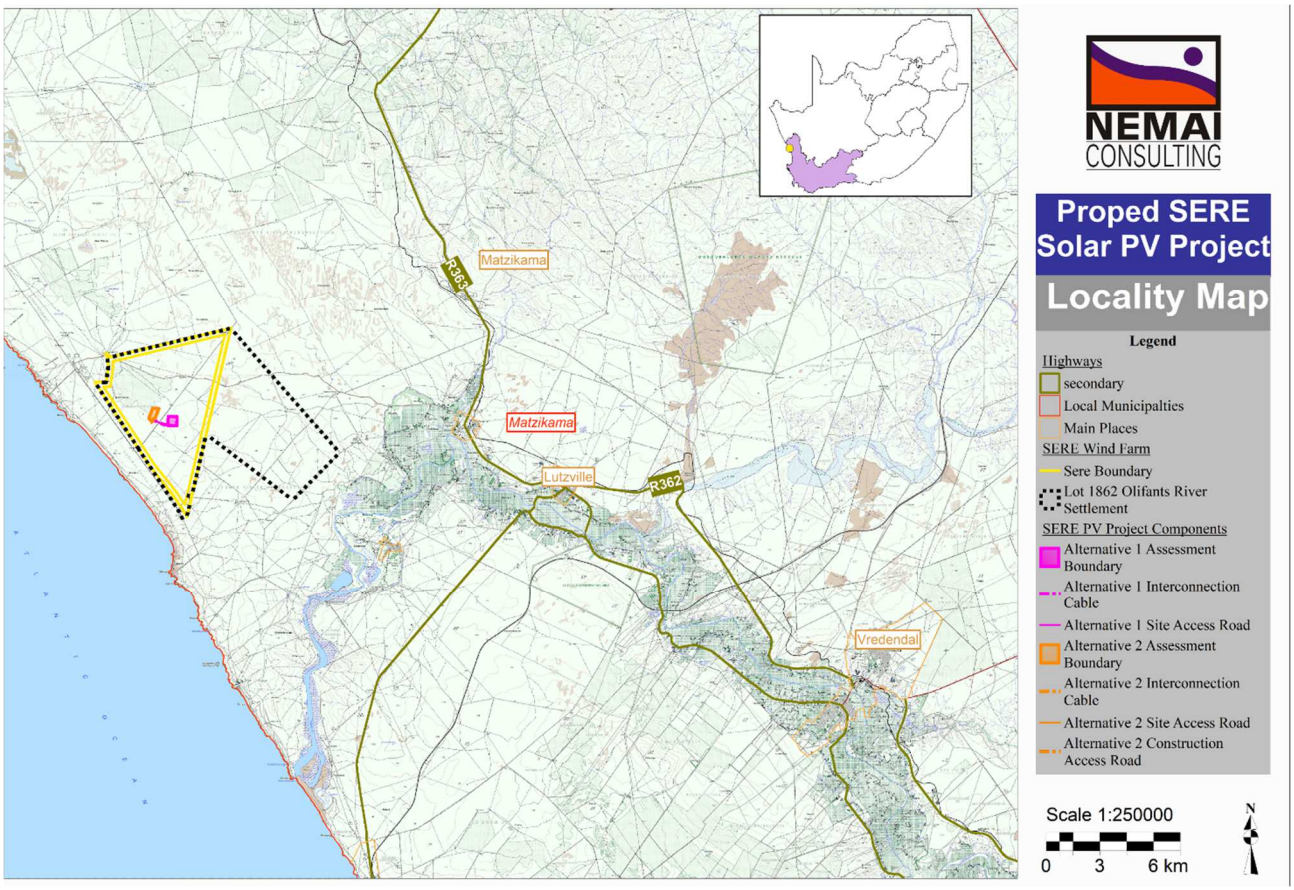
Electricity generation sources need to be diversified to ensure security of supply and reduction in the carbon footprint created by the current heavy reliance of South Africa on coal to produce electricity.

The hybridisation of the existing SERE Wind Farm with the installation of Photovoltaic (PV) capacity was identified as one of the Renewable initiatives in the Eskom Corporate Plan. To address the urgent need for additional generating capacity, it has been proposed that PV technology be installed at the SERE Wind Farm site in phases.
This project is applicable for the first phase (Phase 1A) of the SERE PV project. Phase 1A aims to address Eskom's urgent need for additional generating capacity. The SERE Solar PV site will have a total generation capacity of not exceeding 19.9MW renewable solar energy. The associated infrastructure includes an access road, underground power lines, and control buildings.

This document serves as the Draft Basic Assessment Report (BAR) for the proposed Project.

B. PROJECT LOCATION

The Proposed SERE Solar PV Plant Phase 1A is located within the existing SERE Wind Farm property operated by Eskom. The site is falls in the Western Cape Province approximately 50 km north west of Vredendal within the Matsikama Local Municipality and West Coast District Municipality.



Locality map of the Project Area

C. PROJECT DESCRIPTION

The technical details of the proposed PV facility are tabulated below.

Technical details of the proposed PV facility

No.	Component	Description / Dimensions
1.	Height of PV panels	Between 3 m to 6 m (1.5m deep excavations for supports)
2.	Area of PV Array	Around 16 ha to 18 ha
3.	Number of inverters required	Up to 20 inverter stations between the PV modules.
4.	Area occupied by inverter / transformer stations / substations	▪ Area occupied by Inverter stations (20 Inverter stations 30m^2 each) = 0.003 x 20 = 0.09 ha (within the PV site) ▪ Area occupied by Control room/offices = 0.4 ha ▪ Area occupied by security house = 0.001 ha
5.	Capacity of existing substation	1 x 40 MVA, 22-33kV/132 kV
6.	Area occupied by both permanent and construction areas	Less than 20 ha
7.	Length of roads	▪ Access road alternative 1 = 796m (tracking) / 880m (fixed) ▪ Access road alternative 2 = 30m (permanent) / 110m (construction) ▪ Internal roads to inverter stations = approximately 3.4km (alternative 1); 2km (alternative 2) ▪ Perimeter road = approximately 1.8km (both alternatives)
8.	Length of interconnection cable between PV site and substation	▪ Alternative 1 = 1044m (tracking) / 1150m (fixed) ▪ Alternative 2 = 244m (tracking/fixed)

No.	Component	Description / Dimensions
9.	Width of roads	▪ Internal roads = 2.5 m to 5 m ▪ Access road = 8m (alternative 1) and 6m (alternative 2)
10.	Proximity to grid connection	Approximately 1km from existing Skaapvlei Substation (Alternative 1) Approximately 200m from existing Skaapvlei Substation (Alternative 2)
11.	Height and type of fencing	To be determined

The electricity generated by the PV site will be transferred to the national Eskom grid. The Project will connect to existing Skaapvlei Substation on the same property through a ±1.1km (Alternative 1) and 0.2 km (Alternative 2) single circuit underground line. The voltage of the energy generated by the Project will be transformed on site.

D. LEGISLATION AND GUIDELINES CONSIDERED

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

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

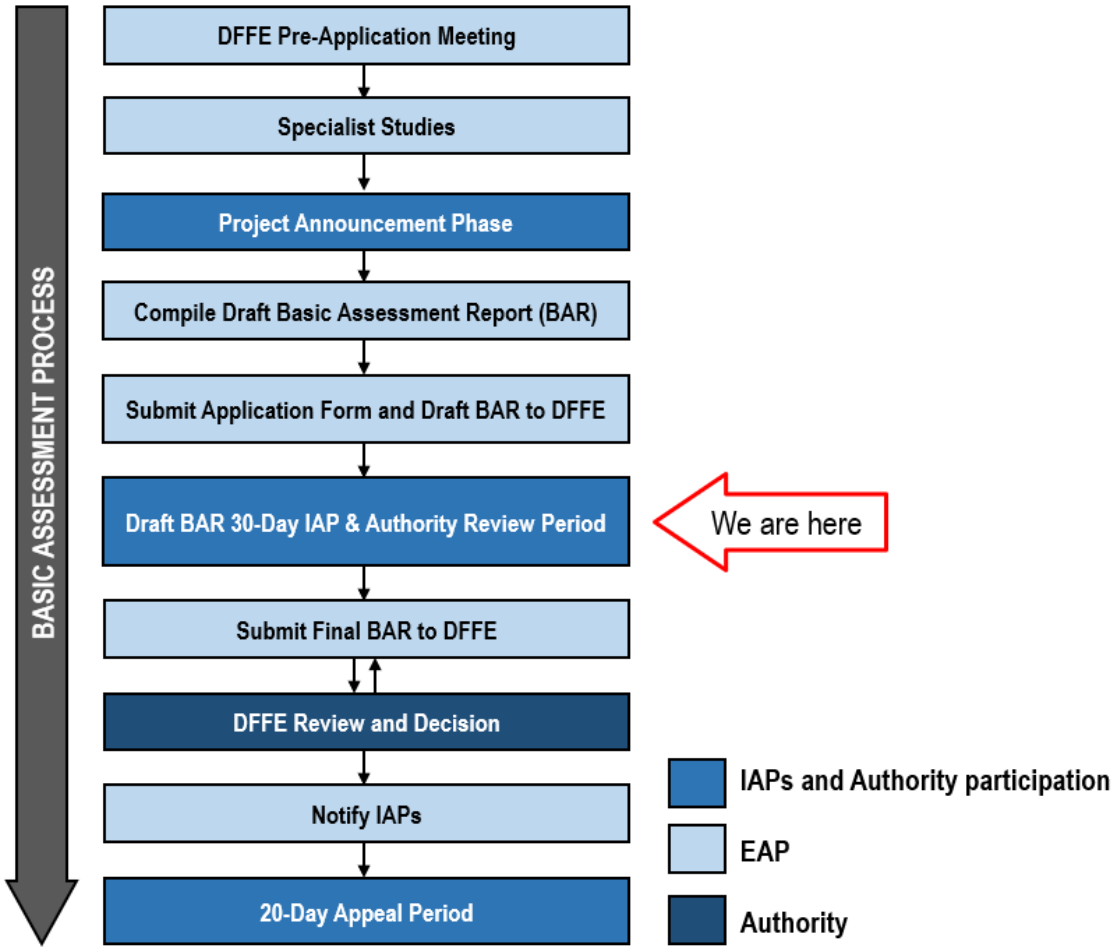
- National Environmental Management Act (No. 107 of 1998);
- National Environmental Management: Waste Act (Act No. 59 of 2008);
- National Water Act (Act No. 36 of 1998);
- National Environmental Management Air Quality Act (Act No. 39 of 2004);
- National Environmental Management: Biodiversity Act (Act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

E. BASIC ASSESSMENT PROCESS

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

The process for seeking authorisation is undertaken in accordance with Government Notice No. R. 982 of 4 December 2014 (as amended). The Project triggers activities listed in Listing Notices 1 and 3, therefore, a Basic Assessment Process is being undertaken.

An outline of the Basic Assessment Process is provided in the diagram to follow.



Overview of Basic Assessment Process

F. PROFILE OF THE RECEIVING ENVIRONMENT

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

The receiving environment is explained in terms of the following:

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

G. SPECIALIST STUDIES

The specialist studies 'triggered' by the nature of the proposed development and its receiving environment include the following:

- Terrestrial Ecological Assessment;
- Avifaunal Assessment;
- Heritage Impact Assessment (existing study available);
- Desktop Palaeontological Impact Assessment;
- Visual Impact Assessment;

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

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

H. IMPACT ASSESSMENT

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

Impacts were identified as follows:

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

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

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

stipulations of environmental authorities and environmental best practices. The Environmental Management Programme (EMPr) provides a comprehensive list of mitigation measures for specific elements of the Project, which extends beyond the impacts evaluated in the body of the Basic Assessment Report.

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

Cumulative impacts were evaluated in terms of renewable energy projects in proximity to the proposed Project footprint. From a desktop scan it can be seen that these other renewable energy project sites are similar in nature to the proposed PV site. Cumulative impacts may be caused by these various developments, including loss of biodiversity and habitat fragmentation, visual and landscape character impacts, noise, and reduction in air quality. The aforementioned impacts in relation to the Project were assessed and mitigation measures were developed for each of the impact areas.

Other aspects considered in terms of cumulative impacts included:

- Traffic-related impacts in terms of the local road network;
- The clearance of vegetative cover for the Project's development footprint;
- Increase in the dust levels during the construction phase;
- Problems associated with the influx of employment seekers;
- Cumulative effects in terms of the electromagnetic fields was ruled out by Eskom since the interconnection line will be underground and some distance from the existing overhead 132 kV lines; and
- Positive cumulative economic effects from the construction of multiple developments in the area.

I. ANALYSIS OF ALTERNATIVES

Based on the recommendations of the specialists, technical considerations and the comparison of the impacts, Alternative 2 was identified as the Best Practicable Environmental Option (BPEO).

The BPEO also includes the revised layout, which avoids the environmental sensitive areas identified through the specialist studies as far as possible. The BPEO provides a balance between technological, energy and environmental aspects, while retaining the flexibility required in the final design stage of the Project.

J. PUBLIC PARTICIPATION

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

- Compiling the database of Interested and Affected Parties (I&APs);
- Notification of the project and review of the Draft Basic Assessment Report;
- Supplying of copies of the Draft Basic Assessment Report to Authorities; and
- Notification of the I&APs of the decision reached by the DFFE.

K. CONCLUSIONS

The following key tasks were undertaken during the Basic Assessment for the proposed Project:

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

Attention is drawn to specific sensitive environmental features for which mitigation measures are included in the BAR and EMPr.

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

With the selection of the BPEO, the adoption of the mitigation measures included in the BAR and the dedicated implementation of the EMPr, it is believed that the significant environmental aspects and impacts associated with this Project can be suitably mitigated. With the aforementioned in mind, it can be concluded that there are no fatal flaws associated with the Project and that Environmental Authorisation can be issued for Alternative 2, based on the findings of the specialists and the impact assessment, through the compliance with the identified environmental management provisions.

AMENDMENTS PAGE

Date	Nature of Amendment	Amendment No.	Signature
July 2022	Draft for Review by Authorities and the Public	0	

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LIST OF ACRONYMS & ABBREVIATIONS

AC	Alternating Current
ACMP	Archaeological Conservation Management Plan
AEL	Atmospheric Emission Licence
ASAPA	Association for Southern African Professional Archaeologists
AZ	Assemblage Zones
BAR	Basic Assessment Report
BI	Biodiversity Importance
BPEO	Best Practicable Environmental Option
CBA	Critical Biodiversity Area
CPV	Concentrated Photovoltaics
CR	Critically Endangered
CRR	Comments and Responses Report
DALRRD	Department of Agriculture, Land Reform and Rural Development
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DEAT	Department of Environmental Affairs and Tourism
DFFE	Department of Forestry, Fisheries and the Environment
DEM	Digital Elevation Model
DFFE	Department of Forestry, Fisheries and the Environment
DC	Direct Current
DMRE	Department of Mineral Resources and Energy
DNI	Direct Normal Irradiance
DWS	Department of Water and Sanitation
ECO	Environmental Control Officer
E4SA	Energy 4 South Africa
EAP	Environmental Assessment Practitioner
EI	Ecological Importance
EIA	Environmental Impact Assessment
EHS	Environmental, Health, and Safety
EMF	Electromagnetic Field
EMPr	Environmental Management Programme
EN	Endangered
ESA	Ecological Support Area
FAA	Federal Aviation Authority
GHG	Greenhouse Gas
GIS	Geographical Information System
GN	Government Notice
HV	High Voltage
HWC	Heritage Western Cape
I&APs	Interested and Affected Parties
IBA	Important Bird & Biodiversity Area

IDP	Integrated Development Plan
IFC	International Finance Corporation
IHIA	Habitat Integrity Assessment
IPP	Independent Power Producer
IRP	Integrated Resource Plan
IUCN	International Union for Conservation of Nature
KOP	Key Observation Point
LC	Least Concerned
LT	Least Threatened
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act (No. 107 of 1998)
NEM:AQA	National Environmental Management: Air Quality Act (Act No. 39 of 2004)
NEM:BA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEM:WA	National Environmental Management: Waste Act (Act No. 59 of 2008)
NFEPAs	National Freshwater Ecosystem Priority Areas
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NPAES	National Protected Areas Expansion Strategies
NWA	National Water Act (Act No. 36 of 1998)
OHS	Occupational Health and Safety
ONA	Other Natural Areas
PA	Protected Area
PES	Present Ecological State
PPE	Personal Protective Equipment
PS	Performance Standards
PV	Photovoltaic
RDL	Red Data Listed
REDZ	Renewable Energy Development Zones
REEA	Renewable Energy EIA Application
REMP	River Ecosystem Monitoring Programme
RFI	Radio Frequency Interference
RR	Receptor Resilience
S&EIR	Scoping and Environmental Impact Reporting
SA	South Africa
SACAA	South African Civilian Aviation Authority
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SAIIAE	South African Inventory of Inland Aquatic Ecosystems
SANS	South African National Standard
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
SEI	Site Ecological Importance
SIP	Strategic Integrated Projects
SKEP	Succulent Karoo Ecosystem Programme

SMME	Small, Medium and Micro-sized Enterprises
SPC	Spatial Planning Category
SQR	Sub-Quaternary Reach
SSD	Shoulder Sight Distance
STS	Scientific Terrestrial Services
ToR	Terms of Reference
UV	Ultraviolet
VAC	Visual Absorption Capacity
VFB	Vanadium Flow Battery
VU	Vulnerable
WCBSP	Western Cape Biodiversity Spatial Plan
WMA	Water Management Area

UNITS OF MEASUREMENT

°	Degree
%	Percentage
°C	Degrees Celsius
cm	Centimetre
ha	Hectare
kl	Kilolitre
km	Kilometre
km^2	Square kilometre
km/h	Kilometres per hour
kV	Kilovolt
l	Litre
m	Metre
m^2	Square metre
m^3	Cubic metre
m/s	Metre per Second
mm	Millimetre
MVA	Megavolt ampere
MW	Megawatt
MWh	Megawatt hour

1 PURPOSE OF THIS DOCUMENT

Eskom Holdings SOC Ltd intends to develop a solar photovoltaic (PV) plant within their existing SERE Wind Farm facility located in the Matzikama Local Municipality falling within the West Coast District Municipality in the Western Cape Province. Nemai Consulting has been appointed as the independent Environmental Assessment Practitioner (EAP) to conduct the Environmental Authorisation (EA) process for Phase 1A of the proposed Solar PV Plant.

The Basic Assessment Process is being undertaken in terms of Government Notice (GN) No. R. 982 of 4 December 2014 (as amended). This document serves as the **Draft Basic Assessment Report** (BAR) for the proposed Project.

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

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

The Draft BAR will be made available to Interested and Affected Parties (I&APs) for a 30-day review period from **01 August 2022 until 31 August 2022**. All comments received will be addressed in the Final BAR and will also be included in the Comments and Responses Report. The Final BAR will then be submitted to the Department of Forestry, Fisheries and the Environment (DFFE), who is the Competent Authority in respect to this proposed development in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA).

2 DOCUMENT ROADMAP

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

Table 1: BAR Roadmap

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

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

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

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

3 PROJECT BACKGROUND AND MOTIVATION

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

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

The hybridisation of the existing Sere Wind Farm with the installation of PV capacity was identified as one of the Renewable initiatives in the Eskom Corporate Plan. Sere Wind Farm is a 105.8 MW wind facility located near Vredendal in the Western Cape, which entered into commercial operation on 31 March 2015. In order to address the urgent need for additional generating capacity, it has been proposed that PV technology be installed at the Sere Wind Farm site in phases. This project is applicable for the first phase (Phase 1A) of the Sere PV project. Phase 1A aims to address Eskom's urgent need for additional generating capacity.

4 PROJECT LOCATION

4.1 Location of the Project relative to Solar Yield Area

As shown in **Figure 1** below, the Vredendal area is considered to have favourable solar radiation levels over most of the year, making it ideal for the production of solar power via PV Panels. The annual average GHI at the project location can be expected to be between 2000 kWh/m^2 and 2200 kWh/m^2.

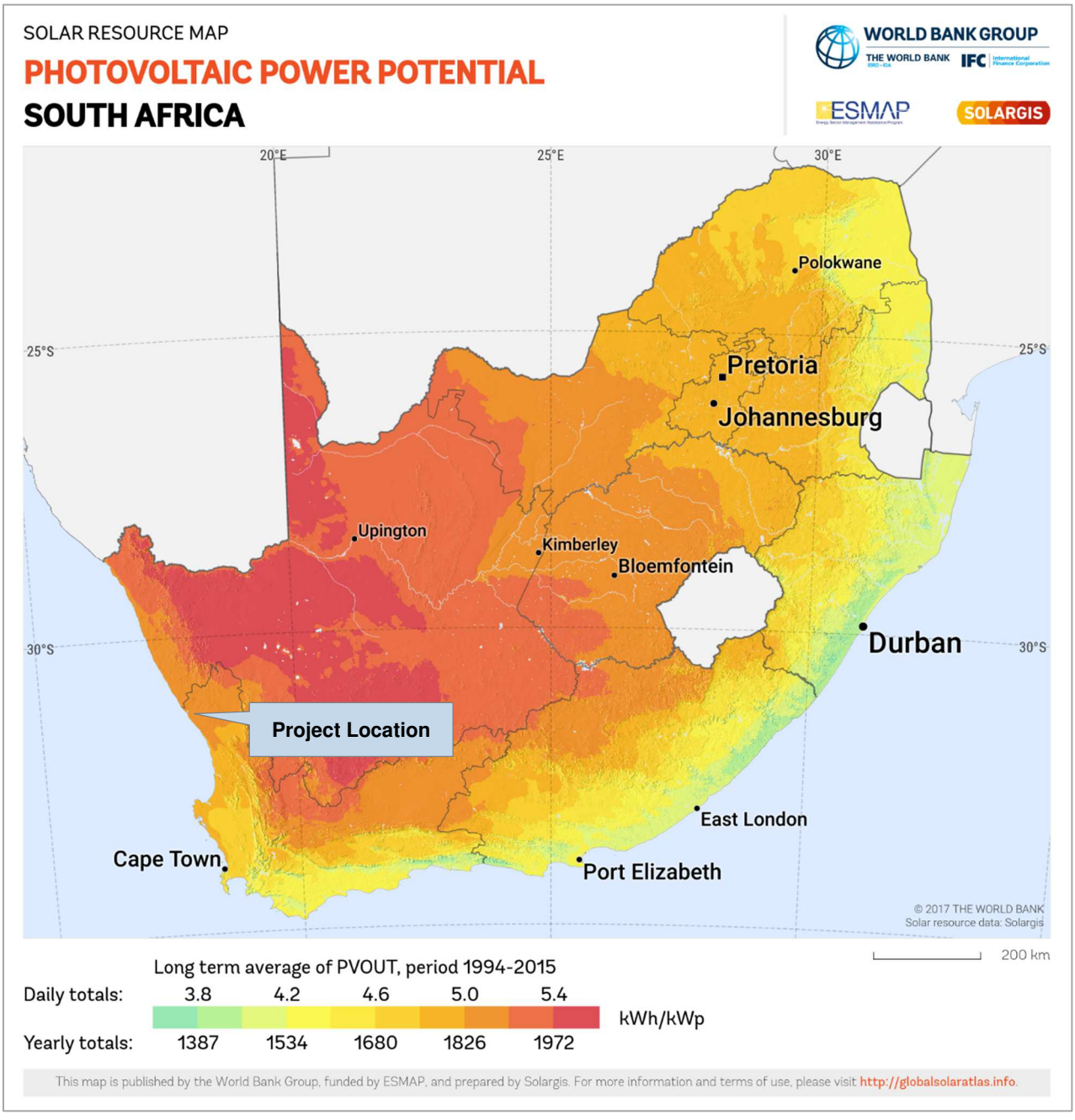


Figure 1: Location of the Project relative to PV Power Potential
(© 2019 The World Bank, Source: Global Solar Atlas 2.0, Solar resource data: Solargis)

4.2 Geographical Context

The Project is located in the north-western part of the Western Cape and falls within the Matzikama Local Municipality (MLM) falling within the West Coast District Municipality (WCDM). The locality map is provided in **Figure 2** below, and is also contained in **Appendix A**.

The property earmarked for the proposed Project (Lot 1862 Olifants River Settlement) is located approximately 40km north-west of the town of Vredendal, and 16km west of Koekenaap. The combined renewable energy assessment site is approximately 0.5km long and between 0.4km and 0.49km wide. The property is relatively flat with elevation decreasing from approximately 62m at the north boundary to 53m at the southern boundary. The property in question are currently zoned Agriculture, however no agricultural activities are currently taking place save for periodic grazing of neighbouring farm sheep. The property is operated as a Wind Farm by Eskom.

Infrastructure associated with the PV Site includes an access/internal roads, offices, guardhouse, and an underground interconnection line connecting the PV site to the existing Skaapvlei Substation on the same property.

The details of the PV Site alternatives are provided in **Table 2** below.

Table 2: Details of the Project's PV Site (property and coordinates)

Farm Details	21-digit Surveyor General No.	MLM Ward	Coordinates of site assessed	Geographical land area (site extent assessed)[a]	Area to be Developed (of [a])
PV Site					
Lot 1862 Olifants River Settlement	C07800070000186200000	8	Approximate centre point: 31°31'22.10"S 18° 7'2.31"E	25 ha	Not exceeding 20 ha

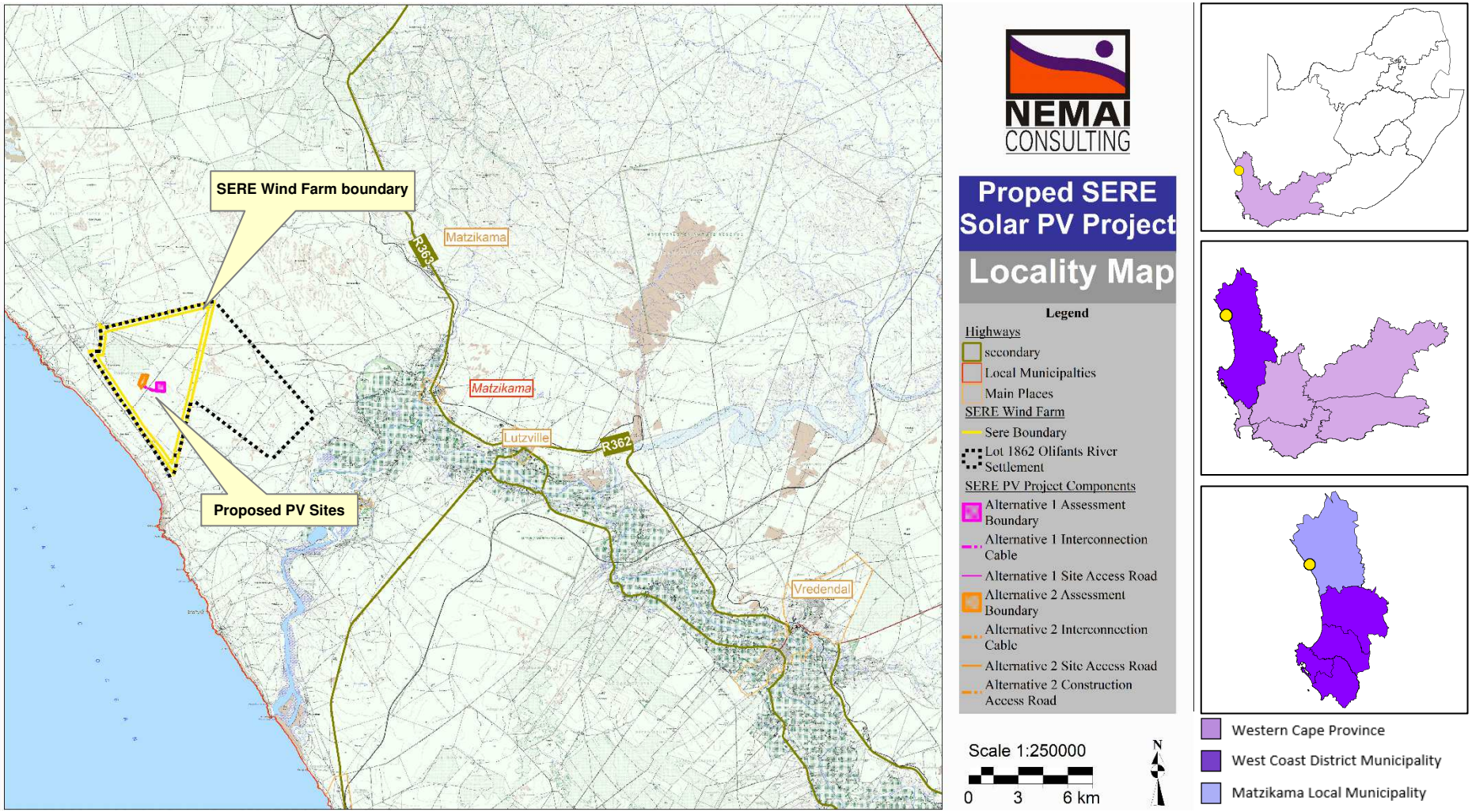


Figure 2: Locality map

Corner coordinates of the overall assessed sites, as well as the fixed and tracking site boundaries for the two alternative sites within the sites assessed are provided in **Table 3** and **4.** The details of the power line and access road are provided in **Tables 5**, **6** and **7** below for both the fixed and tracking technologies.

Table 3: Corner coordinates of the Site Boundaries for Alternative 1

Coordinates	
Fixed Technology	
Site Boundary*	
NW corner:	31°31'14.65"S; 18° 6'56.22"E
NE corner:	31°31'14.99"S; 18° 7'11.61"E
SE corner:	31°31'30.95"S; 18° 7'11.12"E
SW corner:	31°31'30.60"S; 18° 6'55.73"E
Tracking Technology	
Site Boundary*	
NW corner:	31°31'17.32"S; 18° 6'52.94"E
NE corner:	31°31'17.74"S; 18° 7'11.53"E
SE corner:	31°31'30.95"S; 18° 7'11.12"E
SW corner:	31°31'30.53"S; 18° 6'52.53"E
Overall Site Extent Assessed [a]	
NW corner:	31°31'14.04"S; 18° 6'53.04"E
NE corner:	31°31'14.46"S; 18° 7'11.62"E
SE corner:	31°31'30.95"S; 18° 7'11.12"E
SW corner:	31°31'30.53"S; 18° 6'52.53"E
Site Centre Point	
Centre Coordinates	31°31'22.091"S; 18°7'1.8675"E

*Within the overall site extent assessed ([a])

Table 4: Corner coordinates of the Site Boundaries for Alternative 2

Coordinates	
Fixed Technology	
Site Boundary*	
NW corner:	31°30'59.73"S; 18° 6'21.70"E
NE corner:	31°30'60.00"S; 18° 6'33.60"E
SE corner:	31°31'18.68"S; 18° 6'24.97"E
SE bend:	31°31'18.61"S; 18° 6'21.33"E
S corner:	31°31'22.04"S; 18° 6'17.49"E

SW corner:	31°31'18.41"S; 18° 6'13.07"E
Tracking Technology	
Site Boundary*	
NW corner:	31°31'0.23"S; 18° 6'20.77"E
NE corner:	31°31'0.50"S; 18° 6'32.62"E
NE bend:	31°31'2.34"S; 18° 6'32.57"E
SE corner:	31°31'18.77"S; 18° 6'24.98"E
SE bend:	31°31'18.69"S; 18° 6'21.25"E
S corner:	31°31'22.03"S; 18° 6'17.49"E
SW corner:	31°31'18.51"S; 18° 6'13.17"E
SW bend:	31°31'16.55"S; 18° 6'13.23"E
Overall Site Extent Assessed [a]	
NW corner:	31°30'59.6999"S; 18°6'20.8491"E
NE corner:	31°30'59.9969"S; 18°6'33.5984"E
SE bend:	31°31'18.7403"S; 18°6'24.98"E
SE corner:	31°31'30.95"S; 18° 7'11.12"E
SE bend:	31°31'18.6748"S; 18°6'21.2724"E
S corner:	31°31'22.0404"S; 18°6'17.4895"E
SW corner:	31°31'18.4357"S; 18°6'13.0374"E
SW bend:	31°31'16.5677"S; 18°6'13.2102"E
Site Centre Point	
Centre Coordinates	31°31'9.5918"S; 18°6'22.1182"E

*Within the overall site extent assessed ([a])

Table 5: Properties affected by the Project's Power Line and Access Road

Farm / Township Details	21-digit Surveyor General No.	BWLM Ward
Power Line		
Lot 1862 Olifants River Settlement	C07800070000186200000	8

Table 6: Coordinates of the Project's Power Line/Cable

Coordinates		
Fixed Technology		
Cable Route	**Alternative 1**	**Alternative 2**
Start point (PV Site):	31°31'29.05"S; 18° 6'55.85"E	31°31'20.57"S; 18° 6'18.74"E
Bend point:	31°31'29.00"S; 18° 6'52.69"E	31°31'21.65"S; 18° 6'18.64"E

Bend point:	31°31'29.53"S; 18° 6'52.66"E	31°31'22.15"S; 18° 6'18.73"E
Bend point:	31°31'29.32"S; 18° 6'43.07"E	31°31'23.59"S; 18° 6'20.50"E
Bend point:	31°31'22.14"S; 18° 6'25.41"E	31°31'25.33"S; 18° 6'18.97"E
Bend point:	31°31'22.37"S; 18° 6'23.89"E	
Bend point:	31°31'26.74"S; 18° 6'18.81"E	
End point (Substation):	31°31'27.80"S; 18° 6'20.17"E	31°31'26.89"S; 18° 6'20.56"E
Tracking Technology		
Cable Route	**Alternative 1**	**Alternative 2**
Start point (PV Site):	31°31'29.53"S; 18° 6'52.55"E	31°31'20.57"S; 18° 6'18.74"E
Bend point:	31°31'29.32"S; 18° 6'43.07"E	31°31'21.65"S; 18° 6'18.64"E
Bend point:	31°31'22.14"S; 18° 6'25.41"E	31°31'22.15"S; 18° 6'18.73"E
Bend point:	31°31'22.37"S; 18° 6'23.89"E	31°31'23.59"S; 18° 6'20.50"E
Bend point:	31°31'26.74"S; 18° 6'18.81"E	31°31'25.33"S; 18° 6'18.97"E
End point (Substation):	31°31'27.80"S; 18° 6'20.17"E	31°31'26.89"S; 18° 6'20.56"E

Table 7: Coordinates of the Project's Access Roads

Coordinates			
Fixed Technology			
Access Road Route	**Alternative 1 Access Road (Permanent)**	**Alternative 2 Access Road (Permanent)**	**Alternative 2 Construction Road (Temp)**
Start point (PV Site):	31°31'29.31"S; 18° 6'55.80"E	31°31'21.20"S; 18° 6'18.42"E	31°31'19.92"S; 18° 6'19.87"E
Bend point:	31°31'28.98"S; 18° 6'43.58"E		
End point (Existing Road):	31°31'21.31"S; 18° 6'24.35"E	31°31'21.88"S; 18° 6'19.18"E	31°31'22.47"S; 18° 6'22.75"E
Tracking Technology			
Access Road Route	**Alternative 1 Access Road (Permanent)**	**Alternative 2 Access Road (Permanent)**	**Alternative 2 Construction Road (Temp)**
Start point (PV Site):	31°31'29.32"S; 18° 6'52.57"E	31°31'21.20"S; 18° 6'18.42"E	31°31'19.92"S; 18° 6'19.87"E
Bend point:	31°31'28.98"S; 18° 6'43.58"E		
End point (Existing Road):	31°31'21.31"S; 18° 6'24.35"E	31°31'21.88"S; 18° 6'19.18"E	31°31'22.47"S; 18° 6'22.75"E

5 PROJECT DESCRIPTION

5.1 Solar Technology

Solar energy facilities operate by converting solar energy into a useful form (i.e. electricity) through the photovoltaic (PV) effect in a silent and clean process. 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.

5.2 PV Technology Overview

The PV effect is a semiconductor effect whereby solar radiation falling onto the semiconductor PV cells generates electron movement. The main technology categories are crystalline modules (mono or poly), thin film, and concentrated photovoltaics (CPV). PV modules are either mounted on fixed-angle frames or on sun tracking frames. PV technology produces direct current (DC) which is then converted to alternating current (AC) via power electronic inverters. The output from the inverters generally requires a further step-up in voltage to reach the AC grid voltage level. This would take place within the existing Skaapvlei Substation, after which the electricity would be exported into the grid network. **Figure 3** below provides an overview of Solar PV Power Plant.

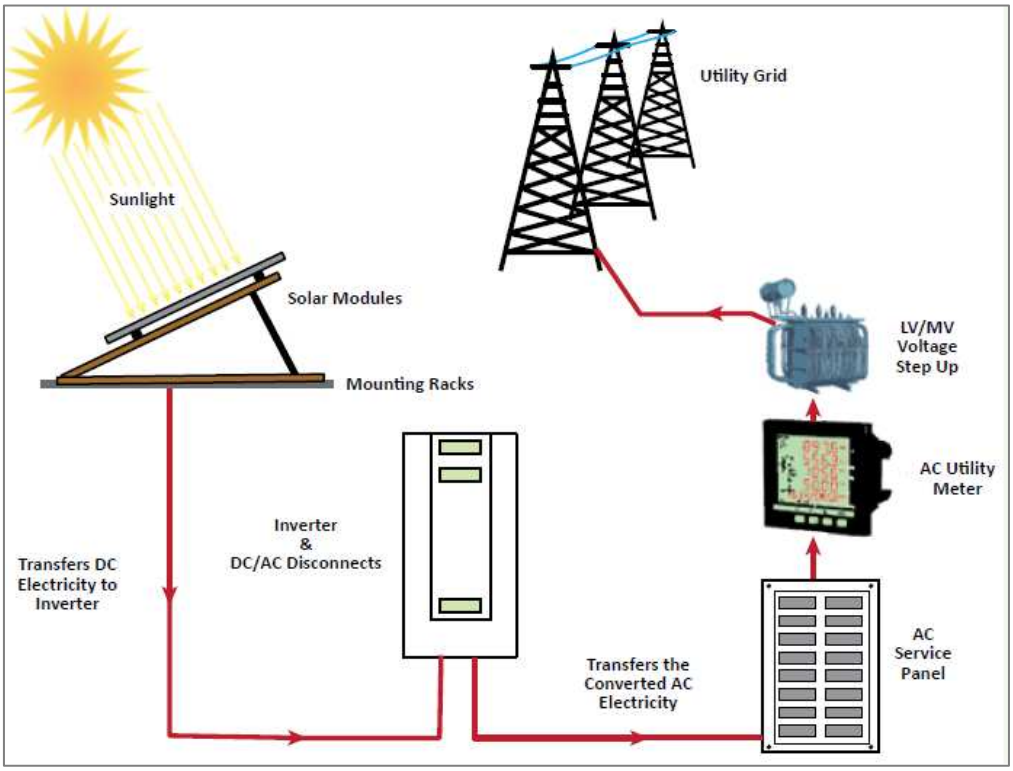


Figure 3: Overview of Solar PV Power Plant (IFC, 2015)

5.3 Infrastructure Overview

5.3.1 Overview of Technical Details

The technical details of the proposed PV Plant are captured in **Table 8** below.

Table 8: Technical details of the proposed PV Plant

No.	Component	Description / Dimensions
12.	Height of PV panels	Between 3 m to 6 m (1.5m deep excavations for supports)
13.	Area of PV Array	Around 16 ha to 18 ha
14.	Number of inverters required	Up to 20 inverter stations between the PV modules.
15.	Area occupied by inverter / transformer stations / substations	▪ Area occupied by Inverter stations (20 Inverter stations 30m^2 each) = 0.003 x 20 = 0.09 ha (within the PV site) ▪ Area occupied by Control room/offices = 0.4 ha ▪ Area occupied by security house = 0.001 ha
16.	Capacity of existing substation	1 x 40 MVA, 22-33kV/132 kV
17.	Area occupied by both permanent and construction areas	Less than 20 ha
18.	Length of roads	▪ Access road alternative 1 = 796m (tracking) / 880m (fixed) ▪ Access road alternative 2 = 30m (permanent) / 110m (construction) ▪ Internal roads to inverter stations = approximately 3.4km (alternative 1); 2km (alternative 2) ▪ Perimeter road = approximately 1.8km (both alternatives)
19.	Length of interconnection cable between PV site and substation	▪ Alternative 1 = 1044m (tracking) / 1150m (fixed) ▪ Alternative 2 = 244m (tracking/fixed)
20.	Width of roads	▪ Internal roads = 2.5 m to 5 m ▪ Access road = 8m (alternative 1) and 6m (alternative 2)
21.	Proximity to grid connection	Approximately 1km from existing Skaapvlei Substation (Alternative 1) Approximately 200m from existing Skaapvlei Substation (Alternative 2)
22.	Height and type of fencing	To be determined

5.3.2 SERE Solar PV Array

5.3.2.1 Photovoltaic Panel Structures

The technology options considered for the PV array include the following:

- ❑ Fixed tilt structures with central inverters; or
- ❑ Single axis trackers with central inverters.

The decision between using the fixed or single axis tracking technology will only be made during the appointment of the Construction Contractor. For this reason, the technology options are not considered alternatives. The assessment site has been enlarged to accommodate both layouts for the fixed and tracking technologies, however each technology footprint itself will be less than 20 ha falling within the assessment site area. As confirmed with DFFE, the Department will provide a decision on the alternatives

provided below within the assessment area for both fixed and single axis tracking technology, which will be chosen post-authorisation.

The alternatives considered are as follows:

- Alternative 1:
  - Sere PV Fixed and Tracking Technology Layout options for site location to the east of the existing Skaapvlei Substation.
- Alternative 2:
  - Sere PV Fixed and Tracking Technology Layout options for site location to the north of the existing Skaapvlei Substation.

See **Section 6 and 16** of this report for further details on the alternatives assessed.

The panel array (technology) layout options have different heights and spacing intervals; however, the total development footprint remains less than 20ha for each technology option. Approximate height differences between the alternatives are as follows:

- Fixed tilt structures and central inverters -
  - 6m height;
- Single axis trackers, bifacial mono-crystalline modules and string inverters -
  - 3.5m height.

Examples of typical panel stacking is provided in **Figures 4** below.

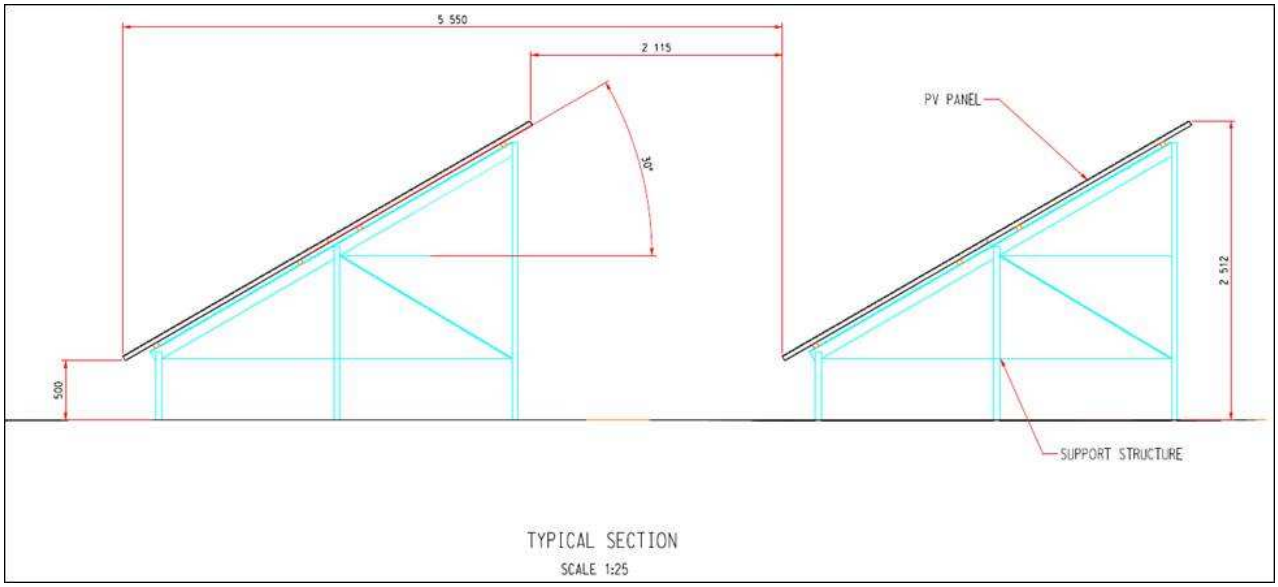


Figure 4: Typical section of PV panel mounting on structures
(Source: Eskom)

5.3.2.2 PV Site Construction

The majority of vegetation clearing and earthworks required for the proposed PV site will be associated with the construction of the Office Buildings (in the footprint of the construction camp), Inverters, internal road network, access road, interconnection cable, and PV support structures.

The installation and stabilisation of the panel mounting rack structures will involve the following (refer to examples in **Figures 5** and **6** below):

- Onsite soil surveys and trial pits will be required for detail design to determine the soil structure and suitability for this method and erecting the PV panel structure bases, as well as the foundations of the inverter stands (approximately 30m^2) and the office buildings.

Figure 5: Installation of panel mounting structures

Figure 6: Placing panels onto support structures

Should the clearing of vegetation and further earthworks be necessary for the installation of the PV panel arrays (as a result of the soil tests), it is recommended that these clearing and installation activities should be undertaken in an incremental / staggered manner, so that the area disturbed at any one time will be small and manageable. Construction traffic required between the arrays will be restricted to demarcated areas and the access roads.

5.3.2.3 Access Roads and Laydown Areas

The installation of the PV panels requires adequate access to the site by transport / delivery vehicles. A primary access road and internal secondary roads of gravel access is sufficient for the Project.

It is proposed to develop a new access point from the existing Wind Farm access road, as shown in **Figure 7** below. From the Wind Farm access road, a main internal road will align to the PV Park facility from which the secondary internal roads branch off to align to the separate PV modules. The preferred option will have two site access roads, a temporary construction access road and a permanent road leading to the office buildings.

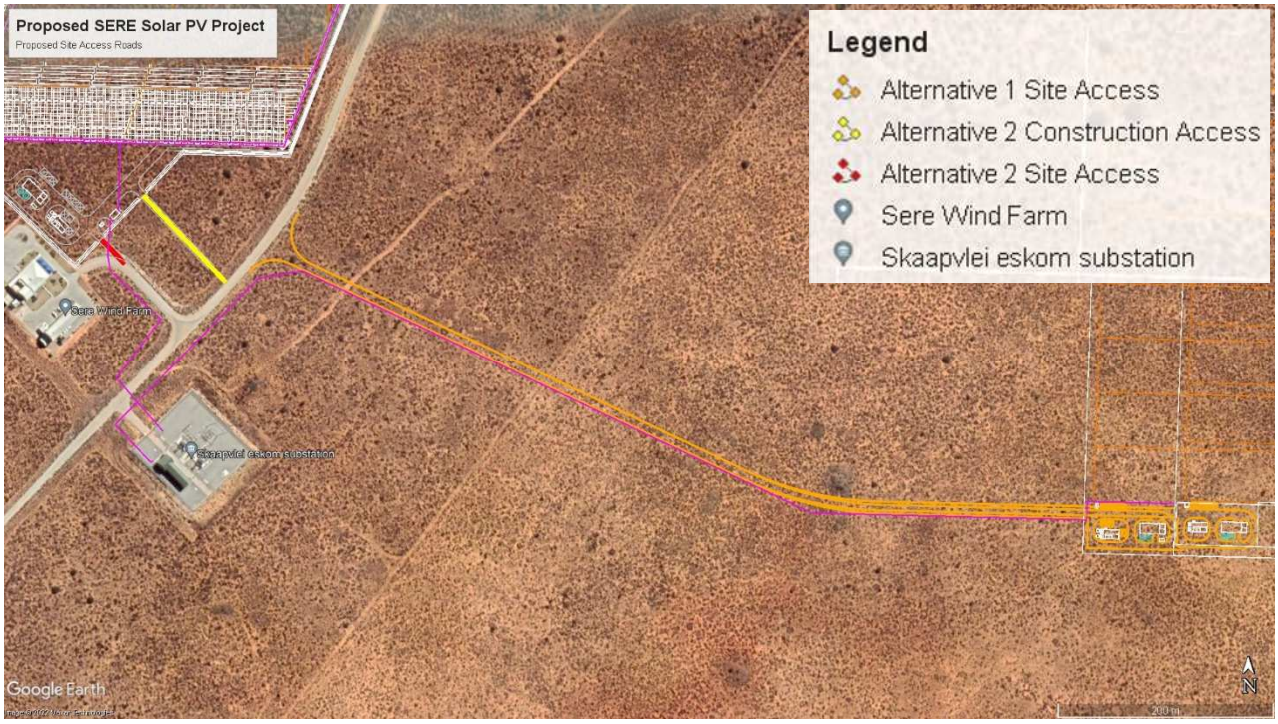


Figure 7: Proposed access points to each alternative site from the existing Wind Farm access road (Google Earth image)

Each PV array requires its own access road next to it for construction, maintenance (and cleaning) and refurbishment. Although the existing on-site farm roads will be used as far as possible, the exact alignment and design of the required roads will be determined during detailed design phase.

5.3.3 Electrical Connection

5.3.3.1 Overview

The electricity generated by the PV site will be transferred to the national Eskom grid. The Project will connect to existing Skaapvlei Substation on the same property (see **Figure 8** below) through a ±1.1km (Alternative 1) and 0.2 km (Alternative 2) single circuit underground line. The voltage of the energy generated by the Project will be transformed on site.

Figure 8: Connection to the existing Skaapvlei Substation from both alternatives through an underground cable (Google Earth image)

5.3.4 Office Buildings

The Solar PV plant is required to have a dedicated Operating and Maintenance building, and spares storage facilities. The Operating and Maintenance building to include the following rooms as a minimum:

- Control room (For employees to view status of plant equipment, air-conditioned)
- Server room (Air-conditioned room for sensitive electronic equipment)
- Ablution facilities (male and female)
- 2 x Offices
- Kitchen
- A security/access control building is to be positioned at the main gate of the PV Plant.
- Spares/Storeroom (for the storage of spare solar panels and electronic equipment)

The control room with regards to operator interface shall be designed to ergonomic principles and good Solar Power Plant practice.

5.4 Project Life-Cycle

The project life-cycle for a new 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.
- Industrialisation and localisation.
- Project cost determination.
- Project financing.
- 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.
- Preparing detail designs (layout, civil, electrical).
- Surveying.
- Conducting a walk-down survey of the interconnection cable and access road routes.
- Preparing construction plans.
- Preparing the Project schedule.
- Preparing the commissioning plans.

❖ Construction phase – During the implementation of the Project, the following construction activities will be undertaken (amongst others) –

- 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.
- Activities associated with the power line, such as creating access roads, excavation for foundations, foundation of steelwork, concrete works, erecting steel structures and stringing of transmission cables.
- Reinstating and rehabilitating working areas outside of permanent development footprint.

❖ Operational phase - Once the Solar PV site is up and running the facility will be largely self-sufficient. Operational activities associated with the maintenance and control of the 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.
- Monitoring of the facility's performance.

❖ Decommissioning –

The solar PV plant has 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. 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. The decommissioning of the plant will have similar activities to those that are performed during construction. The decommissioning activities anticipated once the facility reached its end of life are the following:

- Disassembling of the components of the facility, including but not limited to Solar PV modules, structures, foundations, inverters, cabling, etc.
- Site preparation, removal of all equipment for disposal and re-use.
- Site Rehabilitation to acceptable level as per Environmental Management Plan (EMP) guidelines.

5.5 Resources and Services required for Construction and Operation

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

5.5.1 Water

Construction

The water requirements for the construction phase is estimated to be approximately 528 L.

The laydown area will also accommodate water storage tanks (estimated 32 kL for the first 4 months and 20 kL for the remaining 20 months, until construction is completed). This area will also accommodate the offices for construction contractors and would be used for parking and office buildings during the operation phase.

Operation

The estimated water requirements during the operational phase are associated with the cleaning of the PV panels and are estimated to be approximately 390 kL per year.

All water requirements for the operational phase will either be provided through the local municipality connection or trucked in via tanker and stored on site.

5.5.2 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

An ablution facility will be provided, for use by operation / maintenance staff within the security/guard house and office buildings. Sewerage effluent from this ablution facility will be stored in an underground conservancy tank. This conservancy tank will need to be emptied by a Municipal tanker or private service provider for disposal at the local Wastewater Treatment Works. As the number of personnel on-site will be small, it is likely that this conservancy tank will only need to be emptied once or twice a year.

5.5.3 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.

5.5.4 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 approved waste disposal sites. All the waste disposed of will be recorded.

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

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

Suitable measures will be implemented to manage all wastewater generated during the construction period (refer to the EMPr contained in **Appendix J**).

Operation

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

5.5.5 Roads

An internal road network will be required to construct and operate the PV site.

During construction care will be taken to access the site from designated areas and thereby limiting the impact to areas where roads are to be built. Construction vehicles will not be allowed to access and cross the site randomly and all vehicles will be expected to travel within designated areas.

The existing vegetation will be left in place where possible as the root system will assist in bonding the soil together and thereby reducing erosion. The detailed civil and structural design, and associated method statements, will be undertaken in the detailed design phase of the PV facility.

5.5.6 Stormwater

Construction

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

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. Water will be managed on the surface and dispersed into the environment.

5.5.7 Electricity

Construction

During the construction phase electricity will be obtained from diesel generators and / or temporary supply via cables from the site power grid.

Operation

Electricity will be sourced from the energy-generation facility itself and/or from the existing electrical infrastructure on the property.

5.5.8 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.

6 ALTERNATIVES

6.1 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 the Project.

6.2 Site Alternatives

The Project has been proposed within the existing operational SERE Wind Farm property, which presents an ideal location for the generation of solar energy. Initially, based on desktop selection, one site location was considered for the Project (Alternative 1), however, after Specialist field investigation found that the initial site was of high sensitivity, a second site location was determined as an alternative (Alternative 2) (**Figure 9, 10** and **11**).

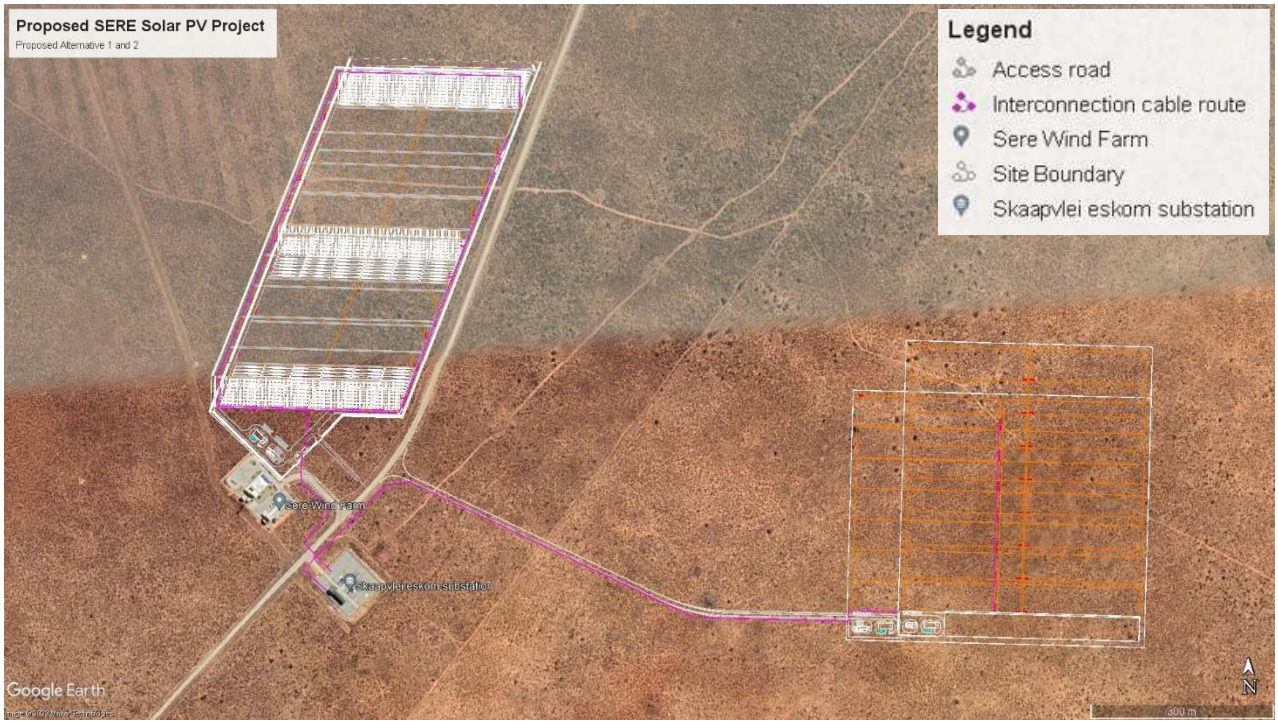


Figure 9: Map of the two site alternatives considered (Alternative 1 on the right and Alternative 2 on the left) (Google Earth image)

Figure 10: Map of Alternative 1 showing both the fixed and tracking layout options (Google Earth image)

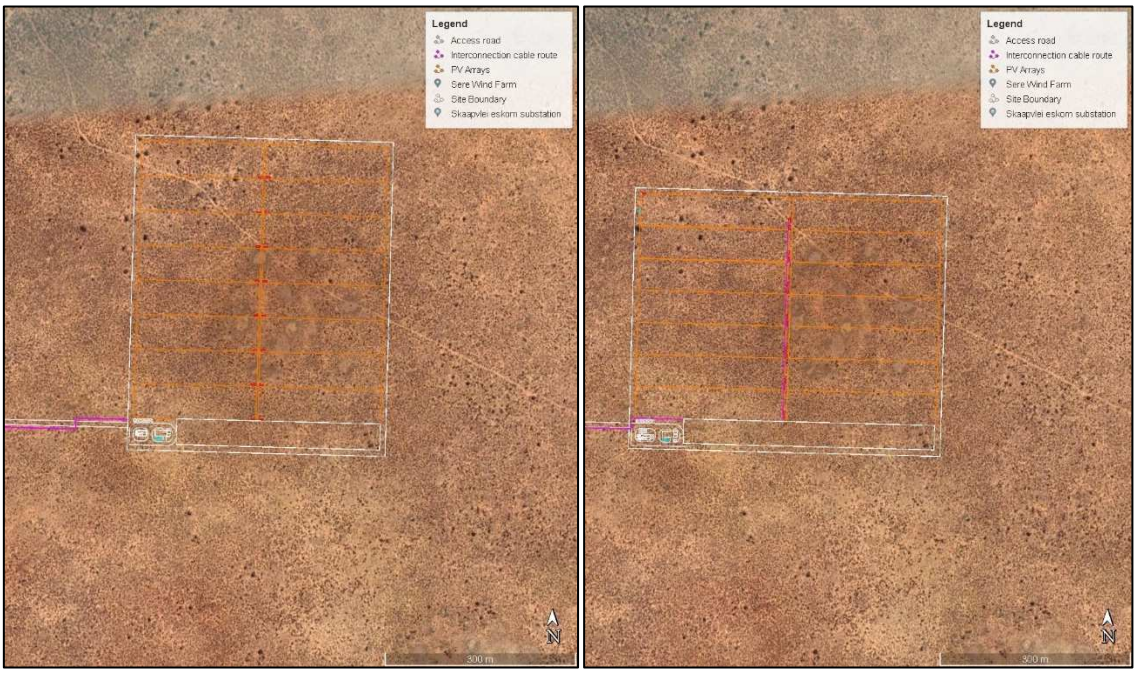


Figure 11: Map of Alternative 1 showing fixed technology option (left) and tracking technology option (right) (Google Earth image)

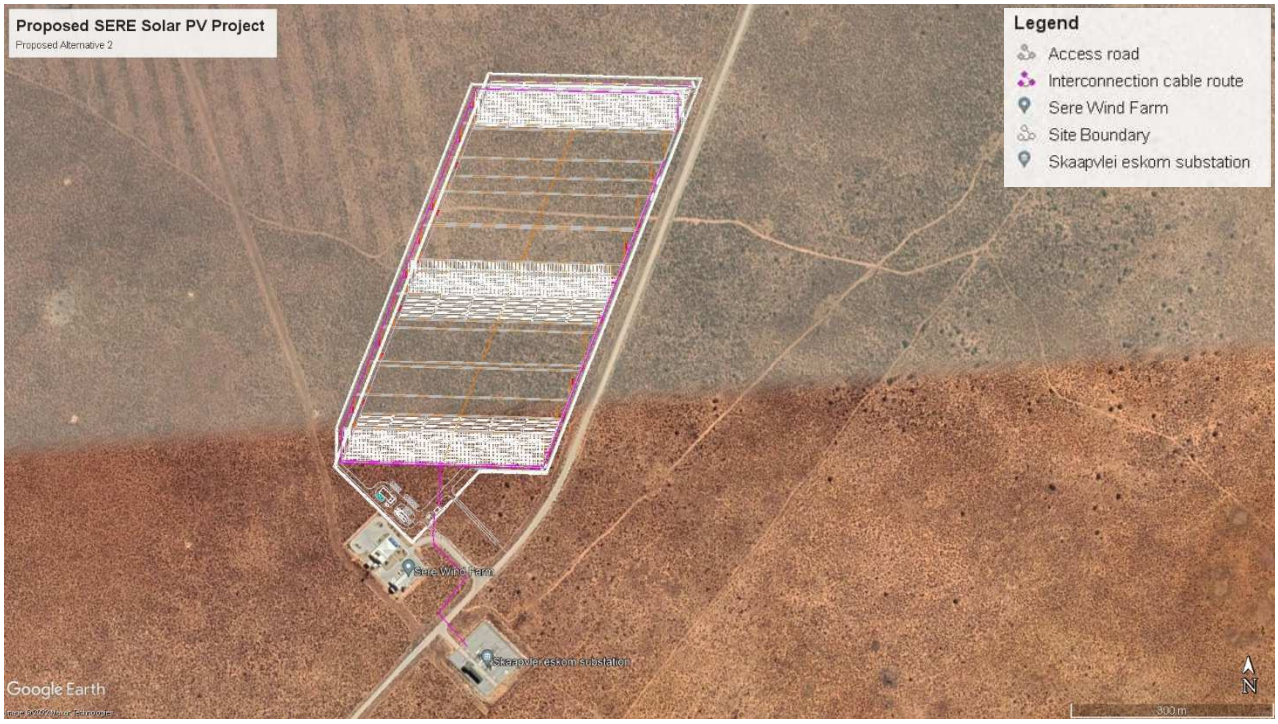


Figure 12: Map of Alternative 2 showing both the fixed and tracking layout options (Google Earth image)

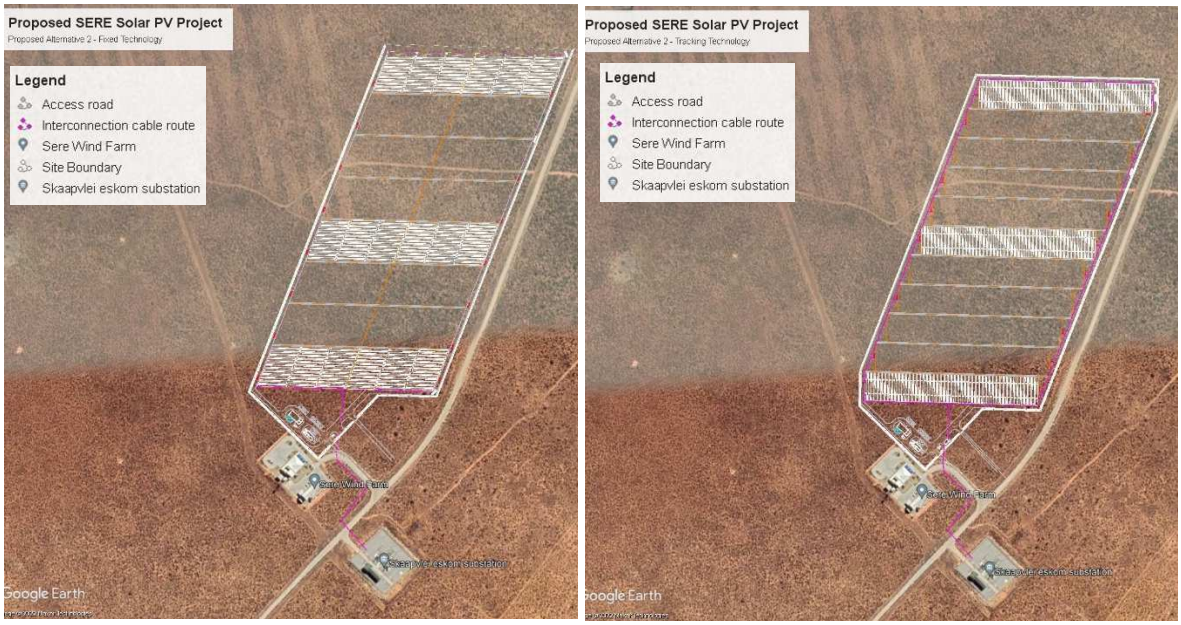


Figure 13: Map of Alternative 2 showing the fixed technology option (left) and tracking technology option (right) (Google Earth image)

6.2.1 Technical Factors

The advantages and disadvantages of the alternatives were considered from a technical perspective:

Alternative 1

Advantages:

- Far from Wind Turbine shading effects.
- Less or no exposure to dust from access road.

Disadvantages:

- Further from the Substation when compared to Alternative 2.
- Further from the existing site access road.

Alternative 2

Advantages:

- Close to the Substation and shorter route of electrical cabling needed to the substation.
- Close to the existing site access road.
- Close to the Operation & Maintenance (O&M) buildings which could allow for sharing of facilities if services are unavailable on the PV site.

Disadvantages:

- Increased dust exposure of PV panels since they are closer to the existing site access road.
- Potential exposure to Wind Turbine shading effects.

Alternative 1 and 2 can be technically considered as alternatives for the development of the solar PV plant.

6.2.2 Environmental Sensitivity

As part of the EIA that was undertaken for the SERE Wind Farm, which received Environmental Authorisation (ref. no.: 12/12/20/913) in 2008, site specific constraints maps were developed based on constraints identified and assessed by the various specialist studies and through input from desktop environmental sensitivities. The location for the PV Site was revised to avoid these constraints within the area designated by Eskom for the development. After specialist studies were undertaken as part of the current process, further sensitivities were highlighted, and an alternative stie location was selected for inclusion in the assessment. The environmental sensitivities of each alternative site are outlined below:

- Biophysical –
  - There are no watercourses within, or in the near vicinity, of the proposed Project;
  - Site 1 overlaps with a NPAES focus area, while Site 2 falls just outside the NPAES area;
  - Site 1 falls within a CBA1, while Site 2 overlaps with a small section of CBA1, and ESA1, ESA2 and ONA area;
  - Provincially projected fauna and flora species where identified to occur in the Project area during the field assessment survey.
- Paleontological –
  - The Project site is underlain by the West Coast Group, which has a desktop sensitivity of very high on the PalaeoMap of SAHRIS. However, geotechnical data available showed that

the aeolian sands are 20m deep and perhaps deeper in sections, therefore the 1.5m deep excavations for the Project were deemed unlikely to impact on underlying potential palaeontological features.

- Archaeological –
  - Archaeological occurrences were identified in the broader area around the proposed sites, but none were identified within the proposed sites. It was deemed likely that archaeological impacts would not occur within the Project site.
- Visual –
  - One sensitive receptor, the SERE Wind Facility, was identified to show a visual exposure rating (VER) of 1.45, which was considered insignificant by the specialist. No other identified sensitive receptors registered a VER rating according to the analysis done.

Adjustments were made to the site location in accordance with the initial findings of the specialist studies, which resulted in Alternative 2 being added to the assessment.
For the visual, heritage, and paleontological studies, there was no preference between the two alternative site locations, however, the terrestrial ecological and avifauna studies favoured site alternative 2 as the preferred alternative.

6.3 Technology / Design Alternatives

The following technology options were considered from a technical perspective:

- **Fixed tilt structures**
- **Single axis trackers**

It is important to note that the technology / design options listed above are **not considered as alternatives** in this assessment. Each site alternative consists of two technology options, each with a slightly different layout. As such, a larger assessment area was considered for each alternative to include both technology option layouts. The choice in technology will only be determined once the Construction contractor is appointed. Therefore, should an alternative be authorised, only one of the proposed technologies will be developed in the corresponding layout within the assessed area. Each technology option layout footprint is less than 20 ha. The associated infrastructure, namely the interconnection cable and access road, remain unchanged between the two technology options.

6.4 No-Go Option

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 implications of the no-go alternative are discussed in **Section 15.27** below.

7 NEED AND DESIRABILITY

7.1 Feasibility Considerations

7.1.1 Solar Resource and Energy Production

The site lies in a region of South Africa with some of the highest solar resource. The semi-arid climate lends itself to the availability of high levels of solar energy. Considering the steady nature of the solar radiation on site, the resource is a sufficient to guarantee a positive return on investment.

7.1.2 PV Site and Grid Connection

Among the positive characteristics of the Project is the fact that it is in line with a renewable energy initiative set in motion by South Africa. The Project site is owned by Eskom and ready access to a national grid connection is available a short distance from the proposed site.

7.1.3 Social Impact

Through community engagement undertaken by the MLM, one of the main needs captured for Ward 8 was identified as the need for further infrastructure development. The provision of reliable electricity is a key pillar in stimulating the economy, which would lead to further infrastructure development in the area. It is proposed that the Project will have a positive impact on the social wellbeing of Ward 8, both directly for those who receive electricity directly from Eskom in the area, and indirectly for those you will benefit from the knock-on effects of a more stable and reliable electricity supply.
A percentage of jobs created through the construction of the Project will be sourced from local labour, especially for general labour, which would have a positive social impact in the local community.

7.1.4 Employment and Skills Transfer

The benefits of renewable energy facilities to local regions are not confined to the initial investment in the Project. They also provide direct employment opportunities for locals, as well as flow-on employment for local businesses through provision of products and services to the Project and its employees.

The Project will have a beneficial impact on local employment during the construction phase. During the estimated 12-month construction phase, the Project will employ approximately 200 people of various qualifications. During operations, the PV Park is expected to have 10-15 direct employees ranging from security staff to administration and artisans. To guarantee successful operations over the lifetime of the investment, the Project will use the skills of outside labour to cross train local

specialists. This cross training and skills development will take place especially in the area of technical maintenance and administration.

7.2 Need and Desirability

This section serves to describe the need for and desirability of the proposed development. The following responses are provided to the questions posed in the Guideline on Need and Desirability (DEA&DP, 2013b):

- *Is the proposed development in line with the projects and programmes identified as priorities within the credible IDP?*
  Yes, a renewable energy development has a strategic place in the Matzikama LM IDP as a suggested intervention and initiative to promote existing strategic objectives.
  The West Coast District Municipality has identified the following five Strategic Objectives/Goals in order to accomplish their vision over the next five-year term (2017/22) includes promoting bulk infrastructure development services.

- *Should the development occur here at this point in time?*
  Site specific and strategic constraints / opportunities determined in the environmental process have determined the optimal development footprint.

- *Does the community / area need the activity and the associated land use concerned?*
  The proposed project will provide additional electricity to the national grid that will benefit the local community and area, as well as the broader province. Lutzville West, Papendorp, Ebenhaeser, Doringbaai and surrounding farms receive electricity directly from Eskom. An increase in supply from Eskom will strengthen the grid supply. The West Coast DM IDP (2022) states that economic growth between 2015 and 2019 has declined in the Western Cape Province over numerous sectors, pinpointing the contractions cause to, amongst others, unreliable electricity supply. The proposed location for the solar PV project is within the existing SERE wind farm owned and operated by Eskom as a renewable energy generation facility.

- *Are the necessary services with adequate capacity currently available?*
  The development proposal includes the installation of electrical cabling to connect the solar PV plant to an existing substation that will feed into the national grid system.

- *Is this development provided for in the infrastructure planning of the municipality?*
  Yes. Local policies and strategies highlight renewable energy as important in the future development of the Matzikama LM and West Coast DM. The Matzikama LM IDP (2022) notes the diversification of energy mix to ensure that a significant proportion of new generation comes from renewable sources as a suggested thematic intervention and initiative to promote existing strategic objectives. Furthermore, growth of the renewable energy sector is listed under the desired state for theme 9: socio-economic development in the West Coast DM IDP (2022), and

renewable energy is highlighted as one of 8 focus areas in the Western Cape Climate Change Response Strategy (2014). The WCDM's goal is to promote and support renewable energy projects that are being proposed in the WCDM area, provided that environmental sustainability is achieved.

- *Is this project part of a national programme to address an issue of national concern or importance?*
  Yes. The following is noted in response:
  - SA's commitment to renewable energy is reflected in its ratification of the Paris Agreement and the country's long-term energy planning iterations.
  - Solar power represents a large component of the needed diversification of SA's electricity system.
  - According to the Department of Energy (2017), energy is by nature an intergovernmental issue, cutting across energy security, economic prosperity, employment and environment, among others. In recognising these benefits, clean energy has been incorporated into the broader policy framework.
  - The White Paper on Renewable Energy of 2003 is one of SA's policy documents that laid the foundation for the promotion of renewable energy technologies such as solar, hydro, biomass and wind (http://www.energy.gov.za/files/renewables_frame.html). Through this policy document, a ten-year target of how renewable energy technologies could diversify the country's energy mix and secure cleaner energy was set.
  - This Project supports SIP 8: Green energy in support of SA's economy.

- *Is the development the best practicable environmental option for this land / site?*
  The target site location is situated within the existing SERE Wind Farm facility owned and operated by Eskom. The proposed site is therefore unlikely to be considered for an alternative land use such as urban development. The property has poor agricultural potential although it is used for occasional grazing, however, given that the property functions as a renewable energy generation facility, its continued use for such purpose is favourable.
  The Project area falls within the mammal endemic habitat of the Succulent Karoo Ecosystem Programme (SKEP). This is a board area, and the Project falls within an existing renewable energy generation facility, therefore it can be seen as better to group the renewable energy projects within one site, as opposed to impacting on other areas within the broader SKEP habitat.
  Alternative 1 falls within a Priority Focus Area of the National Protected Area Expansion Strategy 2017 (NPAES), and thus Alternative 1 is preferred.

- *Would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF?*
  No. According to the MLM IDP, a renewable energy development has a strategic place in the MLM as a suggested intervention and initiative to promote existing strategic objectives.

- *Would the approval of this application compromise the integrity of the existing approved environmental management priorities for the area?*
  The compatibility of the Project with the Western Cape Biodiversity Spatial Plan (WCBSP) and other environmental management and planning tools were assessed as part of the specialists studies undertaken as part of the Basic Assessment, and particularly in the Terrestrial Ecology Assessment (refer to **Section 15.8** below).

- *Do location factors favour this land use at this place?*
  Yes, subject to mitigation.
  The Vredendal area of the Western Cape has been identified as being one of the most viable for Solar energy generation, due to excellent solar radiation received in the area. In addition, the Project falls within an existing operational renewable energy generation facility (the SERE Wind Farm).

- *How will the activity or the land use associated with the activity applied for, impact on sensitive natural and cultural areas?*
  The alternatives considered have been informed by various investigations and assessments undertaken as part of the previous Wind Farm EIA as well as the current basic assessment process' specialist assessments, which considered both the natural and cultural landscapes.

  The PV site positioning took into account the surrounding natural and cultural areas identified on desktop level and those identified through field assessment, as well as through the sensitive features identified through the Wind Farm EIA.

- *How will the development impact on people's health and wellbeing?*
  Refer to the findings of the following related specialist studies:
    - Visual Impact Assessment (refer to **Section 14.8** below);

  It is further noted that the proposed PV site and interconnection line are located outside of the urban edge within the existing SERE Wind Farm property and is characterised by a very low population density given that the surrounding properties are farms. There are no expected impacts on the surrounding people's health and wellbeing.

- *Will the proposed activity or the land use associated with the activity applied for, result in unacceptable opportunity costs?*
  Unlikely. Opportunity costs are associated with the net benefits forgone for the development alternative. The site has been selected and identified for renewable energy development by Eskom in order to supplement the existing grid.

  The property in question is currently zoned Agriculture, however no agricultural activities are currently taking place except for occasional grazing of sheep on the property which will not be significantly impacted given the size of the overall Wind Farm property in relation to the PV site.

- *Will the proposed land use result in unacceptable cumulative impacts?*
  Refer to discussion on cumulative impacts in **Section 15.28** below.

8 LEGISLATION AND GUIDELINES CONSIDERED

8.1 International Finance Corporation - Performance Standards & Guidelines

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

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

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

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

8.2 Legislation

8.2.1 Environmental Statutory Framework

The legislation that has possible bearing on the proposed Project from an environmental perspective is captured in **Table 9** below. Note that 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 for the Project

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

Legislation	Description and Relevance	
National Environmental Management Act (NEMA) (No. 107 of 1998)	▪ Key sections (amongst others): o Section 24 – Environmental Authorisation (control of activities which may have a detrimental effect on the environment). o Section 28 – Duty of care and remediation of environmental damage. ▪ Environmental management principles. ▪ Authorities – DFFE (national) and the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) (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 and 3 that are relevant to this project follow.	
	GN No. R.983 – Activity 1 *The development of facilities or infrastructure for the generation of electricity from a renewable resource where—* *(i) the electricity output is more than 10 megawatts but less than 20 megawatts*	*Development of a solar PV plant consisting of approximately 20,000 – 65,000 solar PV modules and total installed power capacity of 14 – 19.9 MW.*
	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.*	*Electrical interconnection line / cable, with capacity of 22kV or 33kV, for evacuation of power from the Solar PV facility to the 33/132 kV Skaapvlei substation*
	GN No. R.983 – Activity 27: *The clearance of an area of 1 hectare 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.*	*Development of a solar PV plant and associated infrastructure (e.g. offices, maintenance buildings, guard house, inverters, construction laydown area and batching plant) with a footprint of more than 1 hectare but less than 20 hectares.*
	GN No. R.983 – Activity 28: *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:* *(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;*	*The current Wind Farm site is zoned as Agriculture and has been used on an ad hoc basis for grazing of sheep.* *Therefore, this activity may be applicable as an area larger than 1 ha will be converted to a Solar PV Plant and no longer be available for ad hoc grazing.*

Legislation	Description and Relevance	
GN No. R. 985 of 4 December 2014 (as amended) (Listing Notice 3)	▪ Purpose - list activities and identify competent authorities under sections 24(2), 24(5) and 24D of NEMA, where environmental authorisation is required prior to commencement of that activity in specific identified geographical areas only. ▪ The investigation, assessment and communication of potential impact of activities must follow a Basic Assessment process, as prescribed in regulations 19 and 20 of GN No. R 982 of 4 December 2014 (as amended). However, according to Regulation 15(3) of GN No. R 982 (as amended), S&EIR must be applied to an application if the application is for two or more activities as part of the same development for which S&EIR must already be applied in respect of any of the activities. ▪ Activities under Listing Notice 3 that are relevant to this project follow.	
	GN No. R.985 – Activity 4(i) - (ii)(aa): *The development of a road wider than 4 metres with a reserve less than 13,5 metres.* *i. Western Cape* *ii. Areas outside urban areas;* *(aa) Areas containing indigenous vegetation;*	*A number of roads will be constructed as unsurfaced roads in association with the development across indigenous vegetation:* • *Access road alternative 1 = 796m (tracking) / 880m (fixed)* • *Access road alternative 2 = 30m (permanent) / 110m (construction)* • *Internal roads* to inverter stations = approximately 3.4km (alternative 1); 2km (alternative 2)* • *Perimeter road* = approximately 1.8km (both alternatives)* **To note is that the internal and perimeter roads fall under clearance of indigenous vegetation under Activity 27 above. Only the access roads will constitute a new footprint outside the PV site.*
	GN No. R.985 – Activity 10 (i) (ii): *The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres.* *i. Western Cape* *ii. All areas outside urban areas;*	*Information on the actual amount of diesel that will be stored on site during construction by the contractor is unknow. There is a potential for the 30m^3 threshold to be exceeded, but not 80m^3.*
	GN No. R.985 – Activity 12(i) (ii): *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.* *i. Western Cape* *ii. Within critical biodiversity areas identified in bioregional plans;*	*More than 300m^3 of indigenous vegetation will be cleared within a CBA1 according to the Western Cape Biodiversity Spatial Plan 2017:* *Alternative 1 – the entire PV site, access road and interconnection cable falls within a CBA1.* *Alternative 2 – a small portion of the southern section of the PV site (458m^2) and the access road and interconnection cable fall within a CBA1.*
National Water Act (Act No. 36 of 1998)	▪ Sustainable and equitable management of water resources. ▪ Key sections (amongst others): o Chapter 3 – Protection of water resources. o Section 19 – Prevention and remedying effects of pollution. o Section 20 – Control of emergency incidents. o Chapter 4 – Water use. ▪ Authority – Department of Water and Sanitation (DWS).	

Legislation	Description and Relevance
National Environmental Management Air Quality Act (Act No. 39 of 2004)	▪ Air quality management ▪ Key sections (amongst others): o Section 32 – Dust control. o Section 34 – Noise control. ▪ Authorisation type – Atmospheric Emission License. *Note that this is not required for the Project.* ▪ Authority – DFFE, DEA&DP and municipalities.
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	▪ Management and conservation of the country's biodiversity. ▪ Protection of species and ecosystems. ▪ Authorisation type – Permit. ▪ Authority – DFFE and CapeNature.
National Environmental Management: Protected Areas Act (Act No. 57 of 2003)	▪ Protection and conservation of ecologically viable areas representative of South Africa's biological diversity and natural landscapes.
National Environmental Management: Waste Act (Act No. 59 of 2008)	▪ Management of waste. ▪ Chapter 5 – licensing requirements for listed waste activities - GN No. R. 921 of 29 November 2013 (as amended). ▪ Authorisation type – Waste Management Licence. *Note that this is not required for the Project.* ▪ Authority – DFFE and DEA&DP.
National Forests Act (No. 84 of 1998)	▪ Supports sustainable forest management and the restructuring of the forestry sector, as well as protection of indigenous trees in general. ▪ Section 15 – Authorisation required for impacts to protected trees. ▪ Authorisation type – Permit. ▪ Authority – Department of Agriculture, Forestry and Fisheries (DAFF).
Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)	▪ Equitable access to and sustainable development of the nation's mineral and petroleum resources and to provide for matters related thereto. ▪ Key sections (amongst others): o Section 22 – Application for mining right. o Section 27 – Application for, issuing and duration of mining permit. o Section 53 – Use of land surface rights contrary to objects of Act. ▪ Authorisation type – Mining Permit / Mining Right. *Note that this is not required for the Project.* ▪ Authority – DMRE.
Occupational Health & Safety Act (Act No. 85 of 1993)	▪ Provisions for Occupational Health & Safety. ▪ Authority – Department of Employment and Labour. ▪ Relevant regulations, such as Electrical Installation Regulations, Construction Regulations, etc.
National Heritage Resources Act (Act No. 25 of 1999)	▪ Key sections: o Section 34 – protection of structure older than 60 years. o Section 35 – protection of heritage resources. o Section 36 – protection of graves and burial grounds. o Section 38 – Heritage Impact Assessment for linear development exceeding 300m in length; development exceeding 5 000m^2 in extent, etc. ▪ Authorisation type – Permit. ▪ Authority – South African Heritage Resources Agency (SAHRA) and Heritage Western Cape (HWC).
Conservation of Agricultural Resources Act (Act No. 43 of 1983)	▪ Control measures for erosion. ▪ Control measures for alien and invasive plant species. ▪ Authority – Department of Agriculture.
Nature Conservation Ordinance of the Cape of Good Hope (Ordinance 19 of 1974) & Western Cape Nature Conservation Laws Amendment Act (Act 3 of 2000)	▪ Authority – DFFE and CapeNature.
Civil Aviation Act (Act 13 of 2009) & Civil Aviation Regulations of 2011	▪ Consents for obstacles ▪ Authority – Department of Transport & South African Civilian Aviation Authority (SACAA)

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

8.2.2 National Environmental Management Act

According to Section 2(3) of the National Environmental Management Act (Act No. 107 of 1998) (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 of 2014 (as amended), which consist of the following:

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

The Project triggers activities listed in Listing Notices 1 and 3 (refer to **Table 7** above), therefore, a Basic Assessment Process is being undertaken.

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 (contained in **Appendix B**) that will be submitted to the DFFE with the draft BAR.

8.2.3 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:

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

Some key definitions from this Act include:

- "*Disposal*" – the burial, deposit, discharge, abandoning, dumping, placing or release of any waste into, or onto, any land.

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

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

No authorisation will be required in terms of NEM:WA, 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 EMPr (contained in **Appendix J**) makes 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 the relevant municipal sites; and

- Waste generated during maintenance or replacement of panels and inverters will be sent to suitable disposal sites

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

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.

Water requirements for construction and operation will be sourced from the MLM.

The proposed Solar PV site falls outside of the regulated area of watercourses and therefore, no water use authorisation is required.

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

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 (contained in **Appendix J**) to manage impacts to air quality as a result of the Project during the construction phase.

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

The purpose of the National Environmental Management: Biodiversity Act (Act 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 and by GN 1003 of 18 September 2020.

Some key definitions from this Act include:

- "*Alien species*" –
  - A species that is not an indigenous species; or
  - An indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention.
- "*Biological diversity*" or "*biodiversity*" – the variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems.
- "*Indigenous species*" – a species that occurs, or has historically occurred, naturally in a free state in nature within the borders of the Republic, but excludes a species that has been introduced in the Republic as a result of human activity.
- "*Invasive species*" – any species whose establishment and spread outside of its natural distribution range -
  - Threaten ecosystems, habitats or other species or have demonstrable potential; and
  - May result in economic or environmental harm or harm to human health.
- "*Species*" – a kind of animal, plant or other organism that does not normally interbreed with individuals of another kind, and includes any sub-species, cultivar, variety, geographic race, strain, hybrid or geographically separate population.

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

The findings from the Terrestrial Ecology Assessment and Avifaunal Assessment that were undertaken for the Project are included in **Section 14.5** and **Section 14.6** below, respectively.

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

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 this Act, certain listed activities require authorisation from provincial agencies:

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

The findings from the Heritage Impact Assessment and Desktop Palaeontological Impact Assessment that were undertaken for the Project are included in **Section 14.8** and **Section 14.9** below, respectively.

8.3 Governance of Energy in SA

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

- SA is a signatory to various international treaties and conventions relating to climate change and greenhouse gas (GHG), such as –
  - United Nations Framework Convention on Climate Change;
  - Kyoto Protocol; and
  - Paris Agreement.
- SA has developed the following related policy frameworks –
  - White Paper on Energy Policy (1998);
  - White Paper on Renewable Energy (2003);
  - Integrated Energy Plan (2003);
  - Integrated Resource Plan (IRP) 2010;
  - Integrated Resource Plan (IRP) 2019;
  - National Climate Change Response White Paper (2011);
  - Post-2015 National Energy Efficiency Strategy;
  - The National Development Plan (2030);
  - Climate Change Bill (2018); and
  - Carbon Tax Bill (2019).
- SA has developed the following related legal frameworks –
  - Electricity Regulation Act (Act No. 4 of 2006);
  - National Energy Act (Act No. 34 of 2008); and
  - Income Tax Act (1962) - tax incentive provided for Section 12L.

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

8.4 Guidelines

The following guidelines were considered during the preparation of the BAR:

- Integrated Environmental Management Information Series, in particular Series 2 – Scoping (DEAT, 2002);
- Guideline on Alternatives, EIA Guideline and Information Document Series (DEA&DP, 2013a);
- Guideline on Need and Desirability, EIA Guideline and Information Document Series (DEA&DP, 2013b);
- 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).

8.5 National and Regional Plans

The following regional plans were considered during the preparation of the BAR (amongst others):

- Municipal Spatial Development Framework (SDF);
- Municipal Integrated Development Plan (IDP);
- Relevant national, provincial, district and local policies, strategies, plans and programmes; and
- Western Cape Biodiversity Spatial Plan (WCBSP).

8.6 Renewable Energy Development Zones & Strategic Transmission Corridors

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 REDZs, in which development will be incentivised and streamlined. The proposed Project footprint in relation to the REDZs are shown in **Figure 14** below.

As shown in **Figure 14** below, the Project is not located in a REDZ but is located within the Western Corridor of the Strategic Transmission Corridors, in terms of GN No. 113 of 16 February 2018. The Strategic Transmission Corridors were identified through the SEA for Electricity Grid Infrastructure

in SA. These corridors are important for the rollout of the supporting large scale electricity transmission and distribution infrastructure in terms of Strategic Integrated Project 10: Electricity Transmission and Distribution. The proposed project does not constitute a large-scale electricity transmission and distribution infrastructure project as defined through GN 113.

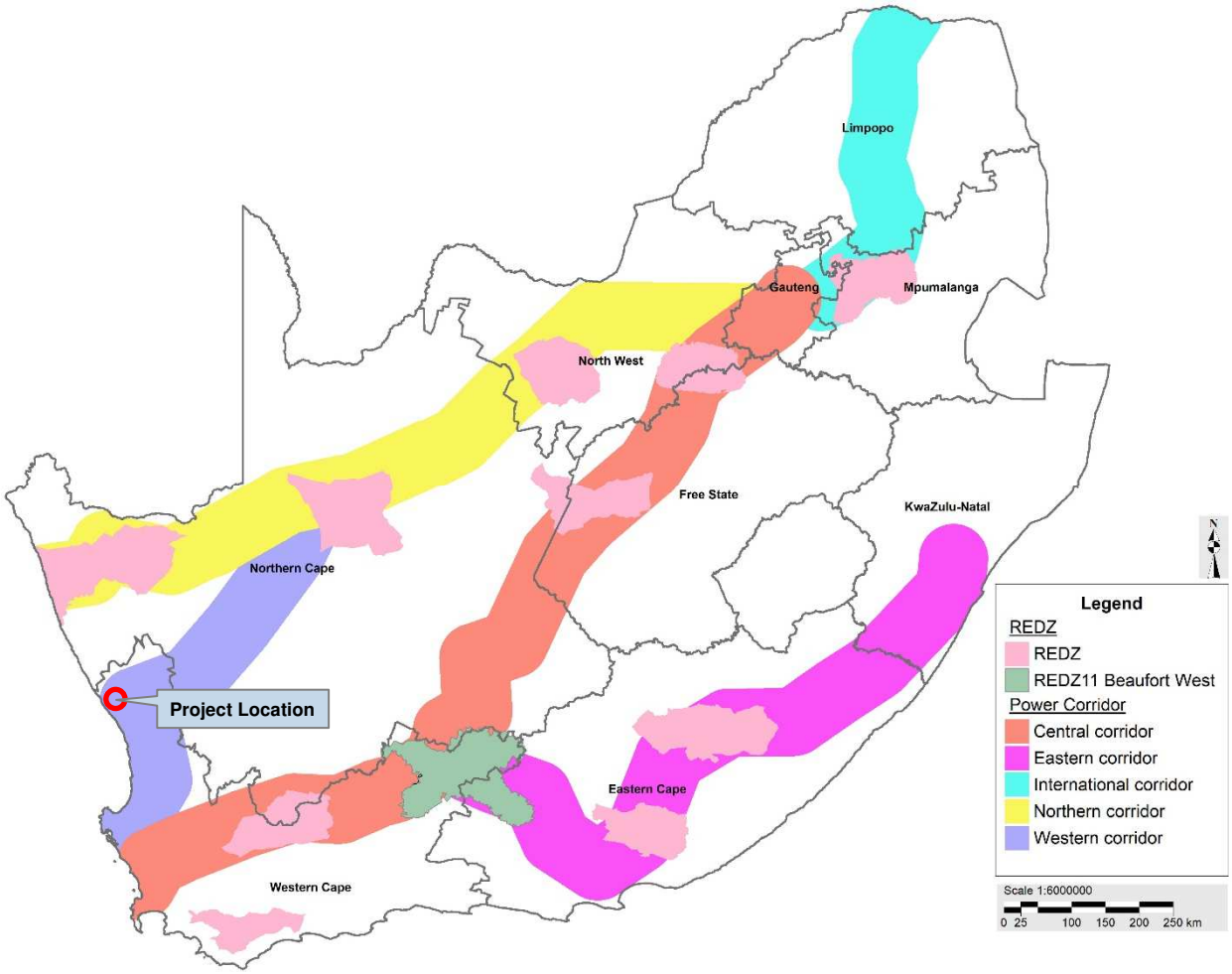


Figure 14: The Project in relation to REDZs and Strategic Transmission Corridors

9 BASIC ASSESSMENT PROCESS

9.1 Previous Environmental Impact Assessments for the Project Area

The following is noted in terms of EIA's that were previously undertaken for the Project Area:

- The former Department of Environmental Affairs and Tourism (DEAT), now known as DFFE, granted Environmental Authorisation for the Wind Farm Project on 15 June 2009 (ref. no.: 12/12/20/913). A copy of the EA is contained in **Appendix C**.
- The DFFE granted Environmental Authorisation for the Development of the 320MWh Skaapvlei Substation Battery energy Storage Facility Project on 10 February 2020 (ref. no.: 14/12/16/3/3/1/2065). A copy of the EA is contained in **Appendix C**.

9.2 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 and for the fact that the Applicant is a State Owned Entity. Due to the geographic location of the Project, DEA&DP 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 Basic Assessment. Refer to the database of I&APs contained in **Appendix G** for a list of the government departments.

9.3 Environmental Assessment Practitioner

Nemai Consulting (Pty) Ltd was appointed by Eskom (the Applicant) as the independent EAP to apply for EA for the proposed development of the Project.

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

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

The core members of Nemai Consulting that are involved with the Basic Assessment Process for the Project are captured in **Table 10** below, and their respective Curricula Vitae are contained in **Appendix D**. The oath of the EAP is contained in **Appendix K**.

Table 10: Basic Assessment Core Team Members

Name	Qualifications	Experience
D. Henning	MSc (River Ecology)	• 20 years' experience. • EAP for various energy related projects, including: o Matjhabeng 400 MW Solar PV Power Plant with 80 MW (320 MWh) Battery Energy Storage Systems, Free State Province, RSA. o Extraction of Gas and Electric Power Production Plant in the Rubavu District, Rwanda. o Impompomo Hydropower Plant, Mpumalanga, RSA. o Hydropower Plant within Hydraulic Network at Rand Water's Zoekfontein Site, Gauteng Province, RSA. o uMkhomazi Water Project Phase 1 with hydropower facilities, KwaZulu-Natal, RSA. o Neptune-Poseidon Transmission Line, including 200 km of 400 kV transmission line, Eastern Cape, RSA. o Makalu B (Igesi) Substation and Associated Transmission Loop-In Lines, Free State Province, RSA. o Anderson Dinaledi Transmission Line, including 80 km of 132 kV transmission line with substations, North-West Province, RSA.
J. Davis	Honours (Environmental Science)	• 9 years' experience. • EAP for the following energy related project: o Emkhiweni Substation and 400KV Line from Emkhiweni Substation to Silimela, Mpumalang Province, RSA.

9.4 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 of 2014 (as amended).

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 is appended to the Application Form, which is included in **Appendix B**.

9.5 Environmental Assessment Triggers

The Project triggers activities listed in Listing Notices 1 and 3 (refer to **Table 7** above), therefore, a Basic Assessment Process is being undertaken. A copy of the Application Form is contained in **Appendix B**.

9.6 Basic Assessment Process

The objectives of the Basic Assessment, based on the EIA Regulations of 2014 (as amended), are captured in **Section 1** above. An outline of the Basic Assessment Process is provided in **Figure 15** below.

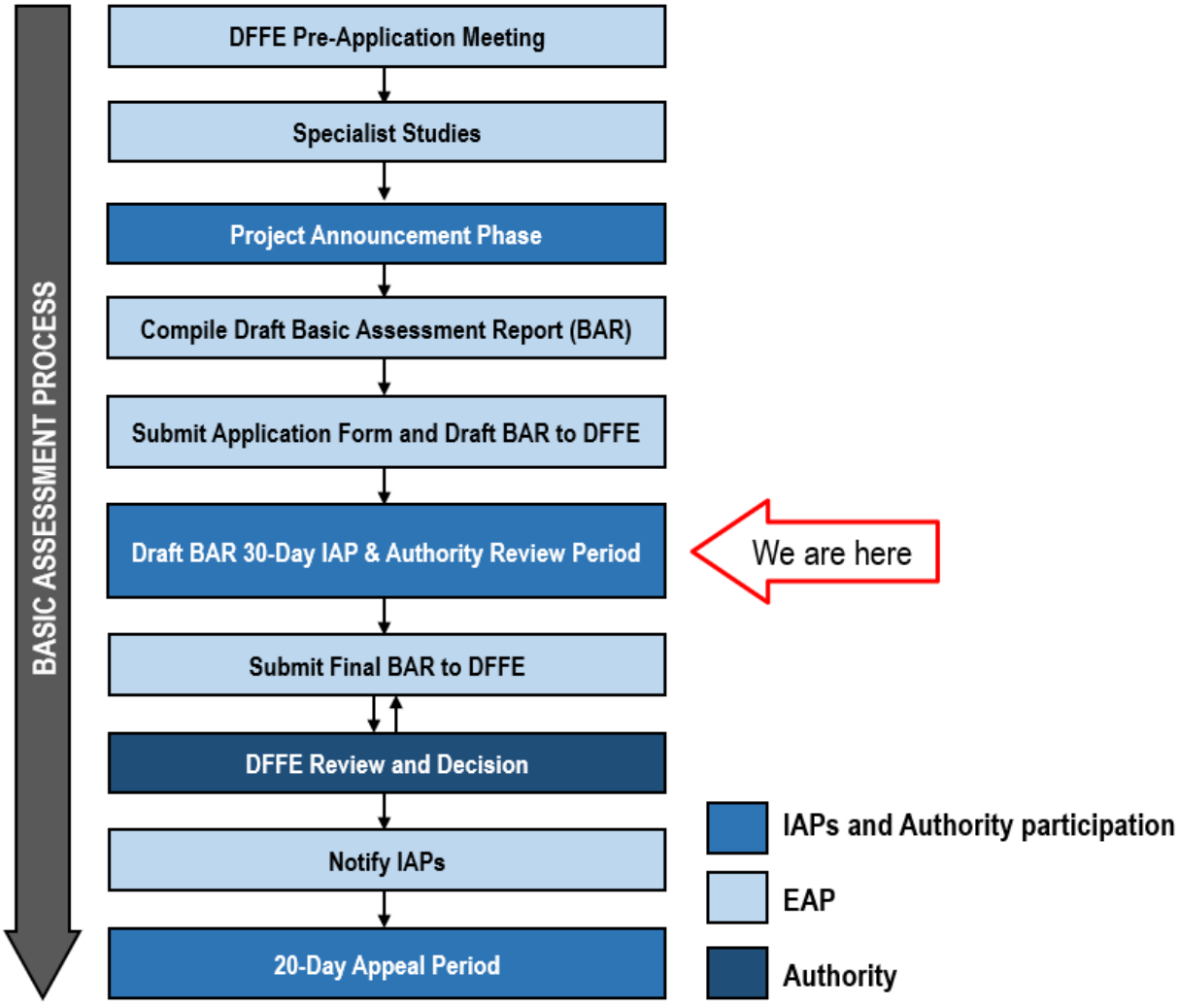


Figure 15: Basic Assessment Process

9.7 DFFE Pre-application Consultation

A Pre-application Meeting was held with DFFE on 28 October 2021 (refer to the minutes of the meeting appended to the Application Form in **Appendix B**). The purpose of the meeting included the following:

- To present an overview of the Project to DFFE;
- To discuss the history of the previous EIA's;
- To seek clarification regarding certain matters that pertain to the Basic Assessment; and
- To determine DFFE's requirements.

9.8 Other Renewable Energy Applications in the Project Area

DFFE created the SA Renewable Energy EIA Application (REEA) Database, which contains spatial data for renewable energy applications for Environmental Authorisation. It includes spatial and attribute information for both active (in process and with valid authorisations) and non-active (lapsed or replaced by amendments) applications (https://egis.environment.gov.za/renewable_energy). A map is contained in **Figure 16** below, which shows other renewable energy applications within a 50 km radius of the Project.

According to the REEA Database, renewable energy applications have been made for properties that are located within approximately 50km of the Project's PV site:

1. **Project Title:** Proposed Establishment of a Wind Farm on Land Owned by Exxaro, Western Cape Province; **Applicant:** Exxaro Resources (Pty) Limited; **Status:** Approved.
2. **Project Title:** Proposed Wind Generation Facility, Namaqualand, Western Cape Province; **Applicant:** Longyuan Mulilo Namaqualand Wind Power (Pty) Limited; **Status:** Approved.
3. **Project Title:** Proposed Construction of Olifants River Settlement Wind Energy Facility and Associated Infrastructure, Western Cape Province; **Applicant:** South African Renewable Green Energy (Pty) Ltd; **Status:** Withdrawn/Lapsed.
4. **Project Title:** Proposed Electrical Grid Connection and associated Infrastructure for the 140MW Juno wind energy facility, Western Cape Province; **Applicant:** AMDA Juliet (Pty) Ltd; **Status:** Approved.
5. **Project Title:** Proposed Romano 10MW PV facility on Portion 334 of Farm 292 Vredendal, Western Cape Province; **Applicant:** Romano Sustainable Solutions; **Status:** Approved.
6. **Project Title:** Proposed Matzikama Solar Park on Portion 414 of Farm Vredendal 292, Vredendal, Western Cape Province; **Applicant:** under review; **Status:** Approved.
7. **Project Title:** Proposed Inca Vredendal 30MW Wind Energy Facility on the Farm 293 Groot Draaihoek near Vredendal, Western Cape Province; **Applicant:** INCA Vredendal Wind (Pty) Ltd; **Status:** Approved.
8. **Project Title:** Proposed Klawer Wind Farm, Matzikama Local Municipality, Western Cape Province; **Applicant:** Klawer Wind Power (Pty) Ltd; **Status:** Approved.

9. **Project Title:** Proposed Keren Energy Solar Plant, Klawer, Western Cape Province; **Applicant:** under review; **Status:** Withdrawn/Lapsed.
10. **Project Title:** Proposed Development of a 20MW Orlight SA Solar PV Power Plant, Western Cape Province; **Applicant:** Orlight SA (Pty) Ltd; **Status:** Approved.
11. **Project Title:** Proposed Construction of a 10MW PV Solar Energy Facility on the Remainder of Farm De Duinen 258 Near van Rhynsdorp, Western Cape Province; **Applicant:** under review; **Status:** Approved.
12. **Project Title:** Proposed Renewable Energy Facility on Farm 519, Vanrhynsdorp; **Applicant:** NK Energie (Pty) Ltd; **Status:** Withdrawn/Lapsed.

A wind farm facility is also operated by Eskom on the property.

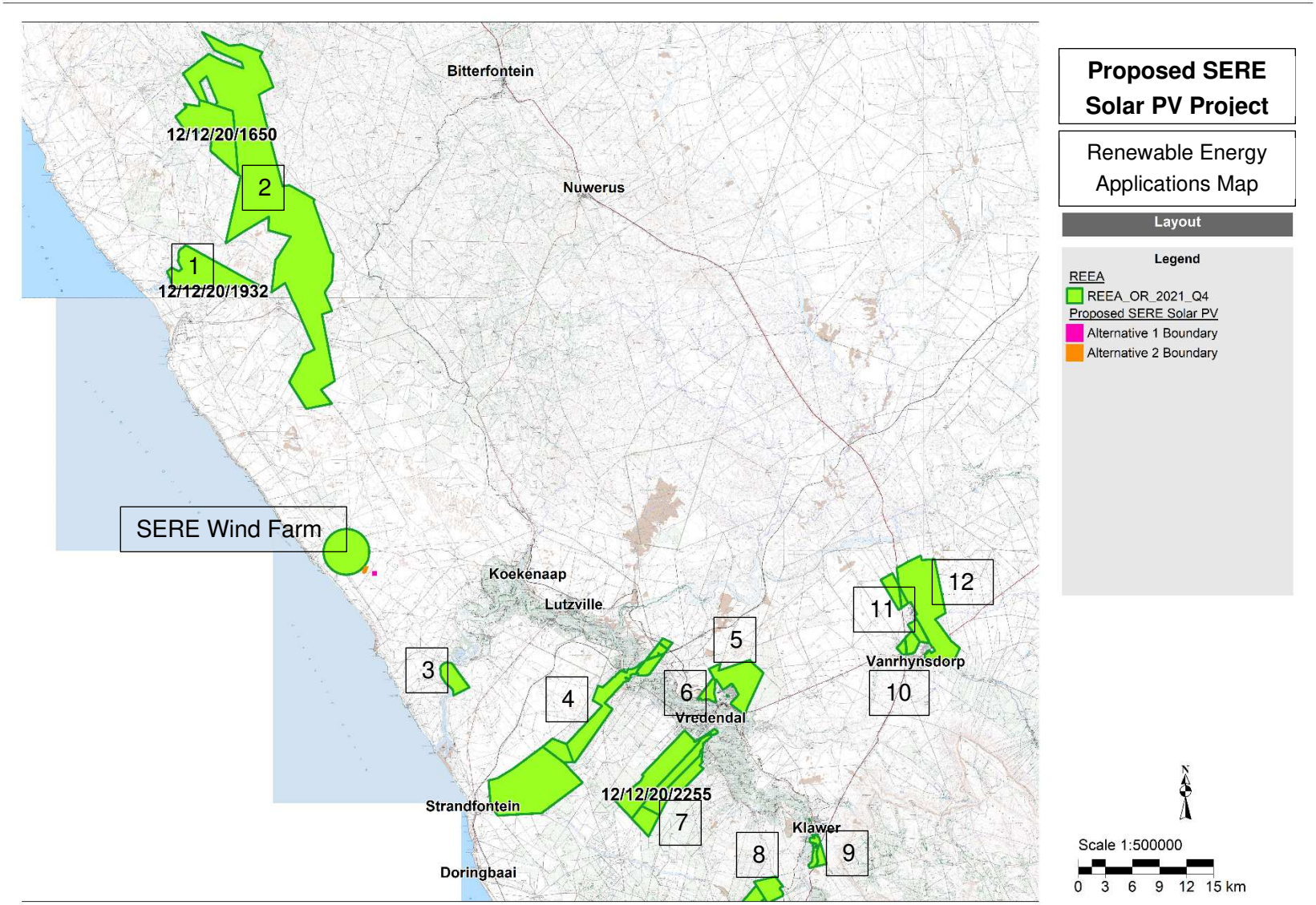


Figure 16: Renewable energy applications in relation to the Project (within a 50 km radius) based on REEA Database

10 ASSUMPTIONS, GAPS AND LIMITATIONS

The following assumptions and limitations accompany the Basic Assessment Process:

- As the design of the Project components is still in feasibility stage, and due to the dynamic nature of the planning environment, the dimensions and layout of the infrastructure may change during the final design phase.
- Regardless of the analytical and predictive method employed to determine the potential impacts associated with the Project, the impacts are only predicted on a probability basis. The accuracy of the predictions is largely dependent on the availability of environmental data and the degree of understanding of the environmental features and their related attributes.
- The following assumptions, gaps and limitation were noted as part of the Specialist Studies –
    - Terrestrial Ecological Impact assessment
        - The assessment area was based on the area provided by the client and any alterations to the route and/or missing GIS information pertaining to the assessment area would have affected the area surveyed;
        - Even though the two sites were assessed on two separate occasions, the assessment areas did not overlap and therefore it can be said that temporal trends were not considered;
        - The surveys conducted for the respective studies, constituted a dry season survey with its limitations;
            - Flora identification is limited due to the lack of aboveground plant parts used to determine species, especially in regard to bulbous plants, the vegetation was dry, and most plants had already lost the green flush;
            - It must be noted that during the survey, only a fraction of the expected geophytes were visible due to their variable emergence patterns.
        - Whilst every effort is made to cover as much of the site as possible, representative sampling is completed and by its nature, it is possible that some plant and animal species that are present on site were not recorded during the field investigations
    - Avifauna Impact Assessment
        - Information relating to project activities, spatial data and infrastructure locations for the proposed development was obtained from information provided by the client. The potential impacts and recommendations described in this report apply specifically to the provided information;
        - Although considerable time has been spent to ensure that information utilised in this report is verified. It is assumed that all third-party information utilised in the compilation of this report is correct at the time of compilation (e.g., spatial data, online databases, and species lists); and
        - The scope and time constraints of a project of this nature does limit the collection of significant primary data on the proposed site.
    - Visual Impact Assessment

- Visual perception is by nature a subjective experience, as it is influenced largely by personal values. For instance, what one-viewer experiences 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. In order to limit such subjectivity, a combination of quantitative and qualitative assessment methods were used. A high degree of reliance has been placed on GIS-based analysis viewshed, visibility analysis, and on making transparent assumptions and value judgements, where such assumptions or judgements are necessary.
- The viewshed generated in GIS cannot be guaranteed as 100% accurate. Some viewpoints, which are indicated on the viewshed as being inside of the viewshed, can be outside of the viewshed. This is due to the change of the natural environment by surrounding activities as well as natural vegetation that play a significant role and can have a positive or negative influence on the viewshed.

- Palaeontological Impact Assessment
  - When conducting a PIA several factors can affect the accuracy of the assessment. The focal point of geological maps is the geology of the area, and the sheet explanations were not meant to focus on palaeontological heritage. Many inaccessible regions of South Africa have not been reviewed by palaeontologists and data is generally based on aerial photographs. Locality and geological information of museums and universities databases have not been kept up to date or data collected in the past have not always been accurately documented.
  - Comparable Assemblage Zones in other areas is used to provide information on the existence of fossils in an area which was not yet been documented. When similar Assemblage Zones and geological formations for Desktop studies is used it is generally assumed that exposed fossil heritage is present within the footprint.

11 FINANCIAL PROVISIONS

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

Due to the sensitive nature of financial provisions, the Applicant cannot provide the exact amounts but can confirm that there will be sufficient funds available to ensure that the Project can be successfully completed and for subsequent maintenance.

Provision will be made in the bill of quantities for the Contractor for the implementation of mitigation measures included in the EMPr (contained in **Appendix J**), including requirements for reinstatement and rehabilitation.

12 RESOURCE USE AND PROCESS DETAILS

12.1 Waste, Effluent and Emission

12.1.1 Solid waste management

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

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

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

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

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

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

General waste will be disposed of at permitted waste disposal.
Hazardous waste will be removed by a waste service provider and will be disposed of at permitted site(s), such as the Vissershok Landfill in the Western Cape.

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

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

Refuse (domestic) generated during the operational phase will be incorporated into the Wind Farm waste stream and removed on a weekly basis and will be disposed of at a permitted waste disposal facility.

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

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

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

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

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

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

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

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

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

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

The EMPr (contained in **Appendix J**) makes provision for waste separation and recycling.

12.1.2 Liquid effluent (other than domestic sewage)

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

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

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

If yes, provide the particulars of the facility:

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

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

12.1.3 Liquid effluent (domestic sewage)

Will the activity produce domestic effluent that will be disposed of in a municipal sewage system?	**YES**
If yes, what estimated quantity will be produced per month?	Unknown at this stage. Capacity of conservancy tank = 2 kL
If yes, has the municipality confirmed that sufficient capacity exist for treating / disposing of the domestic effluent to be generated by this activity(ies)?	**NO**
Will the activity produce any effluent that will be treated and/or disposed of on site?	**NO**

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

12.1.4 Emissions into the atmosphere

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

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

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

Only construction related emissions, such as emissions from construction equipment and machinery, are anticipated.

12.2 Water Use

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

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

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

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

Does the activity require a water use permit from DWS?	**NO**

If yes, list the permits required

[redacted]

If yes, have you applied for the water use permit(s)? [redacted]
If yes, have you received approval(s)? (attached in appropriate appendix) [redacted]

12.3 Power Supply

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

During the operational phase power will be obtained from the Solar PV Plant and the existing electrical infrastructure.

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

During the construction phase electricity will be obtained from diesel generators and / or temporary supply via cables from the site power grid.

During the operational phase, electricity will be sourced from the energy-generation facility itself and/or from the existing electrical infrastructure on the property.

12.4 Energy Efficiency

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

Not applicable, due to the nature of the Project.

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

The Project proposes the development of a PV Site for the generation of renewable solar energy.

13 PROFILE OF THE RECEIVING ENVIRONMENT

13.1 General

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

The reader is referred to **Section 14** below for more elaborate explanations provided through the specialist studies and their findings for specific environmental features.

This section allows for an appreciation of sensitive environmental features and possible receptors of the effects of the proposed Project. The potential impacts to the receiving environment are discussed further in **Section 15** below.

13.2 Land Use & Land Cover

The areas affected by the proposed Project footprint are rural in nature and are located on land used for the generation of renewable energy through wind turbines.
Land Cover 73-class (DEA, 2020) is a Raster-based land-cover dataset representing the full South African landscape for the full year 2020. Land-cover information classes based on new Gazetted land-cover standards and legend content used in 2013-14 national land-cover data. All land-cover and land-use classes generated using automated modelling procedures for full operational repeatability and change detection.
According to the Land Cover 73-class (**Figure 17**), the proposed site alternative 1 land cover is low shrubland (fynbos) and land cover for alternative 2 is low shrubland (fynbos) and fallow land and old fields (low shrub).

Views of the PV site are provided in **Appendix A** (site photos).

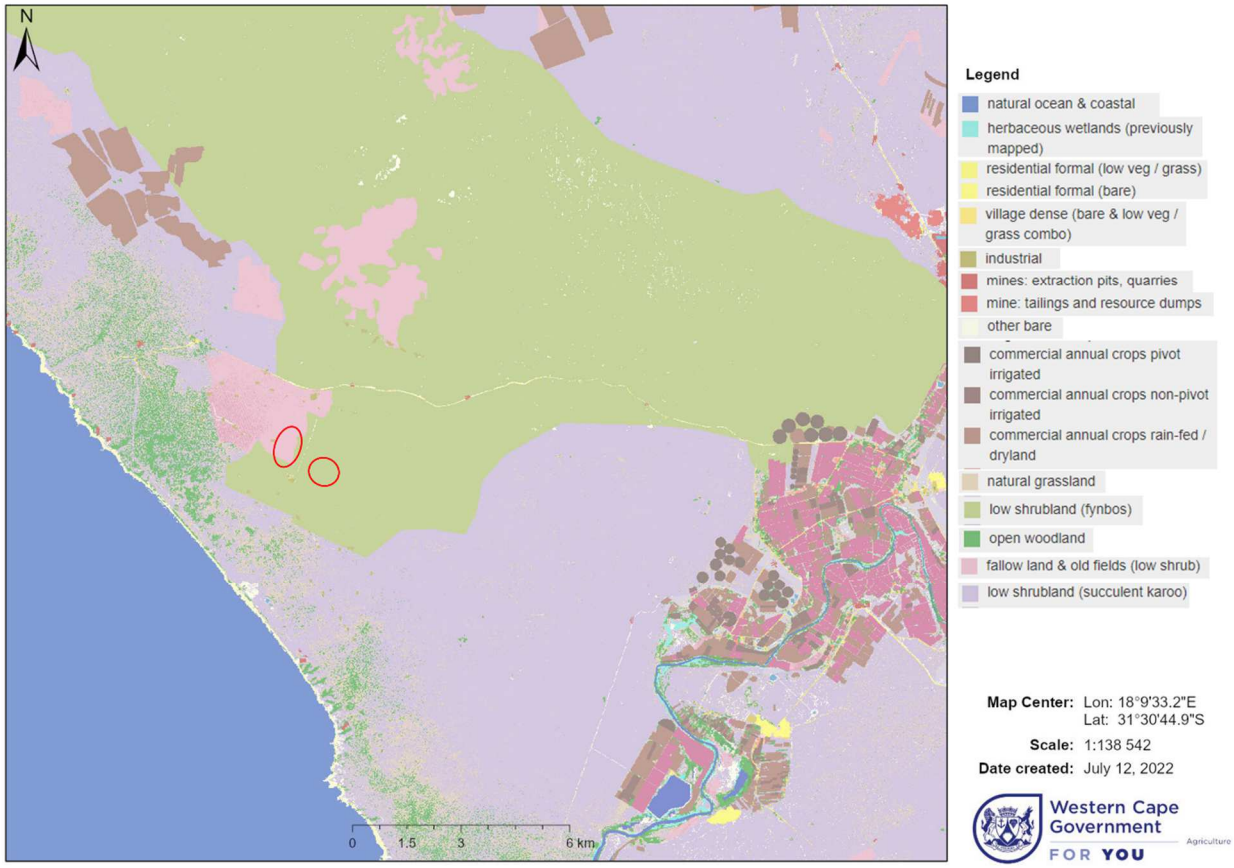


Figure 17: Land Cover 73-class for the proposed site alternatives

13.3 Climate

The nearest climate date available was for Vredendal, located approximately 40km southeast of the proposed site. Climatic information for Vredendal is presented below sourced from Weatherspark (https://weatherspark.com/y/82967/Average-Weather-in-Vredendal-South-Africa-Year-Round).

The summers are characterised as hot, arid and clear, and the winters are cool and mostly clear. Temperatures over the year typically vary from 8°C to 31°C.
The hot season lasts for 3.8 months, from December 7 to April 1, with an average daily high temperature above 29°C. The hottest month of the year in Vredendal is February, with an average high of 31°C and low of 17°C. The cool season lasts for 3.0 months, from May 31 to August 31, with an average daily high temperature below 23°C. The coldest month of the year in Vredendal is July, with an average low of 8°C and high of 21°C (**Figure 18**).

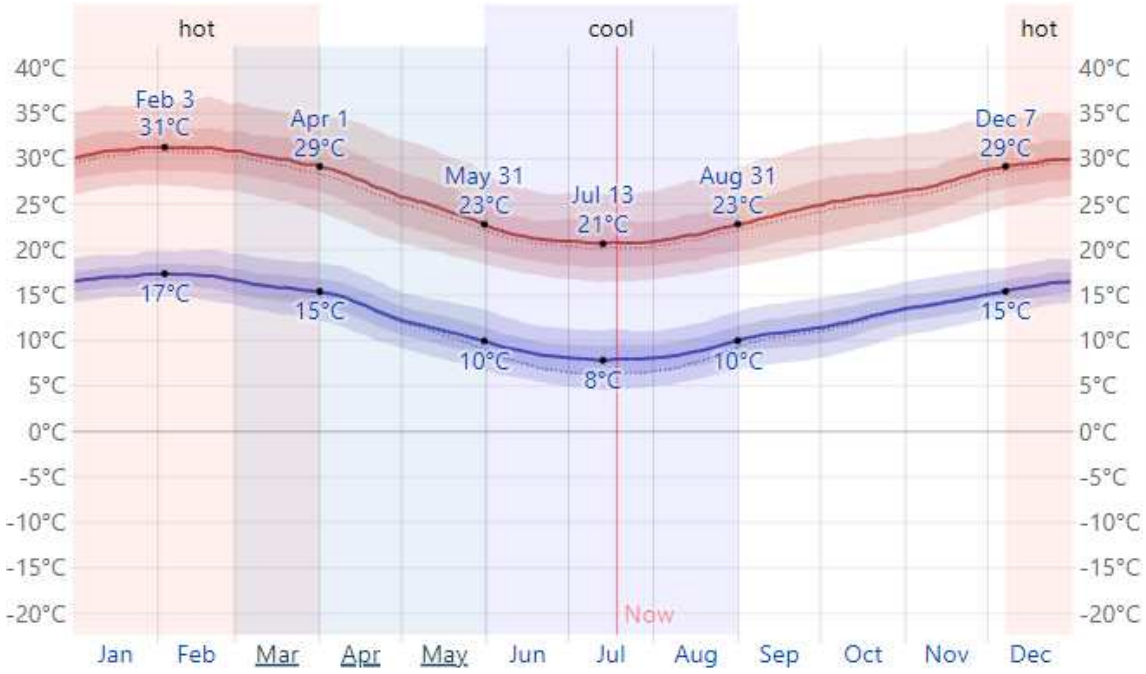


Figure 18: Daily average high (red) and low (blue) temperature, with 25th to 75th and 10th to 90th percentile bands

The wet season lasts approximately 5.5 months, from April to mid-September. The wettest month in Vredendal is June, with an average rainfall of 37 mm. The dry season lasts approximately 6.5 months, from mid-September to April. The driest month in Vredendal is February, with an average rainfall of 3 mm.

Average annual precipitation is between 170 and 190 mm (see **Figure 19** below). Sixty five percent of the rain falls between February and April, twenty percent between November and January and the rest in the period May to July. Seventy percent of the rain occurs as high intensity showers. Droughts occur approximately sixty percent of the time (three out of five years are drought stricken).

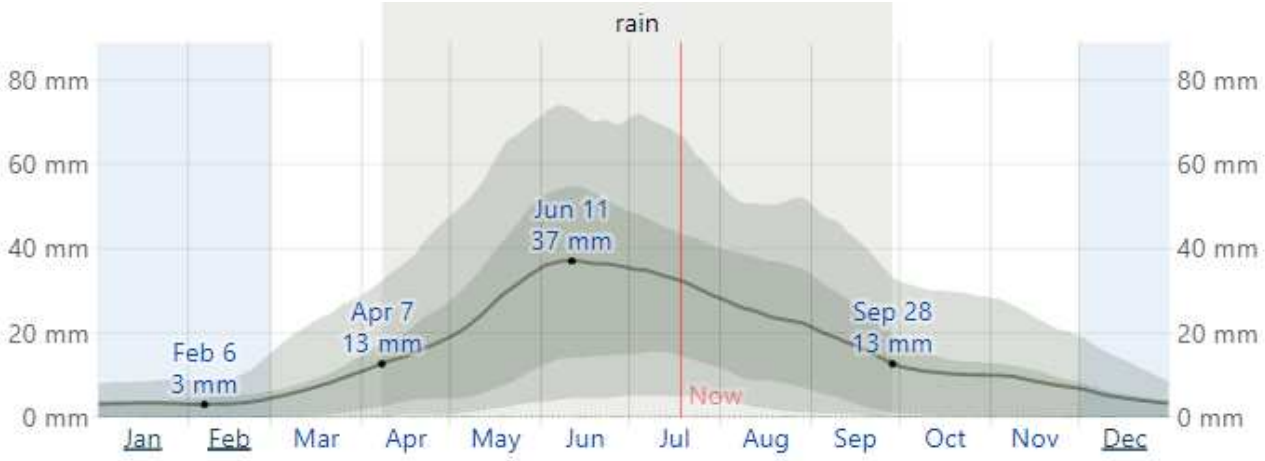


Figure 19: The average rainfall (solid line) with 25th to 75th and 10th to 90th percentile bands

13.4 Geology and Soil

The following information has been extracted from the Geotechnical Study undertaken for the SERE Wind Facility (**Appendix E**):

The site is underlain by deposits laid down in the Cenozoic Era which began approximately 65 million years ago and continued to the present day. During the Cenozoic Era there was significant continental uplift and erosion accompanied by fluctuations in the sea level. These events led to marine erosion and sedimentation with the sediments being, generally, comprised of fluvial and marine gravels, calcrete, silcrete and sand. The bedrock comprises phylite, limestone and sandstone of the Gariep Supergroup.

The stratigraphy at the SERE Wind Facility (the broader site within which the proposed SERE Solar PV project located) was described by BKS Palace Consortium (2010) in their Geotechnical Study (see **Figure 20** below).

Aeolian Deposits of the Cenozoic Era Pale red and orange, very loose to loose, sand. No gravel
Marine Deposits of the Cenozoic Era Lighter coloured, brown and beige, sand, silt, gravel and boulders. Significantly denser than the aeolian deposits above.
Bedrock Phylite, sandstone and quartzitic sandstone of the Gariep Supergroup.

Figure 20: Stratigraphy of the SERE Wind Farm property

In some areas the Cenozoic deposits are absent and sandstone and phylite of the Gariep Supergroup present themselves at surface as outcrops. However, in general the bedrock occurs at depths of between 14m and deeper across the site.

The land at the proposed PV site consists of predominantly loose sandy soil, which has a high or moderate sensitivity or susceptibility to erosion, but given the relatively flat terrain, erosion is expected to be relatively limited.

13.5 Hydrogeology

The following information has been extracted from the Geotechnical Study undertaken for the SERE Wind Facility (**Appendix E**):

No free water was encountered in any of the test pits or rotary core boreholes across the site. Water was however encountered at three windmill turbine positions during percussion drilling at depths ranging from 69m to 79m below ground level. Given that the groundwater table appears to be very deep it is unlikely that ground water will be a significant factor on this project.

13.6 Topography

Some features of the PV site's landscape character include the following:

- The project area is characterised by gently undulating topography indicative of an eroded aeolian landforms. Elevations above sea level at the alternative 1 site range between 52m and 60m, while the average elevation above sea leave for alternative 2 ranges between 59m and 64 m
- The vegetation on the site adds value to the landscape character.
- The close proximity of the site to wind farm turbines and associated infrastructure detracts from the site's landscape character.

Figure 21 below shows a photograph of the site typical terrain characteristics, and **Figure 22 and 23** show Google Earth profiles taken from west to east through the centre of both alternative sites. **Figure 24** shows 5 m contour map of the broader site to provide an indication of the topography.

Figure 21: PV Site Terrain

Figure 22: PV Site Alternative 1 west to east profile through the centre of the site

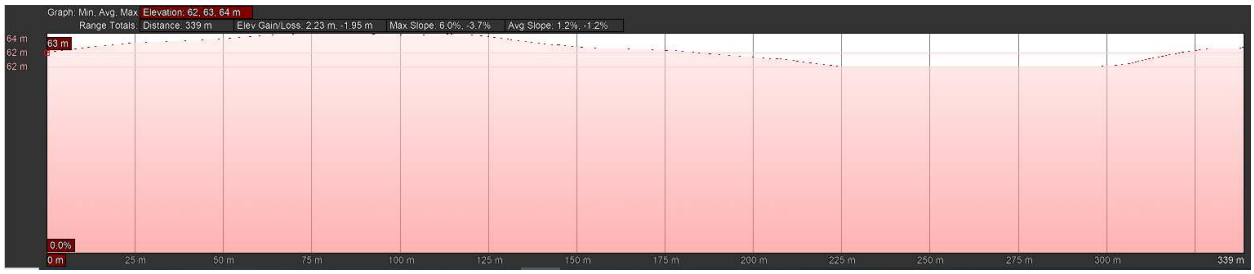


Figure 23: PV Site Alternative 2 west to east profile through the centre of the site

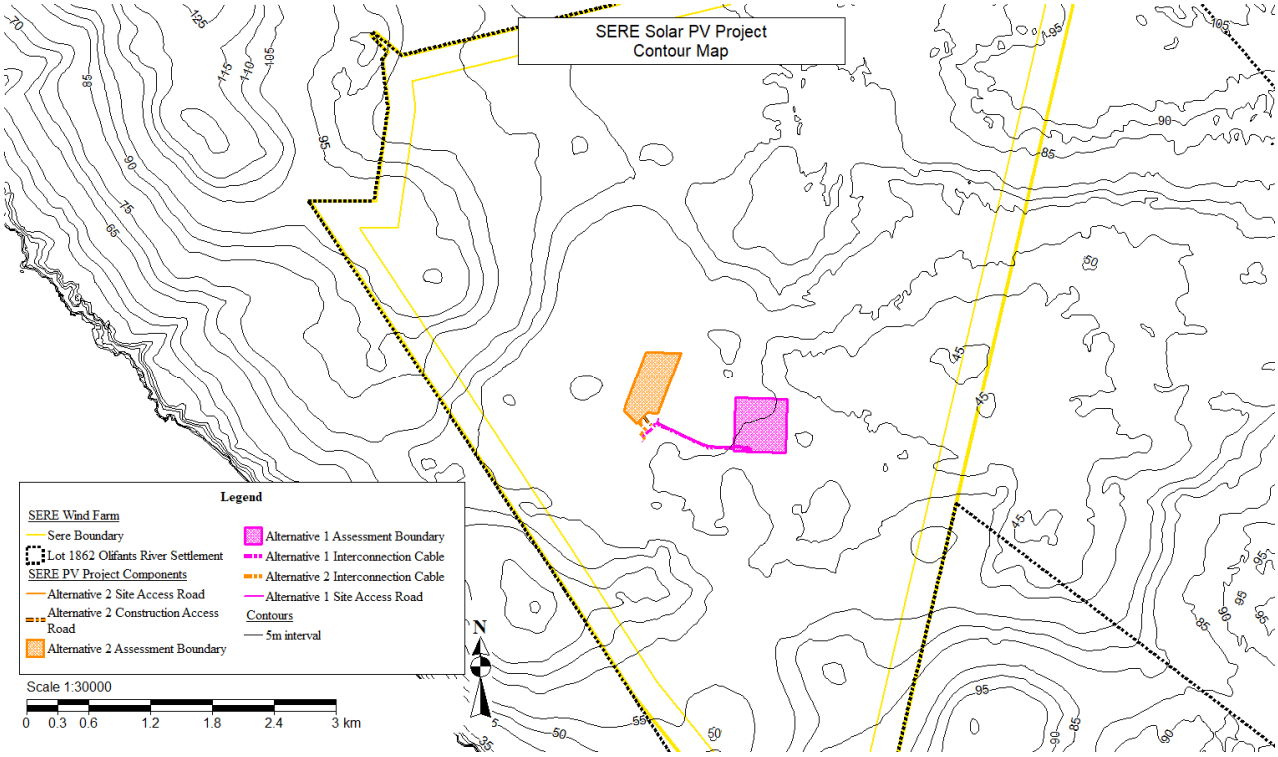


Figure 24: Contour map

13.7 Surface Water

13.7.1 National Biodiversity Assessment Wetlands

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

Three NBA2018 wetlands are indicated to be located on the SERE property and are classified as depression wetlands (**Figure 25**). The Ecosystem threat status of the wetlands is classed as Critically Endangered (CR), while the protection level of these systems is classed as *Not Protected*. The Project site locations were situated in such a manner as to avoid potential wetlands and their 500m buffers.

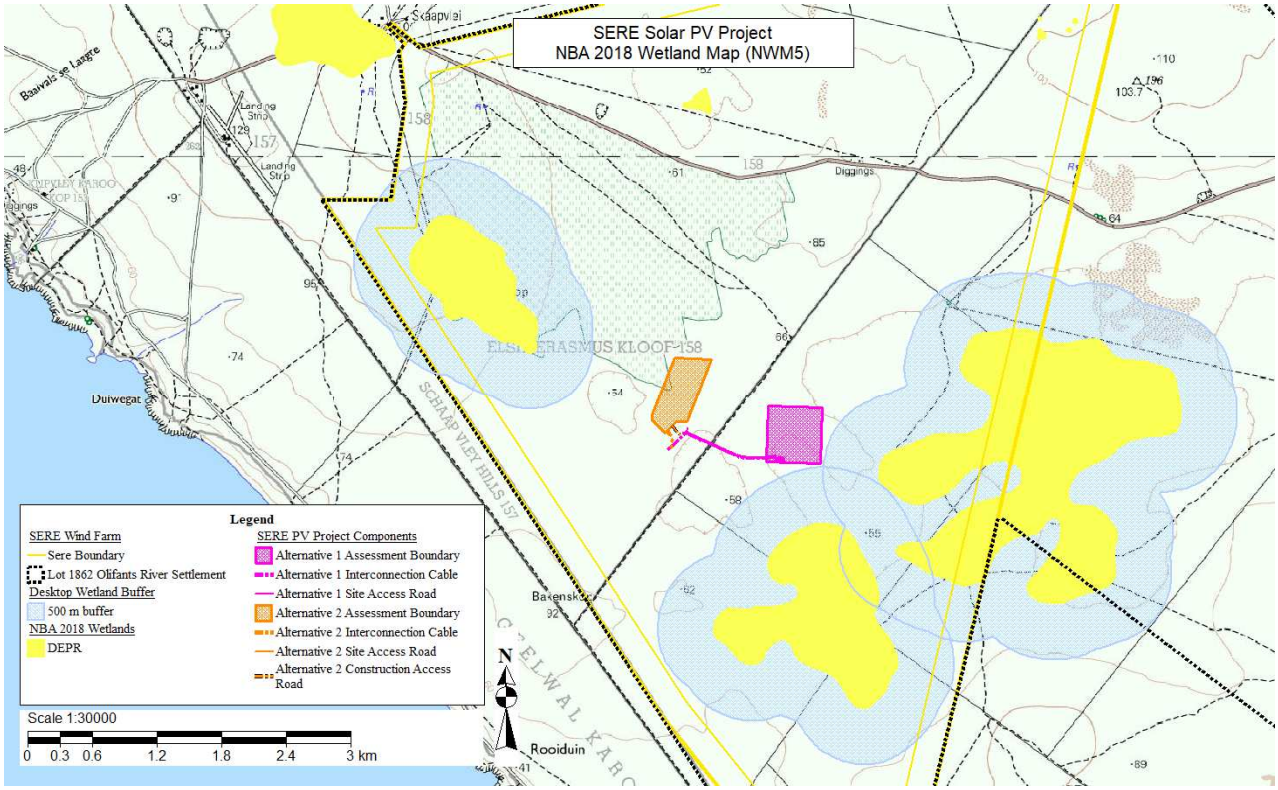


Figure 25: Wetlands and rivers threat status (NBA, 2018)

13.7.2 National Freshwater Ecosystem Priority Areas

The location of the Project area in relation to National Freshwater Ecosystem Priority Areas (NFEPAs) is shown in **Figure 26** below. It should be noted that the NBA2018 NWM5 has replaced the NFEPA wetlands.

Three Unchannelled valley-bottom wetlands are located over 3 km to the southwest of the proposed sites along the coastline. There are no NFEPA wetlands within 500 m of the Project.

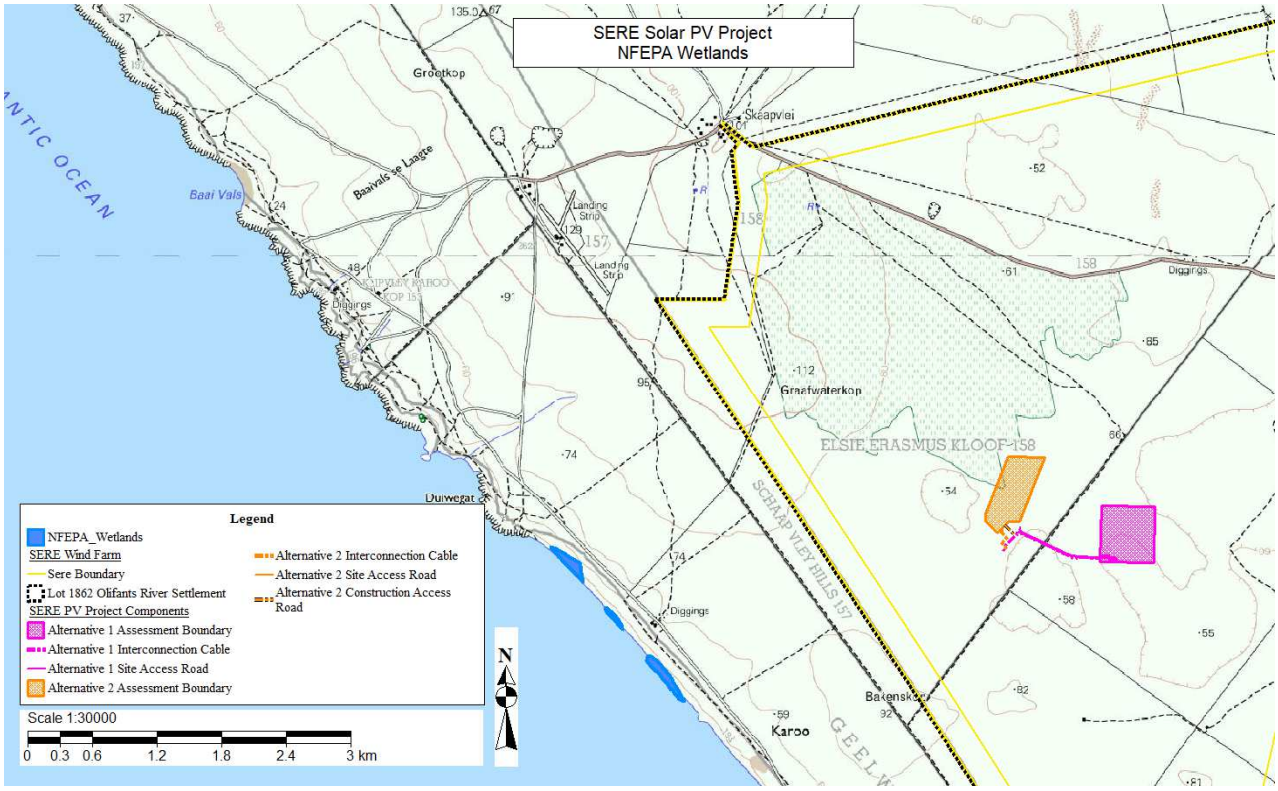


Figure 26: Project area in relation to designated NFEPAs

13.7.3 Hydrological Setting

The Project area is located in the Berg-Olifants Water Management Area (WMA). Major rivers with the WMA include the Berg, Diep and Steenbras, Olifants, Doorn, Krom, Sand, and Sout Rivers. The closest major river to the Project is the Olifants, located just over 10km to the southeast. The Project area is located in a single quaternary catchment, F60E (**Figure 27**).

There are no rivers within the Project sites and none within the near vicinity (**Figure 27**).

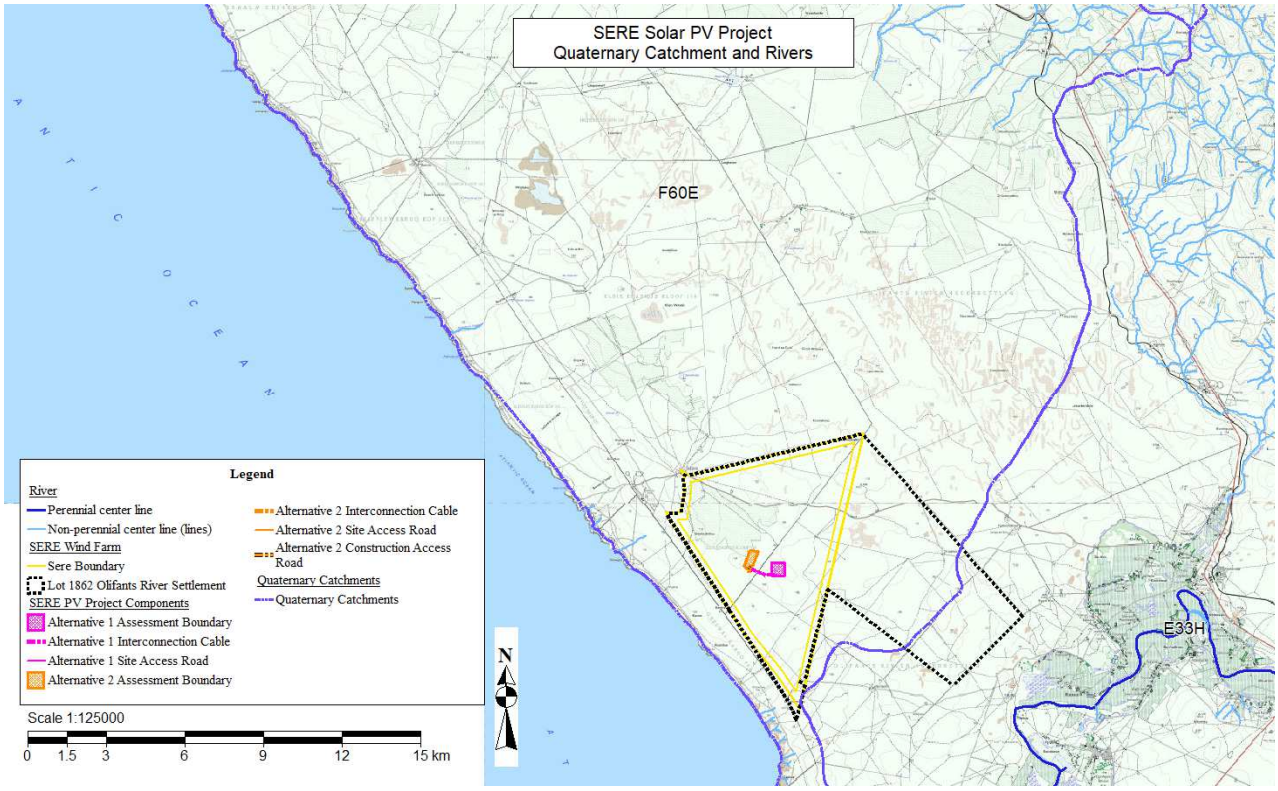


Figure 27: The project area in relation to the Quaternary Catchment and Rivers in the catchment

13.8 Flora & Fauna

The information to follow was sourced from the Terrestrial Ecology Assessment (contained in **Appendix D1**), as well as the Avifaunal Assessment (contained in **Appendix D2**) undertaken by The Biodiversity Company (TBC, 2022a and 2002b). Refer to **Sections 14.5** and **15.13** for a synopsis of the Terrestrial Ecology Assessment and related impact assessment, respectively.

13.8.1 Desktop Spatial Assessment

The GIS analysis pertaining to the relevance of the proposed project to ecologically important landscape features are summarised in **Table 11**.

Table 11: Summary of relevance of the proposed project to ecologically important landscape features (TBC, 2022a)

Desktop Information Considered	Relevant/Not relevant
Ecosystem Threat Status	Relevant – Overlaps with a Least Concern ecosystem
Ecosystem Protection Level	Relevant – Overlaps with a Poorly Protected Ecosystem
Protected Areas	Irrelevant – 11.7 km from the closest Protected Area
Renewable Energy Development Zones	Irrelevant – 156 km from the closest REDZ
Powerline Corridor	Relevant- the project area falls within a corridor

National Protected Areas Expansion Strategy	Relevant – Site 1 overlaps with a NPAES focus area, while Site 2 falls just outside the NPAES area
Critical Biodiversity Area	Relevant – The project area overlaps with a CBA1, ESA1, ESA2 and ONA area.
Succulent Karoo Ecosystem Programme	Relevant- The project area overlaps with a mammal near endemic habitat
Important Bird and Biodiversity Areas	Relevant – Located 9.6 km from the Olifants River Estuary IBA
South African Inventory of Inland Aquatic Ecosystems	Relevant - The project area is more than 500 m away from NBA wetlands and rivers
National Freshwater Priority Area	Relevant – The project area does not overlap with a FEPA river nor a FEPA wetland.
Strategic Water Source Areas	Irrelevant- The project area is approximately 96 km from the closest SWSA

13.8.2 Western Cape Biodiversity Spatial Plan (WCBSP) Matzikama

The WCBSP was updated in 2017. It classifies areas into Critical Biodiversity Area (CBA1), Ecological Support Area (ESA1), ESA2, and Other Natural Areas (ONA).

Figure 28 below shows that the Project overlaps with the following WCBSP areas:

- Alternative 1 – CBA1 (PV site footprint) and ESA1 (small section of the access road tie-in).
- Alternative 2 – CBA 1 (small section of office buildings and access road and interconnection cable route), ESA1, ESA2 and ONA (PV site footprint).

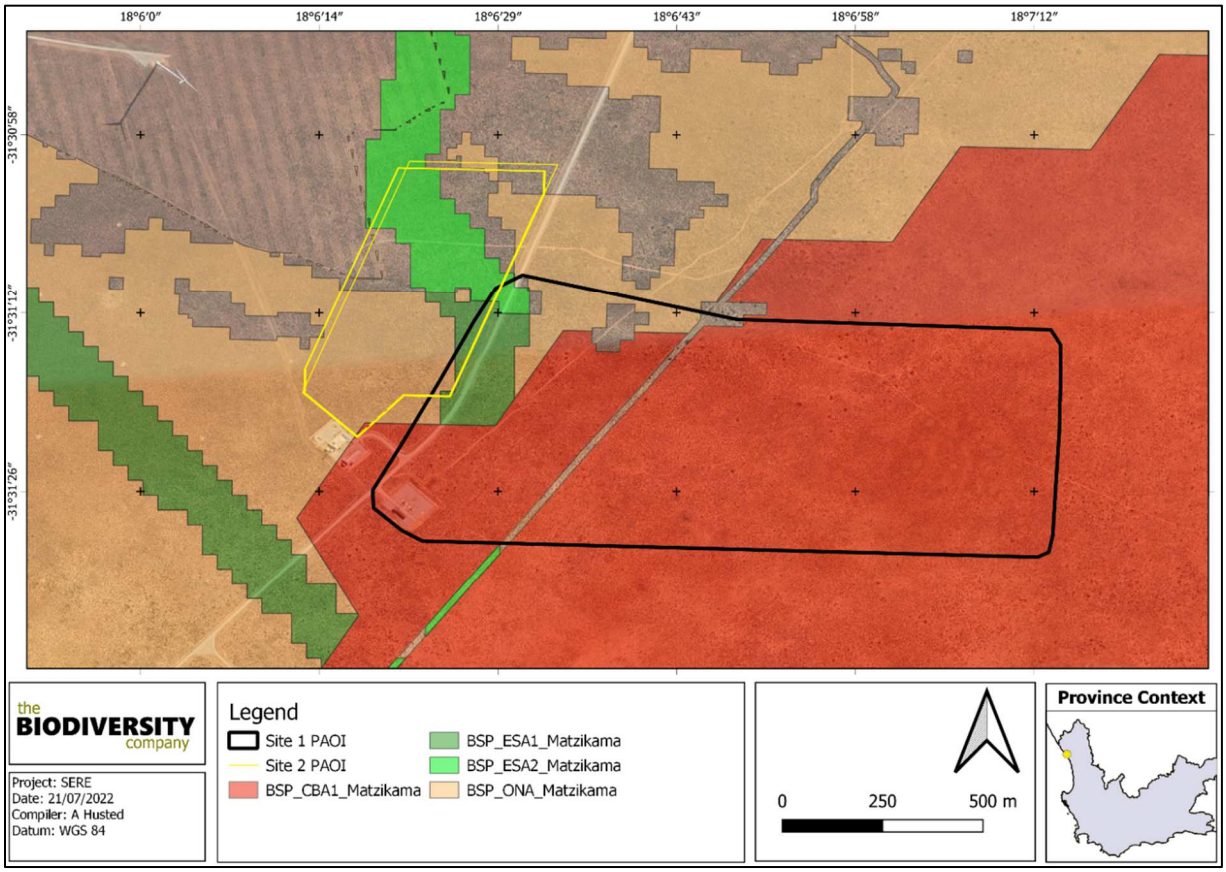


Figure 28: The project area superimposed on the WCBSP (TBC, 2022a)

13.8.3 The National Biodiversity Assessment

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

The project areas overlap with the Namaqualand Sand Fynbos and Namaqualand Inland Duneveld Threatened Ecosystems, which are both categorised as Least Concern.

13.8.3.1 Ecosystem Threat Status

The Ecosystem Threat Status is 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.

According to the spatial dataset the proposed project areas overlap with a LC ecosystem (shown in **Figure 29** below).

13.8.3.2 Ecosystem Protection Level

Ecosystem protection level 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. The proposed project overlaps with a PP ecosystem (**Figure 30**).

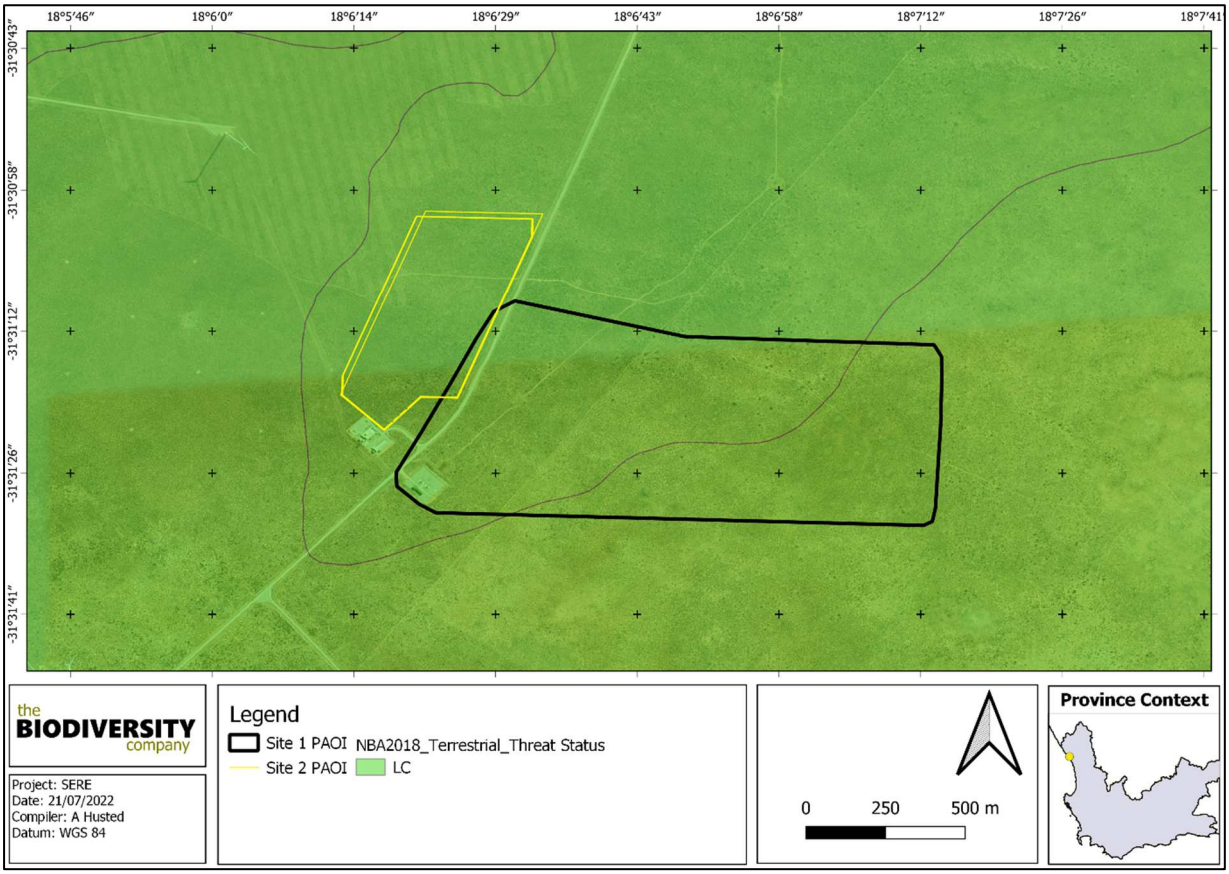


Figure 29: Ecosystem threat status associated with the project areas (NBA, 2018) (TBC, 2022a)

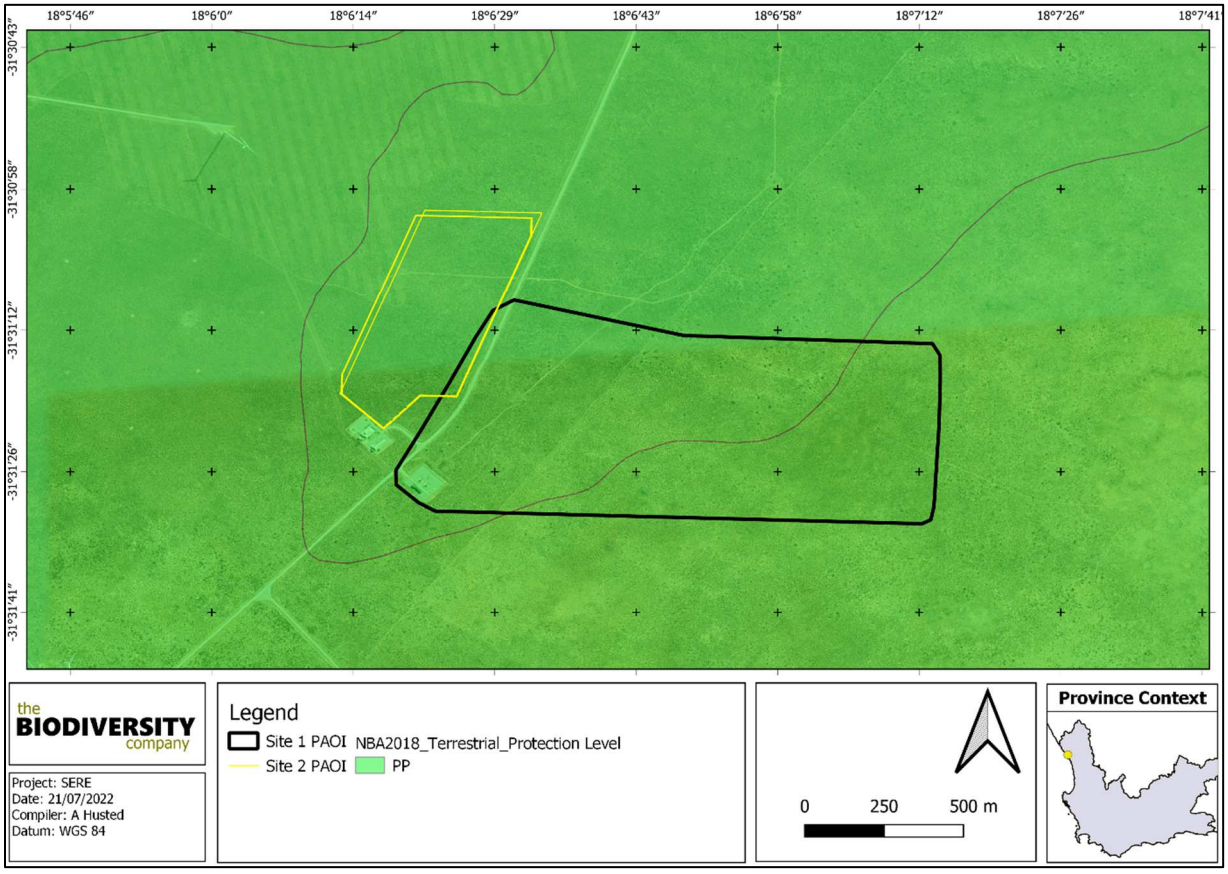


Figure 30: Ecosystem protection level associated with the project areas (NBA, 2018) (TBC, 2022a)

13.8.4 Protected Areas

Figure 31 below shows that the Project is located 29 km from the Moedverloren/(Knersvlakte) Nature Reserve and 21 km from the Lutzville Conservation Area (Local Nature Reserve).

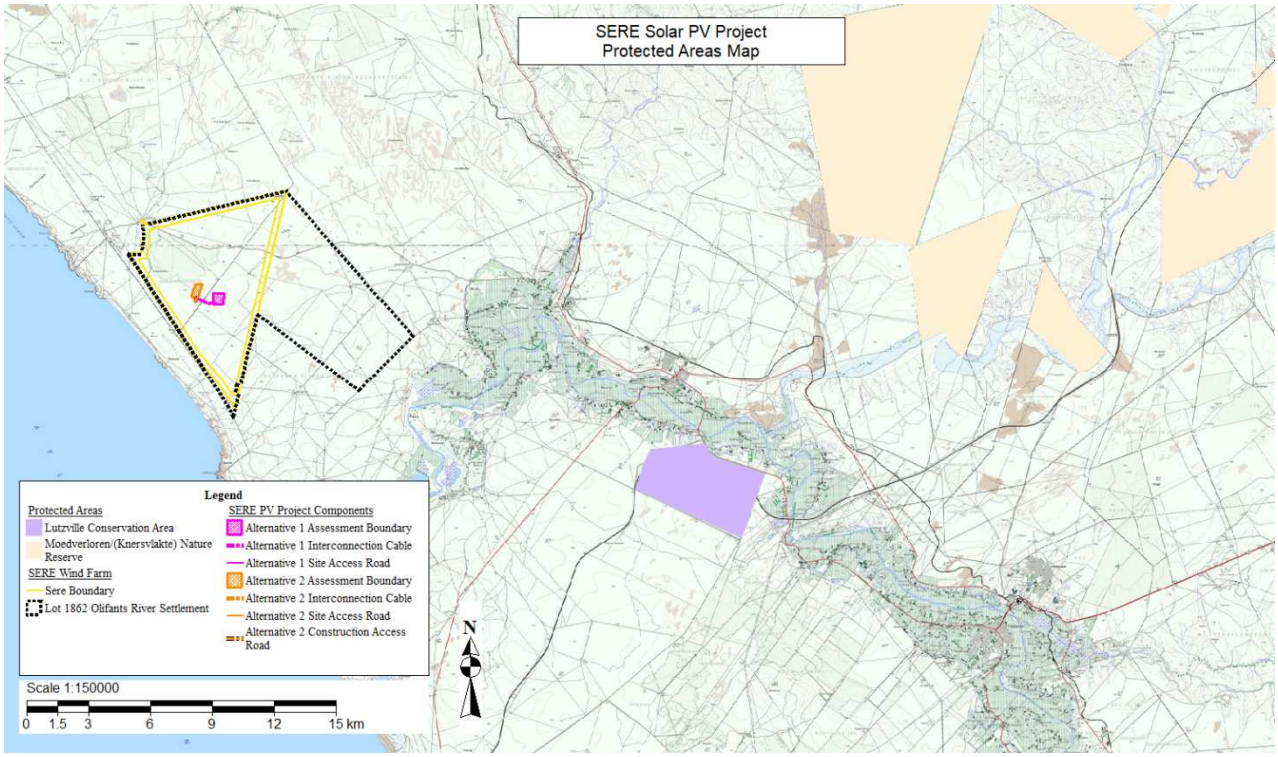


Figure 31: Protected areas in relation to the Project

13.8.5 National Protected Area Expansion Strategy

National Protected Area Expansion Strategy 2017 (NPAES) were identified through a systematic biodiversity planning process. They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for finescale planning which may identify a range of different priority sites based on local requirements, constraints and opportunities (NPAES, 2017). The project area overlaps with a Priority Focus Area, while Site 2 falls just outside of the NPAES as can be seen in **Figure 32** below.

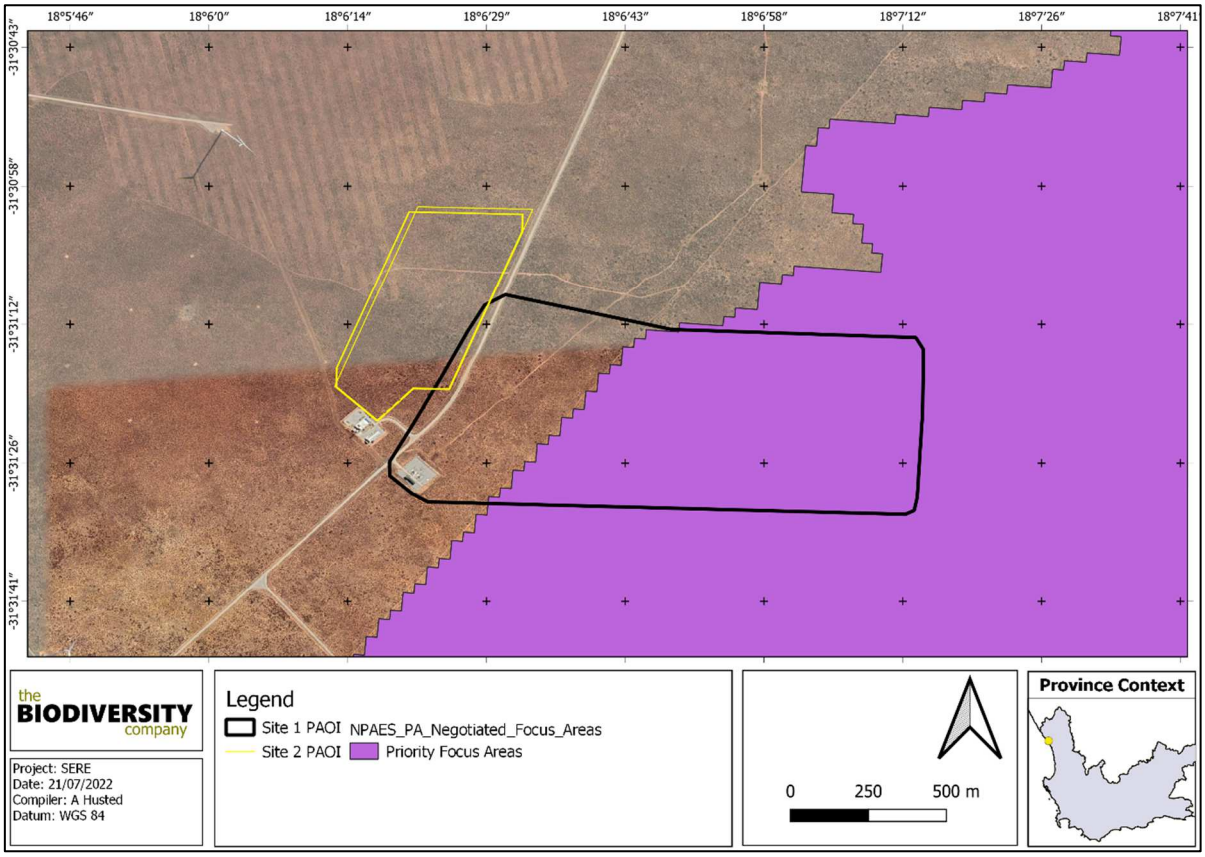


Figure 32: Project area in relation to NPAES (TBC, 2022a)

13.8.6 Succulent Karoo Ecosystem Programme

Succulent Karoo Ecosystem Programme (SKEP) is a long-term bioregional conservation programme, with the aim to conserve ecosystems and to develop conservation as a land-use rather than instead of land-use (SANBI, 2021). Their focal areas are:

- Increasing local, national and international awareness of the unique biodiversity of the Succulent Karoo;
- Expanding protected areas and improving conservation management, particularly through the expansion of public-private-communal-corporate partnerships;
- Support the creation of a matrix of harmonious land uses; and
- Improve institutional co-ordination to generate momentum and focus on priorities, maximise opportunities for partnerships, and ensure sustainability.

The areas of SKEP endemism for mammals, amphibians, reptiles and birds were assessed in relation to the project areas, it was found that the project areas overlap with a mammal near endemic habitat (see **Figure 33** below).

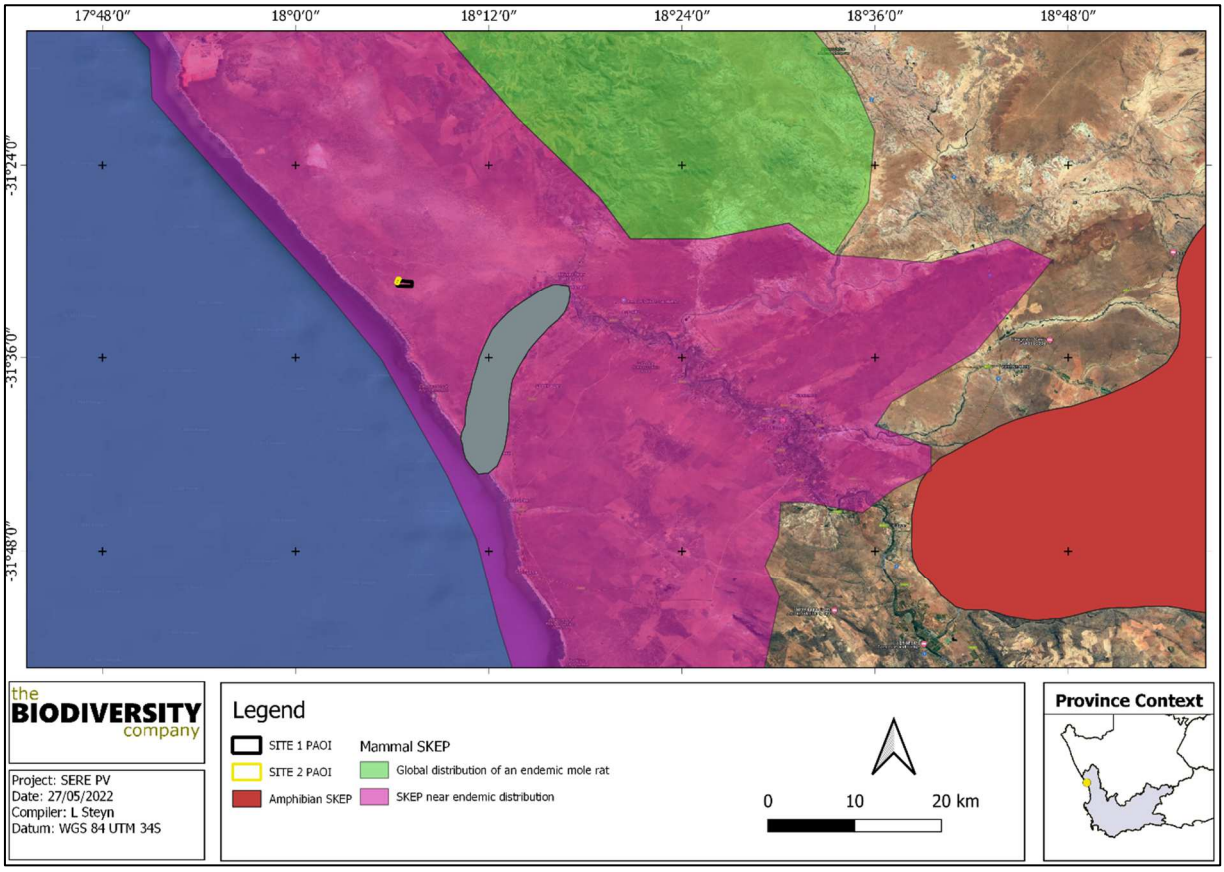


Figure 33: Project area in relation to SKEP (TBC, 2022a)

13.8.7 Flora

The project area is situated within the Fynbos and the Succulent Karoo biomes.

The fynbos biome comprises of three naturally fragmented vegetation type, they are; fynbos, renosterveld and sandveld (Mucina & Rutherford, 2006). This evergreen, fire-prone shrubland is characterised by the presence of restios, high cover of ericoid shrubs and the common occurrence of proteoid shrubs (Mucina & Rutherford, 2006).

The fynbos occurs mainly on nutrient poor sandy soils and less frequently on limestone, leached clay soils derived from shale and granite, and gravelly soils derived from duricrust outcrops and alluvial sediments (Mucina & Rutherford, 2006).

Most of the Succulent Karoo biome covers a flat to gently undulating plain, with some hilly and "broken" veld, mostly situated to the west and south of the escarpment, and north of the Cape Fold Belt. The altitude is mostly below 800 m, but in the east, it may reach 1 500 m (SANBI, 2019).

The Succulent Karoo Biome is primarily determined by the presence of low winter rainfall and extreme summer aridity. Rainfall varies between 20 and 290 mm per year. Because the rains are cyclonic, and not due to thunderstorms, the erosive power is far less than of the summer rainfall biomes. During summer, temperatures in excess of 40°C are common, while fog is common nearer to the coast (SANBI, 2019).

The vegetation is dominated by dwarf, succulent shrubs, of which the Vygies (*Mesembryanthemaceae*) and Stonecrops (*Crassulaceae*) are particularly prominent. Mass flowering displays of annuals (mainly Daisies *Asteraceae*) occur in spring, often on degraded or

fallow lands. Grasses are rare, except in some sandy areas, and are of the C3 type. The number of plant species mostly succulents - is very high and unparalleled elsewhere in the world for an arid area of this size (SANBI, 2019).

On a fine-scale vegetation type, Site 1 overlaps with two vegetation types: the Namaqualand Inland Duneveld and the Namaqualand Sand Fynbos, while Site 2 only falls across the latter vegetation type (see **Figure 34** below).

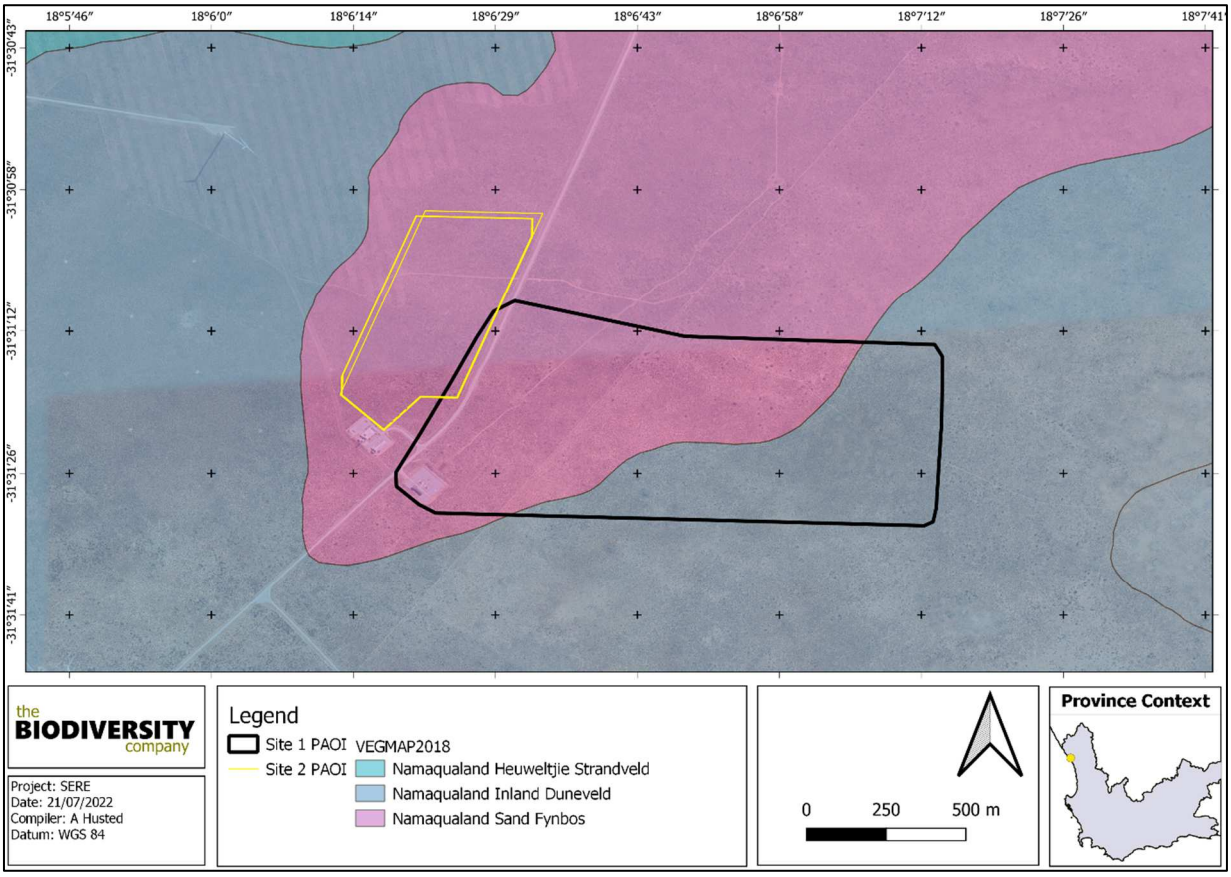


Figure 34: Vegetation type vegetation type associated with the project areas (TBC, 2022a)

13.8.7.1 Expected Flora Species

The POSA database indicates that 537 species of indigenous plants are expected to occur within the project areas. Appendix A provides the list of species and their respective conservation status and endemism. Fourty-one (41) SCC based on their conservation status could be expected to occur within the project area and are provided in **Table 12** below.

Table 12: Threatened flora species that may occur within the project area (TBC, 2022a)

Family	Taxon	Author	IUCN	Ecology
Iridaceae	*Romulea lutea*	J.C.Manning & Goldblatt	CR	Indigenous; Endemic
Iridaceae	*Babiana teretifolia*	Goldblatt & J.C.Manning	CR	Indigenous; Endemic
Scrophulariaceae	*Selago heterotricha*	Hilliard	EN	Indigenous; Endemic
Geraniaceae	*Pelargonium appendiculatum*	(L.f.) Willd.	EN	Indigenous; Endemic

Hyacinthaceae	*Ornithogalum hallii*	Oberm.	EN	Indigenous; Endemic
Geraniaceae	*Pelargonium crassipes*	Harv.	EN	Indigenous; Endemic
Aizoaceae	*Monilaria pisiformis*	(Haw.) Schwantes	EN	Indigenous; Endemic
Iridaceae	*Romulea sinispinosensis*	M.P.de Vos	EN	Indigenous; Endemic
Apocynaceae	*Quaqua pulchra*	(Bruyns) Plowes	EN	Indigenous; Endemic
Fabaceae	*Otholobium incanum*	C.H.Stirt.	EN	Indigenous; Endemic
Crassulaceae	*Tylecodon fragilis*	(R.A.Dyer) Toelken	EN	Indigenous; Endemic
Aizoaceae	*Leipoldtia klaverensis*	L.Bolus	EN	Indigenous; Endemic
Campanulaceae	*Wahlenbergia asparagoides*	(Adamson) Lammers	NT	Indigenous; Endemic
Iridaceae	*Babiana virescens*	Goldblatt & J.C.Manning	NT	Indigenous; Endemic
Iridaceae	*Babiana confusa*	(G.J.Lewis) Goldblatt & J.C.Manning	NT	Indigenous; Endemic
Apocynaceae	*Ceropegia occidentalis*	R.A.Dyer	NT	Indigenous
Asteraceae	*Helichrysum marmarolepis*	S.Moore	NT	Indigenous; Endemic
Aizoaceae	*Jordaaniella uniflora*	(L.Bolus) H.E.K.Hartmann	NT	Indigenous; Endemic
Iridaceae	*Babiana hirsuta*	(Lam.) Goldblatt & J.C.Manning	NT	Indigenous; Endemic
Aizoaceae	*Drosanthemum marinum*	L.Bolus	NT	Indigenous; Endemic
Iridaceae	*Ferraria foliosa*	G.J.Lewis	NT	Indigenous; Endemic
Crassulaceae	*Crassula ammophila*	Toelken	NT	Indigenous; Endemic
Apiaceae	*Arctopus dregei*	Sond.	NT	Indigenous; Endemic
Asteraceae	*Othonna intermedia*	Compton	NT	Indigenous; Endemic
Asteraceae	*Othonna hallii*	B.Nord.	VU	Indigenous; Endemic
Aizoaceae	*Lampranthus procumbens*	Klak	VU	Indigenous; Endemic
Aizoaceae	*Ruschia langebaanensis*	L.Bolus	VU	Indigenous; Endemic
Aizoaceae	*Ruschia bipapillata*	L.Bolus	VU	Indigenous; Endemic
Asphodelaceae	*Bulbine melanovaginata*	G.Will.	VU	Indigenous; Endemic
Iridaceae	*Lapeirousia simulans*	Goldblatt & J.C.Manning	VU	Indigenous; Endemic
Polygalaceae	*Muraltia obovata*	DC.	VU	Indigenous; Endemic
Asteraceae	*Leucoptera nodosa*	(Thunb.) B.Nord.	VU	Indigenous; Endemic
Aizoaceae	*Diplosoma luckhoffii*	(L.Bolus) Schwantes ex Ihlenf.	VU	Indigenous; Endemic
Asteraceae	*Helichrysum dunense*	Hilliard	VU	Indigenous; Endemic
Iridaceae	*Moraea quartzicola*	Goldblatt & J.C.Manning	VU	Indigenous
Asteraceae	*Othonna cakilefolia*	DC.	VU	Indigenous; Endemic
Iridaceae	*Babiana lewisiana*	B.Nord.	VU	Indigenous; Endemic
Asteraceae	*Oedera silicicola*	(K.Bremer) Anderb. & K.Bremer	VU	Indigenous; Endemic
Hyacinthaceae	*Ornithogalum naviculum*	W.F.Barker	VU	Indigenous; Endemic
Proteaceae	*Leucospermum rodolentum*	(Salisb. ex Knight) Rourke	VU	Indigenous; Endemic
Asphodelaceae	*Bulbine haworthioides*	B.Nord.	VU	Indigenous; Endemic

NT = Near Threatened; VU = Vulnerable·

13.8.8 Fauna

13.8.8.1 Avifauna

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

Figure 35 below shows that the project area is approximately 13 km from the Olifants River Estuary IBA. Approximately 127 bird species have been recorded at the Olifants River estuary and its environs, at least 60 of which are waterbirds. The estuary is estimated to support 15 000 waterbirds, amongst these are the threatened species such as: Lesser Flamingo *Phoeniconaias minor*, Greater Flamingo *Phoenicopterus roseus*, Caspian Tern *Sterna caspia*, African Marsh Harrier *Circus ranivorus*, Black Harrier *C. maurus* , African Black Oystercatcher *Haematopus moquini*, and Great White Pelicans *Pelecanus onocrotalus*.
The vegetation surrounding the estuary is suitable for many Namib-Karoo biome-restricted assemblage and other arid-zone species, including Karoo Korhaan *Eupodotis vigorsii*, Grey Tit *Parus afer*, Karoo Lark *Calendulauda albescens*, Tractrac Chat *Cercomela tractrac*, Karoo Chat *C. schlegelii*, Sickle-winged Chat *C. sinuata* and Black-headed Canary *Serinus alario*.

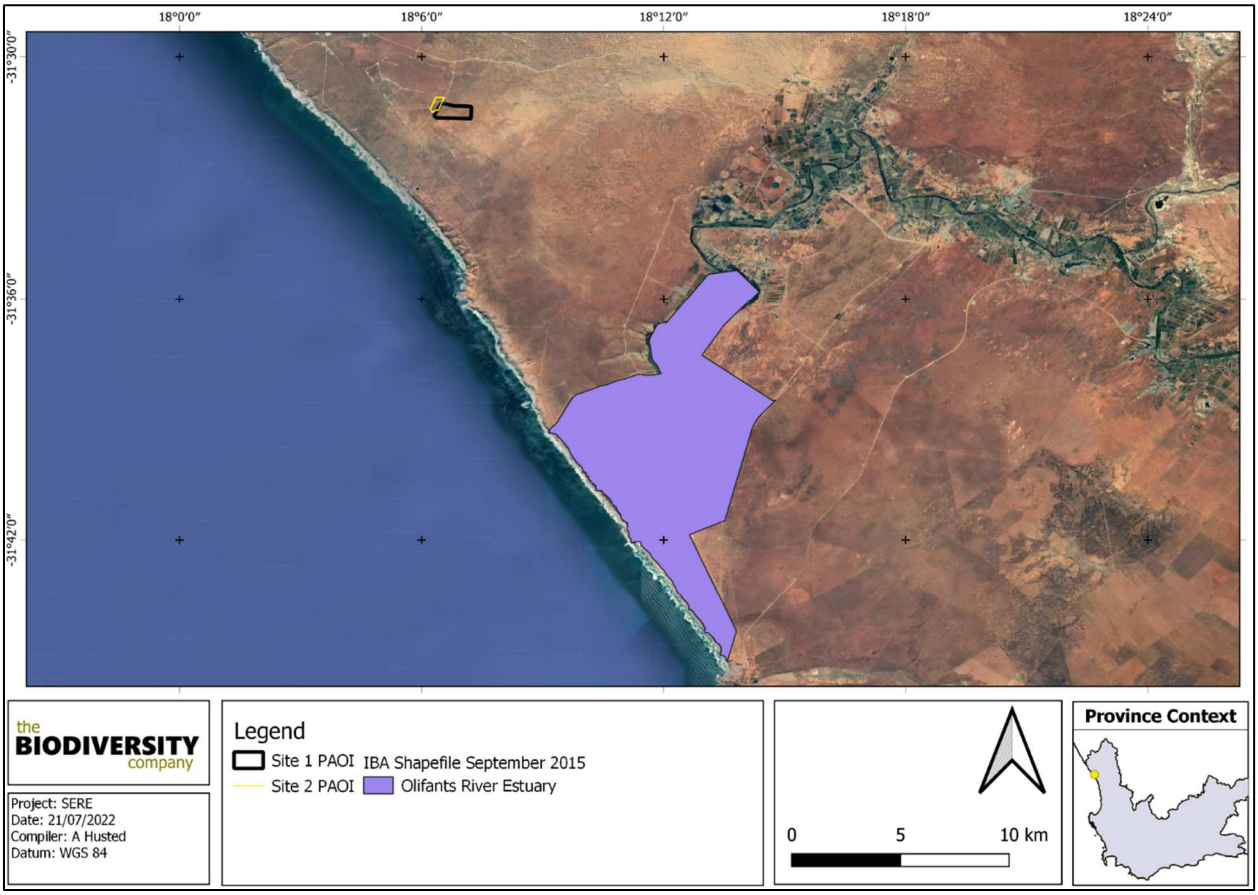


Figure 35: The important bird and biodiversity areas in relation to the project area (IBA, 2015) (TBC, 2022b)

The Succulent Karoo Ecosystem Programme (SKEP) is a long term bioregional conservation programme, with the aim to conserve ecosystems and to develop conservation as a land-use rather than instead of land-use (SANBI, 2021). Their focal areas are:

- Increasing local, national and international awareness of the unique biodiversity of the Succulent Karoo;
- Expanding protected areas and improving conservation management, particularly through the expansion of public-private-communal-corporate partnerships;
- Support the creation of a matrix of harmonious land uses; and
- Improve institutional co-ordination to generate momentum and focus on priorities, maximise opportunities for partnerships, and ensure sustainability.

The areas of SKEP birds were assessed in relation to the project area, it was found that the project area can be found 9.6 km from a unique bird habitat (**Figure 36**).

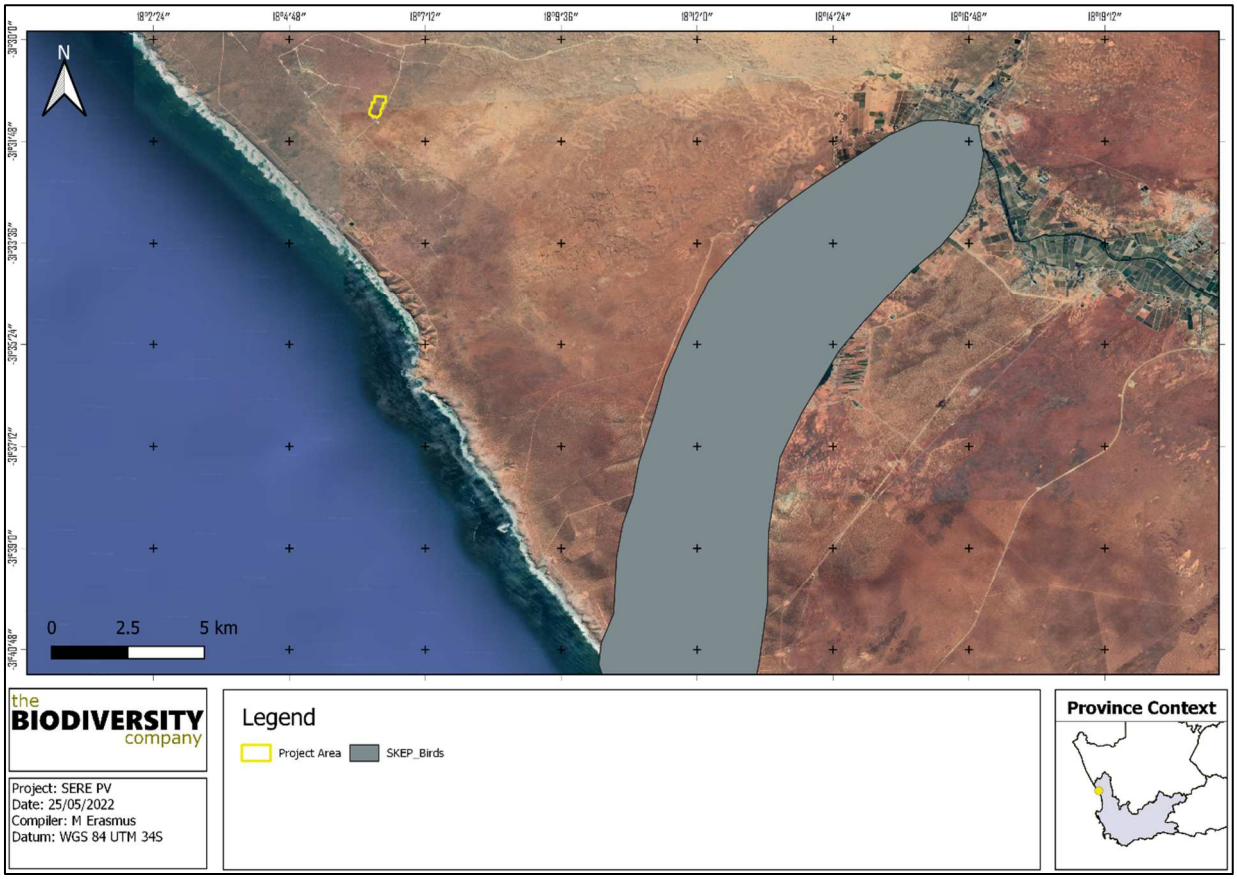


Figure 36: The project area in relation to the bird SKEP areas (TBC, 2022b)

Based on the South African Bird Atlas Project, Version 2 (SABAP2) database, 189 bird species have the potential to occur in the vicinity of the project area. The full list of potential bird species is provided in Appendix A of TBC (2022b), the list was compiled from all the pentads along the project area. Of the potential bird species, seventeen (17) species are listed as Species of Conservation Concern (SCC) either on a regional or global scale (**Table 13**). Seven of the species were given a low likelihood of occurrence due to the lack of suitable habitat in the area and the level of disturbance already found in the area.

Table 13: List of bird SCCs that are expected to occur in close vicinity to the project area and their reporting rates (SABAP2) (TBC, 2002b)

Common Name	Scientific Name	Conservation Status		Pentad									Likelihood of occurrence
		Regional (SANBI, 2021)	**IUCN (2021)**	**3125_1800**	**3125_1805**	**3125_1810**	**3130_1800**	**3130_1805**	**3130_1810**	**3135_1805**	**3135_1810**	**3135_1815**	
Ludwig's Bustard	***Neotis ludwigii***	**EN**	**EN**			**66.7**				**6.7**	**4.8**		**High**
Bank Cormorant	***Phalacrocorax neglectus***	**EN**	**EN**	**25.0**			**100.0**			**6.7**			**Low**
Cape Cormorant	***Phalacrocorax capensis***	**EN**	**EN**	**62.5**			**100.0**			**100.0**	**14.3**		**Moderate**
Crowned Cormorant	***Microcarbo coronatus***	**NT**	**NT**	**12.5**						**66.7**			**Moderate**
Maccoa Duck	***Oxyura maccoa***	**NT**	**VU**								**14.3**		**Low**
Martial Eagle	***Polemaetus bellicosus***	**EN**	**EN**			**66.7**			**0.0**				**High**
Greater Flamingo	***Phoenicopterus roseus***	**NT**	**LC**						**5.6**		**52.4**	**16.7**	**High**
Lesser Flamingo	***Phoeniconaias minor***	**NT**	**NT**								**23.8**		**High**
Cape Gannet	***Morus capensis***	**VU**	**EN**	**12.5**						**26.7**			**Low**
African Marsh Harrier	***Circus ranivorus***	**EN**	**LC**								**33.3**		**Moderate**
Black Harrier	***Circus maurus***	**EN**	**EN**						**5.6**	**0.0**	**9.5**		**High**
Southern Black Korhaan	***Afrotis afra***	**VU**	**VU**	**12.5**				**0.0**	**5.6**	**13.3**		**50**	**High**
Great White Pelican	***Pelecanus onocrotalus***	**VU**	**LC**								**14.3**		**Low**

Curlew Sandpiper	***Calidris ferruginea***	**LC**	**NT**	**12.5**							**28.6**		**Low**
Caspian Tern	***Hydroprogne caspia***	**VU**	**LC**						**22.2**		**66.7**		**Moderate**
Cape Vulture	***Gyps coprotheres***	**EN**	**EN**								**0.0**		**Low**
Ground Woodpecker	***Geocolaptes olivaceus***	**LC**	**NT**	**12.5**									**Low**

13.8.8.2 Mammals

The IUCN Red List Spatial Data lists 58 mammal species that could be expected to occur within the area (Appendix D of the TBC 2022a report). This list excludes large mammal species that are limited to protected areas. Seven (7) of these expected species are regarded as threatened, three of these have a low likelihood of occurrence based on the lack of suitable habitat and the level of disturbance nearby to the project areas (see **Table 14** below).

Table 14: Threatened mammal species that are expected to occur within the project area (TBC, 2002a)

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
Eremitalpa granti	Grant's Golden Mole	VU	Unlisted	Moderate
Felis nigripes	Black-footed Cat	VU	VU	Low
Graphiurus ocularis	Spectacular Dormouse	NT	LC	Moderate
Leptailurus serval	Serval	NT	LC	Moderate
Mystromys albicaudatus	White-tailed Rat	VU	EN	Low
Panthera pardus	Leopard	VU	VU	Low
Parotomys littledalei	Littledale's Whistling Rat	NT	LC	Moderate
Eremitalpa granti	Grant's Golden Mole	VU	Unlisted	Moderate
Felis nigripes	Black-footed Cat	VU	VU	Low
Graphiurus ocularis	Spectacular Dormouse	NT	LC	Moderate

Eremitalpa granti (Grant's Golden Mole) is categorised as VU on a regional scale. This species prefers soft, shifting sands of dune crests but also present in inter-dune swales with quite dense vegetation as long as sand is not too consolidated. Areas containing scattered clumps of the dune grass (*Aristida sabulicola*), Ostrich Grass (*Cladoraphis spinosa*) and Long Bushman Grass (*Stipagrostis ciliata*), are the preferred habitats for this species. Much of the range of this species coincides with coastal desert where human influence on habitats is not substantial, so the overall population is probably not in decline. The likelihood of occurrence in the project areas are rated as moderate.

Graphiurus ocularis (Spectacular Dormouse) is categorised as NT on a regional scale. This species is endemic to South Africa, where it occurs widely in Northern Cape, Eastern Cape, and Western Cape provinces, with a single record from the North West province. The species is associated with the sandstone formations of the Cape, which have many vertical and horizontal cracks and crevices in which to shelter and nest. The likelihood of occurrence is rated as moderate

Leptailurus serval (Serval) occurs widely through sub-Saharan Africa and is commonly recorded from most major national parks and reserves (IUCN, 2017). The Serval's status outside reserves is not certain, but they are inconspicuous and may be common in suitable habitat as they are tolerant of farming practices provided there is cover and food available.

In sub-Saharan Africa, they are found in habitat with well-watered savanna long-grass environments and are particularly associated with reedbeds and other riparian vegetation types. The project areas provide some areas of suitable habitat and were given a moderate likelihood.

Parotomys littledalei (Littledale's Whistling Rat) is listed as NT on a regional scale. This diurnal species occurs in shrubland and is dependent on ground cover. Littledale's Whistling Rat is herbivorous only, feeding on fresh plant material, including annuals, succulent perennials, non-succulent perennials, and grasses. The presence of ground cover increases their likelihood of occurrence in the project areas. Suitable but not ideal habitat is found in the project areas; therefore the likelihood of occurrence was rated as moderate.

13.8.8.3 Amphibians

Based on the IUCN Red List Spatial Data and AmphibianMap, 13 amphibian species are expected to occur within the area (Appendix B of the TBC, 2022a report). None are regarded as threatened.

13.8.8.4 Reptiles

Based on the IUCN Red List Spatial Data and the ReptileMAP database, 68 reptile species are expected to occur within the area (Appendix C of the TBC, 2022a report). Four (4) are regarded as threatened (**Table 15**).

Table 15: Threatened reptile species that are expected to occur within the project area (TBC, 2022a)

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
Chersobius signatus	Speckled Dwarf Tortoise	EN	EN	High
Goggia matzikamaensis	Matzikama Gecko	NT	LC	High
Psammophis leightoni	Cape Sand Snake	VU	VU	High
Scelotes gronovii	Gronovi's Dwarf Burrowing Skink	NT	NT	High

Chersobius signatus (Speckled Dwarf Tortoise) is naturally restricted to a small area in the Little Namaqualand, where it normally lives on rocky outcrops and forages among the rocks on succulent plants. Based on the suitable habitat and food sources found in the project areas, a high likelihood of occurrence was appointed to the species.

Goggia matzikamaensis (Matzikama Gecko) is NT on a regional scale. This species rock cracks in Succulent Karoo. Suitable habitat can be found in the project areas, as such the species were given a high likelihood of occurrence.

Psammophis leightoni (Cape Sand Snake) is categorised as VU internationally and locally. Endemic to the western regions of the Western Cape, South Africa. Threatened primarily by habitat loss associated with agriculture and development of human settlements

throughout its range. The likelihood of finding the species in the project areas are high, this was based on another snake species with similar habitat requirements being present. *Scelotes gronovii* (Gronovi's Dwarf Burrowing Skink) is NT on both a regional and global scale. They inhabit sparsely-vegetated coastal dunes and strandveld, chiefly at elevations below 100 m. As their ideal habitat is found in the project areas this species were given a high likelihood of occurrence.

13.9 Socio-Economic Environment

The following information was sourced from the MLM IDP (MLM, 2022).
The MLM is located on the north-west coast of the Western Cape. The Municipality borders the Atlantic Ocean to the west, the Kamiesberg and Hantam Municipalities in the Northern Cape to the north and east respectively and the Cederberg Municipality in the Western Cape to the south. The MLM is a category B municipality proclaimed in terms of Provincial Notice No 481/2000 of September 2000. MLM is characterized by an arid environment but is served by a life-giving arterial namely the Olifants River. The river with its associated canal systems supports a flourishing agricultural sector that is mainly built on viniculture. Apart from the previously district-municipality managed area to the north as well as the towns of Doring Bay, Strandfontein and Vanrhynsdorp the rest of the population is concentrated along the river and canal system. Vredendal is by far the largest town in the area, and it is also centrally located rendering it the logical economic and administrative centre of the municipal area.

Ward eight consist of 8 towns/villages and occupies the biggest geographical space in the municipal area. The area was formerly managed by the District Municipality and is commonly known as the District Municipal Area (DMA). Through community engagement undertaken by the MLM, the following were the main needs captured:

- The communities in Ward eight identified the need for further infrastructure development as the most important service they want. Many of the villages are connected with poor gravel or dust roads, with no storm water provision, no pavements and a lack of lighting.
- Upgrades to sport fields, changing rooms and lighting were listed as the second most important need within the community.
- The provision of running water inside residential properties within the villages of Rietpoort, Stofkraal, Putsekloof and Molsvlei was cited as the third priority.

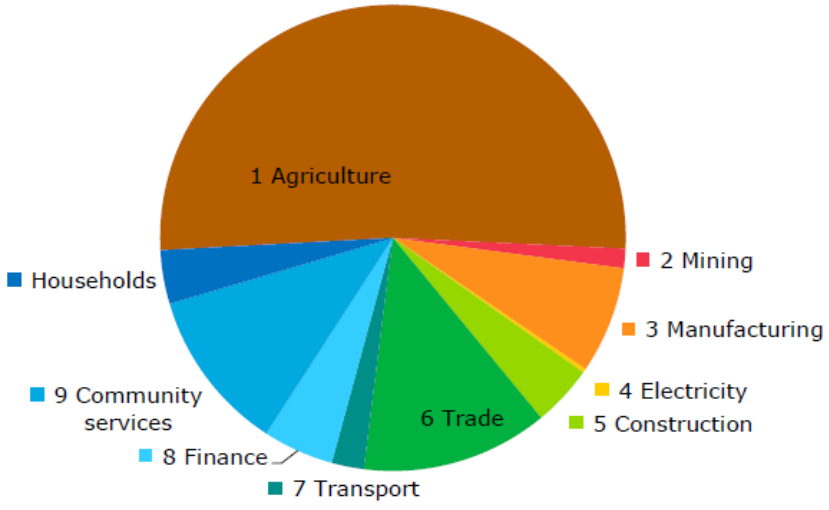
As of 2021, Matzikama Municipality has an estimate of 72 759 persons, making it the second smallest populated municipal area in the WCD. This total is expected to grow to 73 026 by 2025, equating to an average annual growth rate of 0.2 per cent.
In 2020, the population density of the WCD was 15 persons per square kilometre with Matzikama recording a figure of 6 persons per square kilometre. Population density figures aid public sector decision makers to mitigate environmental, health and service delivery risks.

Household size refers to the number of people per household. The actual size of households is on a constant trend at 3.8 people per household in 2020 through to 2026. Contributing factors to a stagnation in household size growth could include, but are not limited to, lower fertility rates, occurrences of divorce, ageing population, etc.
In 2019, the economy of Matzikama was valued at R4.5 billion (current prices) and employed 28 507 people. Historical trends between 2015 and 2019 indicate that the municipal economy realised an average annual growth rate of 0.4 per cent which can be attributed to the tertiary and primary sector growth of 0.7 per cent and 0.4 per cent respectively.

Employment creation for 2020 was poor overall, with all sectors contracting in the number of jobs per sector. Despite the manufacturing sector's important role in the local economy, particularly as one of the main sources of employment, this sector is estimated to have contracted by 7.4 per cent in 2020.

It is estimated that Matzikama's total employed will in 2020 amount to 27 156 workers of which 20 679 (76.1) per cent) are in the formal sector while 6 477 (23.8 per cent) are informally employed.
Most of the formally employed consisted of low-skilled (53.1 per cent) and semi-skilled (32.4 per cent) workers. Although the skilled category only contributed 14.5 per cent to total formal employment (2020), it outpaced the other two categories in terms of average annual growth – between 2016 and 2020, the skilled cohort grew on average by 0.2 per cent (albeit off a small base) while the semi-skilled and low-skilled categories grew by -0.6 per cent respectively. The growth in the skilled category reflects the market demand for more skilled labour. Evidently, the demand for skilled labour is on the rise which implies the need to capacitate and empower low-skilled and semi-skilled workers. Formal employment overall declined by 0.5 per cent between 2016 and 2020.

The total employment composition per sector in MLM in 2019 is illustrated in **Figure 37**. The sectors recording the largest employment numbers were Agriculture, Trade, Community Services and Manufacturing. The sectors recording the lowest employment numbers were Transport, Mining and Electricity.



Source: IHS Markit Regional eXplorer version 2070

Figure 37: total employment composition per sector in MLM (MLM IDP, 2022)

Matzikama's unemployment rate of 11.7 per cent in 2020 and was notably lower than that the Western Cape's unemployment rate of 18.9 per cent. The unemployment rates are concerning given that this estimate is based on the narrow definition of unemployment i.e. the percentage of people that are actively looking for work, but unable to find employment. In turn, the broad definition refers to people that want to work but are not actively seeking employment (excludes those who have given up looking for work).
The development of the proposed private hospital in Vredendal can be a valuable injection into the local economy. Although temporary, the construction of the development will generate new activity and jobs in the construction sector, while the operation of the hospital can have direct and indirect benefits in the tertiary sector.

The HDI (Human Development Index) is a composite indicator reflecting on education levels, health, and income. It is a measure of peoples' ability to live a long and healthy life, to communicate, participate in the community and to have sufficient means to be able to afford a decent living. The HDI is represented by a number between 0 and 1, where 1 indicates a high level of human development and 0 represents no human development. There has been a general increase in the HDI for the MLM area, from 0.67 in 2017 to 0.74 in 2020. There has been a similar upward trend for the WCD as well as for the Western Cape.

In 2020, the MLM had 5 primary healthcare facilities, which comprised of 5 fixed clinics. There were also 13 mobile/satellite clinics and 9 antiretroviral treatment clinics. In addition to these primary healthcare facilities, there is also 1 district hospital.

13.10 Planning

The MLM is a category B municipality proclaimed in terms of Provincial Notice No 481/2000 of September 2000 and is located in the WCD Municipality.

The following is noted from a planning perspective:

- The Project is supported through local policy and planning. The MLM SDF states that renewable energy projects, such as solar and wind farms, need to be promoted in strategic areas to reduce the current dependence on Fossil fuels and reduce the carbon footprint within the LM.
- The Project will contribute towards both National and Provincial targets for renewable energy and Eskom's target, as well as assist in meeting the increasing electricity demands in South Africa and specifically in the Western Cape.
- The PV site is located outside of the urban areas within an existing renewable energy facility and should not impact on future urban expansion, based on the SDF.
- In terms of the draft Karoo Regional Spatial Development Framework (RSDF), the region is a focus area for sustainable energy planning and solar energy areas are included in Western Cape planning.

13.11 Existing Structures and Infrastructure

The property (Lot 1862 Olifants River Settlement) is owned by the Applicant (Eskom SOC Ltd.) and is currently in use as a Wind Energy Facility as operated by Eskom. The property is dissected by an unpaved District Road that connects to the R363. The existing infrastructure on the property include (**Figures 38** and **39**):

- Existing Wind Farm Facilities, including operation and maintenance (O&M) buildings and yard, Skaapvlei substation, wind turbines, subterranean electrical cables, and powerline that evacuates electricity from the substation.
- Access roads (unpaved).
- Farm buildings on the far eastern boundary.

Future developments for which Environmental Authorisation have been obtained, include the Battery Energy Storage Supply (BESS) facility to be constructed alongside the existing substation.

Figure 38: Existing Wind Farm O&M Buildings and Skaapvlei Substation (left); Wind Turbines and access roads (right)

Figure 39: Farm buildings near the far east boundary

13.12 Transportation

The transportation network in the Project area is shown in **Figure 40** below. A railway runs along the R363 to the east of the Project area. The N17 lies further inland to the east. A District Road just north of Koekenaap traverses westward and intersects the Wind Farm property toward the mining operations in the west along the coast. The Wind Farm entrance and main access road is located on the District Road. The Proposed PV site alternatives' access roads join to the existing Wind Farm access road.

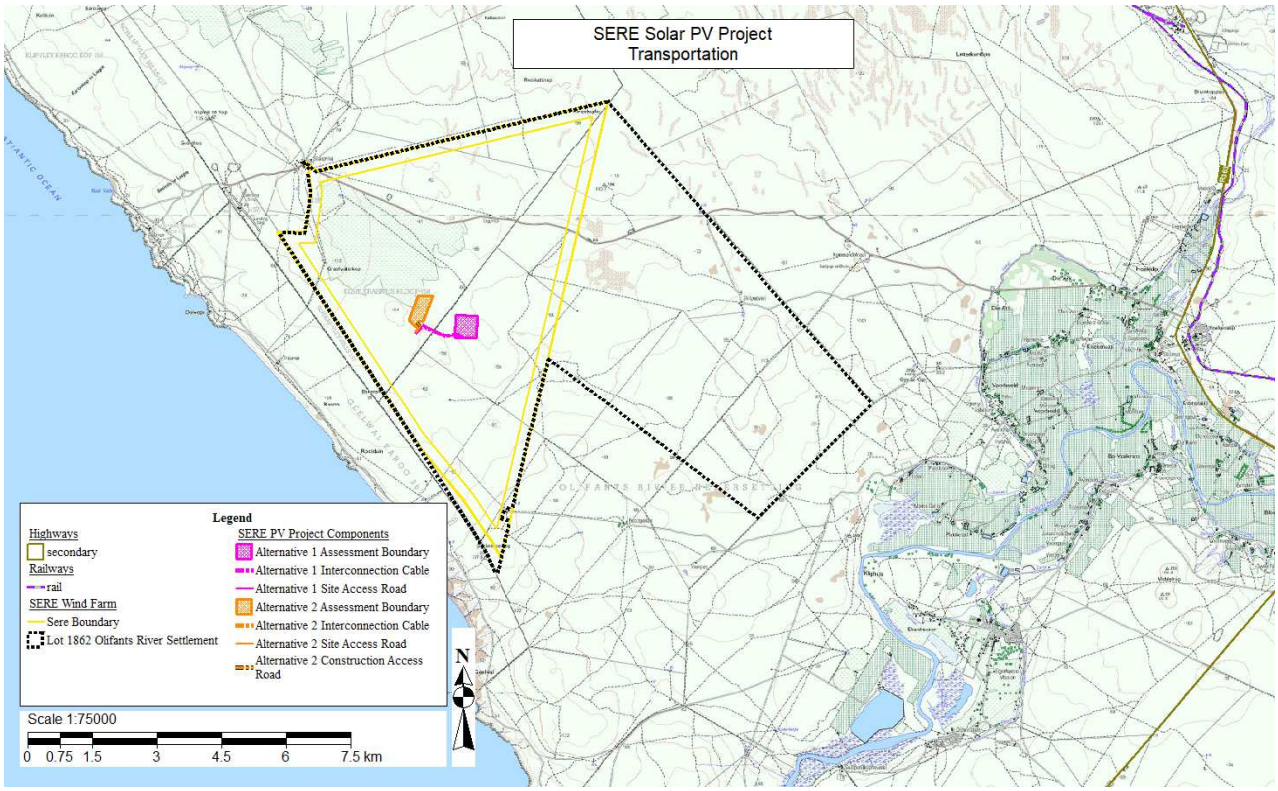


Figure 40: Transportation network in Project area

13.13 Air quality

Potential sources of air pollution in the region are generally limited given the rural nature and sparce population density, but include the following:

- Fugitive dust emissions from mining activities;
- Exhaust emissions from vehicles traveling on unpaved roads;
- Biomass burning (veld fires);
- Domestic fuel burning;
- Mining operations; and
- Other fugitive dust sources such as wind erosion from exposed areas.

13.14 Noise

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

Noise in the greater area emanates primarily from mining operations, vehicles on the surrounding road network, and noise generated by the operation of the Wind Farm.

13.15 Heritage

Findings from the Heritage Impact Assessment undertaken by Archaeology Contracts Office, Department of Archaeology, University of Cape Town compiled by Tim Hart (ACO, 2007) for the SERE Wind Facility EIA, are presented below. Refer to **Section 14.8** below for a further discussion on the overall Heritage Impact Assessment. A copy of the report can be found under **Appendix D6**.

13.15.1 Receiving Environment

The land in question (the SERE Wind Farm property) is entirely undeveloped and somewhat remote. The built environment is limited to a gravel provincial road, casual off-road tracks and the Skaapvlei Farm/Mining houses immediately to the north of the study area. On Skaapvlei previous attempts have been made to farm wheat. Currently wheat farming has been abandoned and the land is largely overgrown at present. In the immediate coastal zone to the west, concession diamond mining has significantly damaged an otherwise scenic coastline (characterised by cliffs, beaches and sheltered bays).

Within the study area, the landscape is characterised by low vegetated dunes, occasional deflation bays and fossil *Termiteria* mounds (*Heuweltjies*). The vegetation is low and scrubby – there are no significant trees. Rocky outcrops are limited to a number of low ferricrete rafts which are mostly confined to the eastern side (inland) of the study area. The landscape is sandy throughout, however there is evidence of dried out wetlands and pans (many evidently highly saline) in some areas. Two waterholes (which in the recent past contained potable water) were identified.

13.15.2 Cultural landscape, built environment and historical sites

The Colonial period heritage is extremely scarce in the study area and vicinity. Besides the newly build SERE Wind Farm Facility, there are no built structures close to, or within the study area apart from the provincial road, off-road tracks, stock drinking troughs, grazing camps and wind pump reservoirs. The nearest built settlement is the Skaapvlei farm (to the north of the site) and the mining camp a number of kilometres to the south of the site. Neither of these places can be considered to be significant heritage resources, although buildings and family graves at Skaapvlei located outside of the study area may be more than 60 years old. Most of the Skaapvlei structures show evidence of ad hoc modernisation and are not worthy of high conservation status. The buildings have little aesthetic or historical value so the nearby presence of the wind energy facility will not compromise their cultural landscape qualities.

13.15.3 Pre-colonial archaeology

Previous research has revealed that the bulk of archaeological sites (mainly Late Stone Age middens) lie within half a kilometre of the coast. Their frequency drops off rapidly with distance away from the coast. This spatial patterning reflects that people (typically in an arid environment) tended to focus their settlements, which were mostly of short seasonal duration, close to resource rich areas. Inland of the coast above the coastal escarpment archaeological sites are quite scarce being limited to ephemeral scatters situated in occasional deflation hollows.

Within the study area, the general patterning of pre-colonial occupation is very much in keeping with what would be expected in an arid area. Some 65 observations of archaeological material were recorded during the course of the study. Many of these are ephemeral scatters. The inland areas of the landscape are almost devoid of surface archaeological material, however ephemeral occurrences of mostly MSA material were noted associated with low ferricrete rafts, particularly in the central eastern part of the area. Almost every blowout/deflation that was inspected showed evidence of pre-colonial Late Stone Age occupation. These sites are generally ephemeral typically consisting of no more than 20-60 fragments of flaked quartz or silcrete with very little shell or bone. It should be noted that none of the 65 observations made during the extensive field survey were located within either Solar PV Project sites. The nearest identified sites to the Project are shown in **Figure 41**.

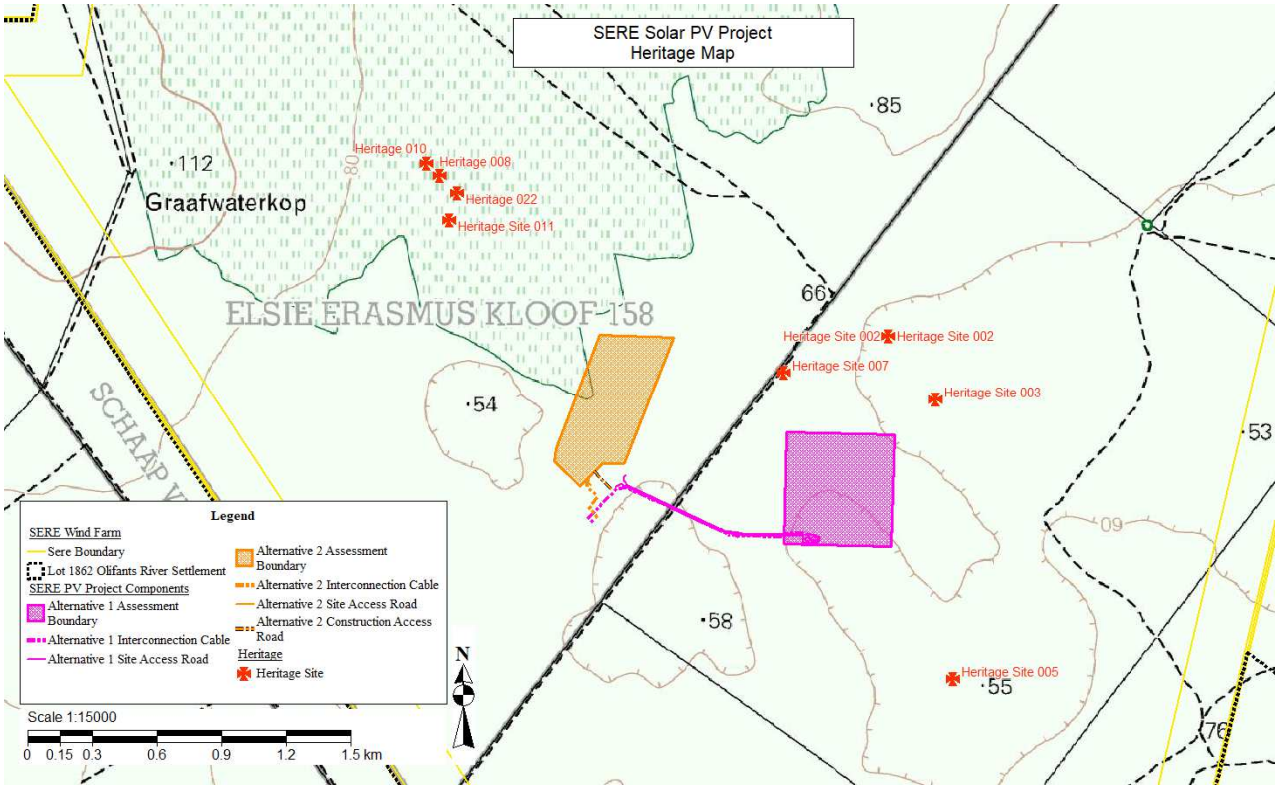


Figure 41: The identified archaeological sites located nearest to the proposed Project alternatives.

Late Stone Age sites were identified to the northwest of the SERE PV Project areas, associated with the presence of two dried springs that were once waterholes with potable water. Each one of these had attracted a concentration of small shell middens. The contents of the sites are varied – many are ephemeral limpet dominated shell scatters. Stone artefacts are present on all sites associated with the waterholes. The raw materials used are wide ranging – notably quartz, crystal quartz, very high quality silcrete, hornfels, quartzite as well as cryptocrystalline silicates. Fragments of animal bone have been noted on the denser sites. The assemblages tend to be informal despite the high grades of raw material available. Ceramics are present on many of the waterhole associated sites indicating that part of the occupation span took place within the last 2 000 years. The value of the waterhole related sites is that they represent two complete systems of occupation which are of scientific value in terms of their potential to provide information about the cultural affinities of the people who lived there, and the time depth of their occupancy of the area.

Older archaeological material dating from the Middle and Early Stone Ages has been found in areas where sand mining or overburden excavation/removal has resulted in the exposure of previous land surfaces. However due to the large amounts of aeolian sands that cover the study area none of this material is visible. Ephemeral occurrences of Middle Stone Age artefacts were noted within the Wind Farm study area associated with low outcrops of ferricrete, however none of these are considered significant.
None of these sites were identified within the PV Project footprints proposed.

13.16 Palaeontology

Findings from the desktop Palaeontological Impact Assessment undertaken by Banzai Environmental (2022), are presented below. Refer to **Appendix D3** for a copy of the report and **Section 14.9** below for a further discussion on this study.

The proposed Sere PV Plant is underlain by the Cenozoic deposits of the West Coast Group that mantles the bedrock of the Gariep Supergroup. The West Coast Group is in depth underlain by various bedrock types that is not of palaeontological interest. North of the proposed development superficial sediments is underlain by basement gneisses of the Namaqua Metamorphic Province that are older than 1000 million years. These basement rocks include the Gifberg Metasediments, Table Mountain Group sandstones as well as intrusions comprising of dykes, pipes, and plutons.
The West Coast Group comprises of Cenozoic coastal deposits located between the Orange River and Elandsbaai (Roberts et al., 2006). The early coastal plane was flooded by the sea during the late Cretaceous. Nowadays the marine record of the palaeo-shorelines are uplifted to 150 to 2000asl. These older portions of the coastal plain are kaolinized (white china clay) and deeply

weathered and mantled by silcrete in places. The latter developed in poorly drained low areas in tropical, stages of humid weathering during the latest Cretaceous and earlier Cenozoic. The deep weathering and formation of silcrete formed from tropical weathering in humid times during the latest Cretaceous or earlier Cenozoic.

Ancient river channels (representing wetter climates during the early Cenozoic) are buried between the major Namaqualand rivers. During the early Cenozoic more rivers drained the coastal plane. These channels infill have also been kaolinized while silcrete formed in places within the upper channels (the so-called Channel-clays) now known as the Koingnaas Formation (De Beer, 2010). The outcrops around the development are formed by the sands and white, kaolinitic quartz gravels of the Koingnaas Formation. These exposures are the best-preserved natural exposures of the Koingnaas Formation in Namaqualand. This Formation is mantled by younger deposits.

Plant fossils occur in carbonaceous beds of peaty material, while fossilized wood of the tropical African mahogany has been found. Silicified, fossil wood has been uncovered in the gravels of the Olifants Rivier (near Vredendal) and was presumably reworked from the Koingnaas Formation. Fossil pollen represents numerous trees (including yellowwood forests, conifers, and ironwoods).

The aeolian coversands of the Namaqualand coastal plain comprises of extensive marine formations containing warm-water mollusc assemblages. Currently these formations are formally divided in the Alexander Bay Formation comprising of the Kleinzee, Avontuur and Hondeklipbaai Members. But each of these marine formations occupy a detailed spatial position in the stratigraphic geometry, is characterized by different faunas of different ages and are worthy of full formation status (Pether, 2018). The Quaternary Curlew Strand Formation is close to the coast and includes three “raised beaches” comprising of modern cold-water fauna. The Alexander Bay Formation is thus endorsed to Subgroup and includes all four marine formations (Pether, 2018).

The SERE Solar PV development footprint is located on the outer margin of the coastal plain and the formations that could be impacted are the marine and younger aeolian formations. Extensive research has been conducted on deposits of the West Coast Group and includes papers by Carrington & Kensley, 1969; Kensley & Pether, 1986, De Beer et al. (2002), Elferink (2005).

13.16.1 Formation (90m Package)

The Kleinzee Formation (Mid-Miocene Climatic Optimum) is the oldest marine formation located on the inner high part of the coastal bevel/cliff extending seawards from about 90m asl (above sea level) or commonly known as the 90m Package. This Formation was deposited about 17 to 15 Ma ago when the high sea level of the warm Mid-Miocene Climatic Optimum dropped. Miocene marine beds weathered when the sea-level rose during the Early Pliocene Warm Period. A hominoid tooth

as well as petrified teeth of extinct pigs were described from the basal gravels of this Formation (18 - 17.5 Ma) (Pickford & Senut, 1997). These fossils were reworked from earlier terrestrial deposits. The Kleinzee Formation has a rare shelly fauna that is poorly preserved and relatively unstudied. The zone fossil for this formation is the thick-shelled bivalve Isognomon gariesensis

13.16.2 Avontuur Formation (50m Package)

The Avontuur Formation (50m Package) represents the Early Pliocene Warm Period and was deposited as the sea-level retreated from the transgression high of almost 50m asl and the shoreline advanced seawards (about 5-4 Mya). The Avontuur Formation was also eroded by a rising in sea-level about ~3 Mya during the Mid-Pliocene Warm Period. Fossils of the Avontuur Formation is generally decalcified, fairly well preserved and thus fairly well sampled (Carrington & Kensley, 1969; Kensley & Pether, 1986). The zone fossil is the extinct Donax haughtoni “surf clam”. This Formation also contains petrified wood as well as reworked vertebrate remains from older periods. The latter includes the teeth and bones of extinct proboscideans, bovids and equids, rhinocerotids, shark teeth, as well as whales. The bear-dog Agnotherium sp. (13 - 12 Ma) and gomphothere Tetralophodon (12 - 9 Ma), represents the oldest fossils in the basal assemblage but the general age of fossils in this formation is late Miocene (7.5 - 5 Ma). Important finds in this formation include the suid (bushpig) Nyanzachoerus kanamensis and phocid (seal) Homiphoca capensis. These fossils are contemporaneous with the Pliocene Varswater Formation uncovered at the West Coast Fossil Park near Saldanha.

13.16.3 Hondeklipbaai Formation (30 m Package)

The 30 m Package (Hondeklipbaai Formation) represents the Mid-Pliocene Warm Period and accumulated as the sea-level dropped from a high of about 30-33 m asl while the marine formation extended seawards (Pether, 1994; Pether, in Roberts et al., 2006). This Formation could extend up to a few km in width. The marine formations of the Miocene and Pliocene contain fossil shells of warm water species as well as extinct shell species that characterise the Formation. This formation is the last major formation of the coastal plane and was deposited during a very high sea level that has never since been surpassed. Molluscs lived and thrived in the warm waters, and it is difficult to postdate the commencement of the major cooling of the Benguela System. Core samples taken from Lüderitz indicates that the diatom microfossil assemblages extend from 4.5 Ma. The water temperatures declined from about 3Ma ago with a previous high of about 26° during the late Pliocene (Marlow et al., 2000).

This 30m Package is probably older than 3 Ma and corresponds to the “Mid-Pliocene Warm Period” where the Pliocene sea-level was high (about 3.0 to 3.4 Ma). This Formation consists of coarse-sand and is extensively decalcified and reddened. At present fossils shell of this formation is rare

and the collection needs to be expanded. Early fossil collection was conducted by Haughton (1926, 1928, 1932) and are kept in the IZIKO Collections . As in most cases the collection date was neglected and most of these specimens lack precise locations. Fossil collection in this Formation was bias towards robust shells . The zone fossil is the large extinct “surf clam” Donax Rogers’.

13.16.4 Curlew Strand Formation

The Curlew Strand Formation consists of the amalgamation of old beaches comparable to the Velddrif Formation of the SW Cape Coast. This Formation consist of an 8 - 12 m Package that is about 400 ka years old (ka = thousand years ago), the 4 - 6 m Package of the Last Interglacial (~125 ka) and the 2 - 3 m Package (6-4 ka, mid-Holocene High).

Fossils of this formation are mostly resent cold-water fauna. Extended erosion of the older marine deposits has taken place, mostly by wind deflation decalcification, pedogenic reddening and the formation of pedocretes beneath palaeosurfaces. The eroded marine sequences are overlain by various terrestrial deposits. These deposits are mostly extensive aeolian dune and sandsheet deposits. Pether (2018) conducted the PIA for the Tormin mine extension just west of the proposed development. He recognized aeolian formations of later Miocene, mid-Pliocene, late Pliocene, and several Quaternary ages.

Quaternary raised beaches is present more north of the development where bedrock with low gradients occurs inland. Fossils in the Quaternary Curlew Strand Formation is rare but may comprise of marine animals and sea birds. These specimens may be closely related to modern marine species, but unexpected, rare fossils may occur and would be of scientific value.

13.16.5 Older Aeolianite Formations

The Terrestrial record
Various terrestrial deposits are also present in the coastal plain of Namaqualand. These deposits are mostly aeolian dune and sandsheet deposits that overlie the weathered tops of the marine formations. Locally these deposits may be ephemeral stream channel and colluvial (sheetwash) deposits linked with hillslopes and are sometimes interbedded with aeolian deposits. In the upper parts of the terrestrial and marine sequences a variety of palaeosols and pedocretes is present with different compositions and degrees of development. These sediment have not yet been stratigraphically formalized, and formations are only generally defined.

The Aeolianite formations is inadequately studied and comprise of the following formations.
The Graauw Duinen Formation is aeolianites of Pliocene age. This Formation is a thick aeolianite accumulation in the south of the West Coast. Fossilized eggshells of the extinct Pliocene giant

ostrich, Struthio daberasensis (Roberts, in Roberts et al., 2006), skeletal remains of the bovid Numidocapra crassicornis, and teeth of the extinct sabre-toothed felid, Dinofelis barlow. have been recorded. The Dorbank Formation varies in thickness and is a large, compact red-brown unit.

13.16.6 Younger Aeolianite Formations

The younger aeolianite formations are pale-hued in colour and comprise of relatively-soft aeolianite units. The coastal units of this formations comprise of the following

- Koekenaap Formation overlies the Dorbank Formation, compact but unconsolidated red sands, widely distributed in Namaqualand (Roberts et al., 2006; De Beer, 2010). These sands occupy large areas of the Namaqualand coastal plain
- The Hardevlei Formation occurs mostly inland and comprise of pale-yellow dunes with a complex, reticulate morphology
- Swartlintjies and Swartduine Formations are large, semi-stabilized, pale plumes of, parabolic dune
- Ridges. The latter expands from the beaches north of the major rivers (Roberts et al., 2006; De Beer, 2010). The Swartduine Formation is present in interdune areas between the Swartlintjies Formation and comprise of grey sandsheet as well as small dunes with smooth vegetation.
- The Witzand Formation comprise of sand and shell fragments. Originated in the Holocene and has blown from sandy beaches. This formation is located northward from the Sandveld Group of the southwestern Cape.

13.16.7 Fossils from the Aeolian Formations

Fossils in the aeolian sands are extremely rare and usually found in sand dunes. These fossils include tortoise shells, mole bones as well as land snails. Rarer fossils consist of small mammal and bird bones. Fossils are more abundantly found in palaeosurfaces and their soils that formed when dunes stabilized. Larger fossil bones are more commonly found along palaeosurfaces overlying marine deposits as well as palaeosurfaces between main aeolianite units. Dune slopes along the coast usually contain more fossils as it is utilized for foraging and scavenging. Jackals and hyaenas carry they prey to sand slopes and bones are collected around hyaena dens. These dens are often found on sea-facing aeolianite slopes. Fossils are noticed when bones is exposed to the surface and are falling downslope. These rare fossils find are important as they are important in biostratigraphic, palaeobiological and palaeoclimatic research.

13.16.8 Summary of the findings

Two Layout alternatives for the proposed Sere Photovoltaic Plant have been proposed. All alternatives are underlain by the West Coast Group. The geology of the proposed site alternatives is the same and thus no preferences on the grounds of palaeontological fossil heritage, for any specific alternative layout under consideration was identified. The PalaeoMap on the South African Heritage Resources Information System (SAHRIS) database indicates that the Palaeontological Sensitivity of the West Coast Group is Very High (Almond and Pether 2008, SAHRIS website) (**Figure 42**). However, the geotechnical report conducted for the Sere Wind Energy Farm (BKS Palace Consortium, 2010) found that bedrock occurs between 14 m and at a depth greater than 102m. The depth of the sand in the development area was found up to 20 m, while the approximate excavation depths for the Sere PV project are 1.5m. It is thus anticipated that excavations will not extend into the underlying bedrock of the PV project and that the Palaeontological Significance of the proposed development will thus be LOW.

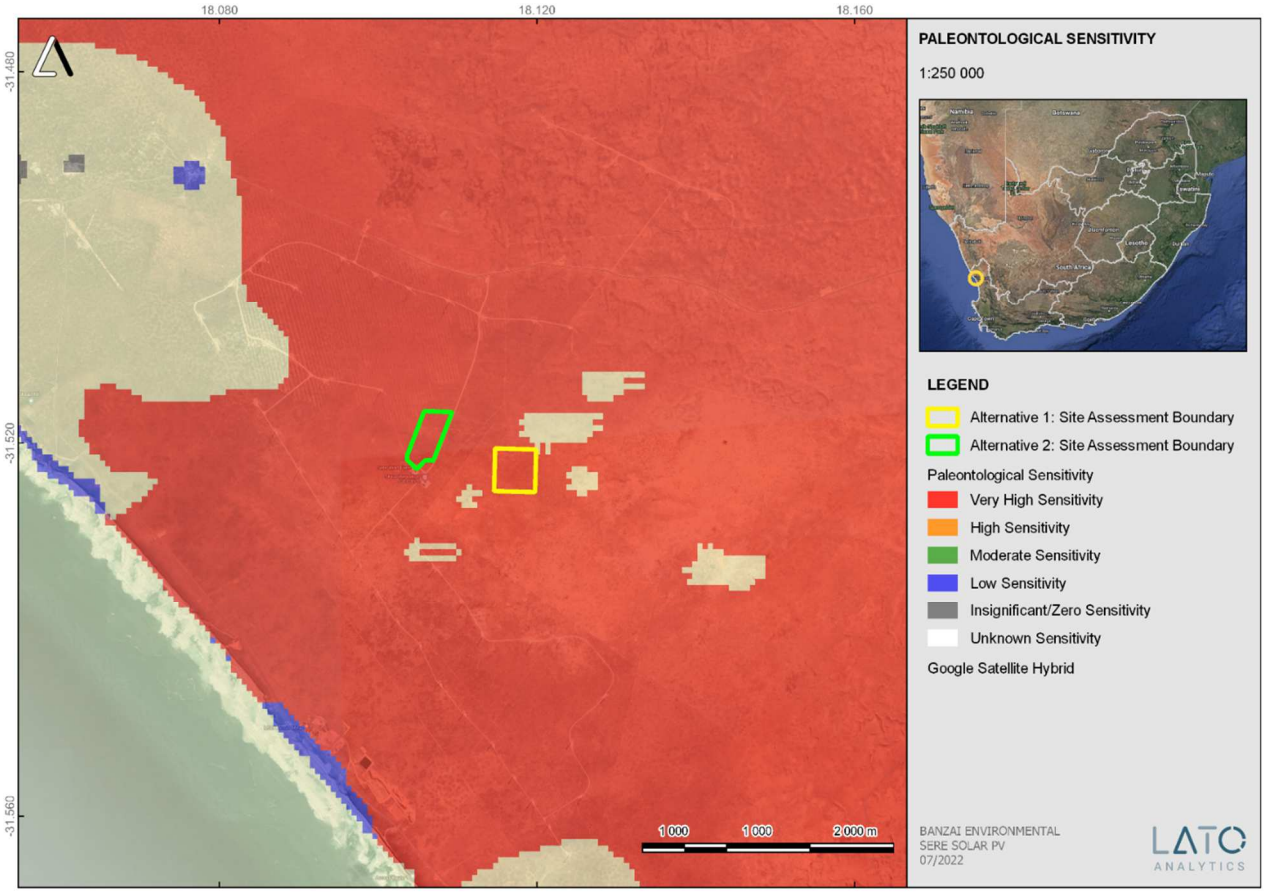


Figure 42: Extract of the 1:250 000 SAHRIS PalaeoMap map (Council of Geosciences) indicating the proposed development.

13.17 Aesthetic Qualities

The information to follow was obtained from the Visual Impact Assessment (Eco Elementum, 2022) (contained in **Appendix D4**). Refer to **Sections 14.10** and **15.18** for a synopsis of the study and a related impact assessment, respectively.

From a desktop study of satellite imagery various sensitive receptors in the form of human habitation areas, consisting of the town of Koekenaap to the east of the proposed Sere PV project area can be seen in **Figure 43**. The closest receptor was the SERE Wind Farm, with the majority of the receptors consisting of farm residences along the Olifants River.

The proposed operation area is situated in flat terrain with no major topographical features found in the immediate vicinity. The sense of place is created by the arid landscape together with the existing wind turbines in the area.

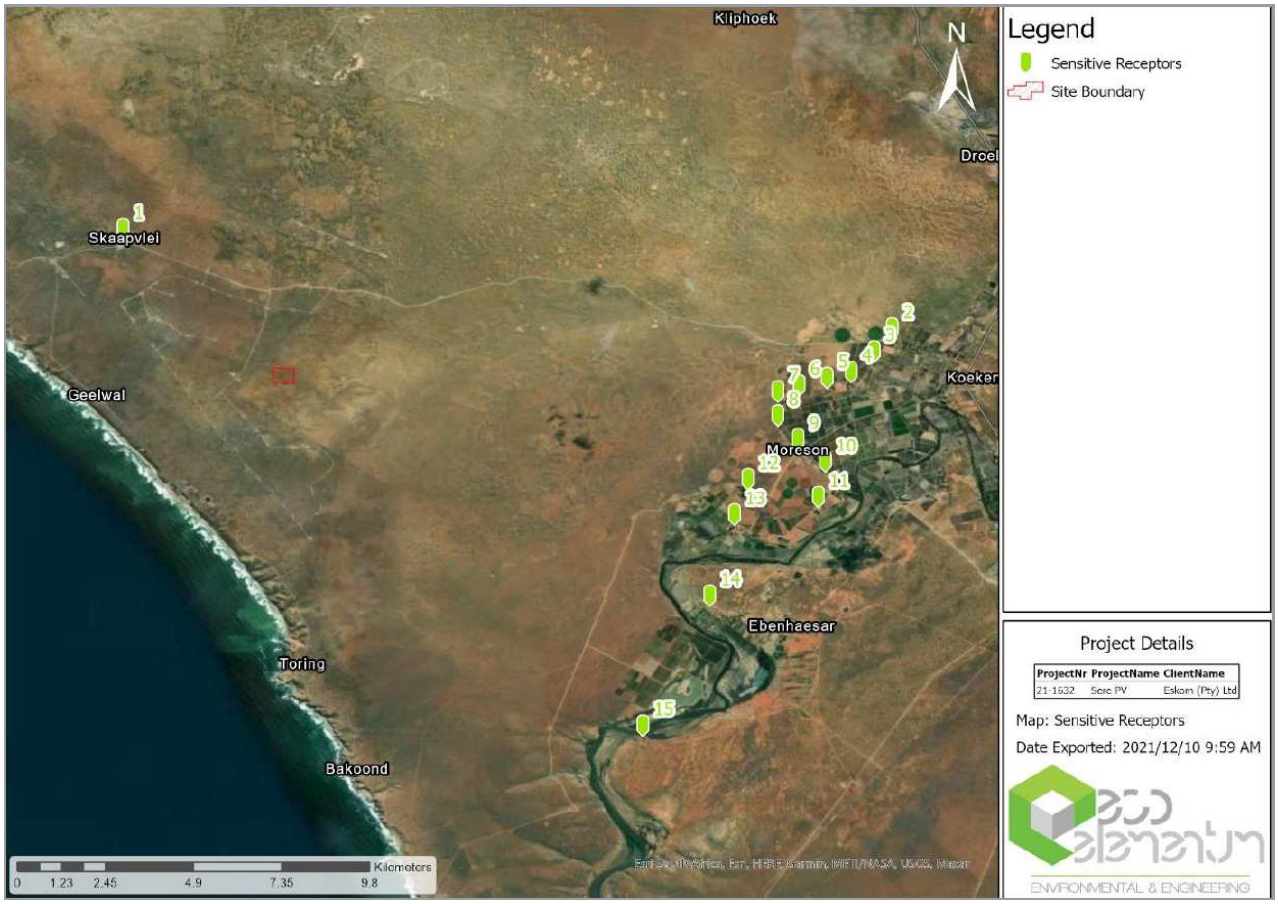


Figure 43: Population areas within close proximity of the proposed SERE PV Project (Eco Elementum, 2022)

The photographs provided in **Figures 44 – 47** below were taken from the proposed PV site in the compass points and depicts the views outwards from the property.

Figure 44: View west from PV site

Figure 45: View north from PV site

Figure 46: View east from PV site

Figure 47: View south from PV site

13.18 Agriculture

The information to follow was obtained from the Soil and Agricultural Study (ARC, 2008) undertaken as part of the SERE Wind Farm EIA (the Study is contained in **Appendix D5** along with a letter from the Specialist). Refer to **Section 15.14** for an impact assessment (which was undertaken based on the results of the Study).

The site lies inland of the coastal ridge at a height of 60-110 metres above sea level and consists of virtually flat to slightly undulating topography, with slopes of less than 4%. The climate can be regarded as typical of the Cape west coast, with an extremely low, all-year round rainfall distribution, warm to hot summers and cool winters. The site has aeolian sandy material overlying granite and gneiss of the Namaqualand Metamorphic Complex.

Based on the information provided in the Study, the dominant soils expected at the site fall under land type Ae373 (red, high base status soils, usually deep) include Hutton 31, Hutton 30/40/41, and Oakleaf 11/21/10, described as Red, sandy, structureless soils on rock or calcrete.

The soils were considered to have a low agricultural potential, due to a combination of:

- excessive drainage due to the sandy texture;
- low fertility associated with the low clay content; and
- a susceptibility to wind erosion if exposed, caused by the fine to medium grade of sand. This may be especially prevalent in dune areas.

In addition, the low rainfall in the area means that there is little potential for arable agriculture in the area and that the soils are suited for extensive grazing at best. The grazing capacity of the area is low, namely around 30 ha for a large stock unit (cattle) and around 10 ha per small stock unit (sheep/goats).

14 SUMMARY OF SPECIALIST STUDIES

14.1 Specialist Studies undertaken as part of the Basic Assessment

According to Münster (2005), a 'trigger' for a specialist study 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 specialist studies triggered by the nature of the proposed development and its receiving environment include the following:

1. Terrestrial Ecological Assessment;
2. Avifaunal Assessment;
3. Heritage Impact Assessment;
4. Desktop Palaeontological Impact Assessment;
5. Soil and Agricultural Study;
6. Visual Impact Assessment;

Where relevant, the abovementioned studies took into consideration and built on the specialist studies that were undertaken in 2008 as part of the previous EIA for the SERE Wind Farm development.

The Heritage Impact Assessment and Soil and Agricultural Study undertaken in 2008 were used in this Basic Assessment Report as discussed with DFFE during the pre-application meeting. In line with the DFFE requirements written consent was received from the report authors that the reports and their findings were still considered valid (see **Appendix D7**).

Furthermore, a Geotechnical Study was undertaken for the Wind Farm in 2010, as supplied by Eskom for use in the current application. A copy of the study is available in **Appendix E**).

14.2 Excluded Specialist Studies identified during Environmental Screening

As mentioned in **Section 9.4** above, a report was compiled by means of the National Web Based Environmental Screening Tool, which is appended to the Application Form (contained in **Appendix B**). To note is that a report was generated for each alternative separately given the constraints of the Tool in assessing multiple boundaries in one report. **Table 16** below lists the specialist studies that were identified in the Screening Reports, but which were not deemed to be necessary.

Table 16: Specialist studies identified in the Screening Reports that were not undertaken

Specialist Study identified in Screening Report	Reason for not undertaking the Specialist Study
Aquatic Biodiversity Impact Assessment	The map that was created by the Environmental Screening Tool showed the aquatic biodiversity theme to have low sensitivity in the Project area. Desktop data showed no aquatic features within the sites or within 500m of the two site alternatives.
Civil Aviation Assessment	The map that was created by the Environmental Screening Tool showed the civil aviation theme to have low sensitivity in the Project area.
Defence Assessment	The map that was created by the Environmental Screening Tool showed the defence theme to have low sensitivity in the Project area.
RFI (Radio Frequency Interference) Assessment	The map that was created by the Environmental Screening Tool showed the RFI theme to have medium sensitivity in the Project area. The study was not undertaken given the remoteness of the proposed site and its location within an existing Wind Farm facility. Furthermore, research (e.g. United States Federal Aviation Admiration) suggests that RFI from PV installations is low risk. PV systems equipment such as step-up transformers and electrical cables are not sources of electromagnetic interference because of their low frequency of operation and PV panels themselves do not emit EMI. The only component of a PV array that may be capable of emitting EMI is the inverter. Inverters, however, produce extremely low frequency EMI similar to electrical appliances and at a distance of 150 feet from the inverters the EM field is at or below background levels. Standard engineering mitigations will be implemented to address RFI at the PV site, as necessary.
Socio-economic Assessment	Given the remote location of the proposed Project, which is also located within an existing operational renewable energy generation facility, the completion of a socio-economic assessment was not deemed necessary in order to qualify the expected impacts.

14.3 Incorporating the Findings from Specialist Studies into the Basic Assessment

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

- Ensuring that the specialists have adequately addressed 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 environments has been accurately reflected and considered.

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

- The assumptions and limitations identified in each study were included in **Section 10** above;
- The information was used to complete the description of the receiving environment (**Section 13** above) in a more detailed and site-specific manner;
- A summary of each specialist study is contained in the sub-sections to follow (**Sections 14.4 – 14.14** below), focusing on the approach to each study, key findings and conclusions drawn;
- The specialists' impacts assessment, and the identified mitigation measures, were included in the overall project impact assessment contained in **Section 15** below;
- Where relevant, the evaluations performed by the specialists on the alternatives of the Project components were included in **Section 16** 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 final conclusions (**Section 18** below).

Refer to **Appendix D7** for declarations from the respective specialists.

14.4 Terrestrial Ecology Assessment

A summary of the Terrestrial Ecology Assessment (contained in **Appendix E1**) follows.

14.4.1 Details of the Specialist

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

Organisation:	The Biodiversity Company		
Name:	Andrew Husted	Rudolph Greffrath	Martinus Erasmus
Qualifications:	MSc Aquatic Health	B-tech Degree in Nature Conservation	B-tech Degree in Nature Conservation
Affiliation (if applicable):	South African Council for Natural Scientific Professions (SACNASP) Pr Sci Nat registered (400213/11)	South African Council for Natural Scientific Professions (SACNASP) Pr Sci Nat registered (400018/17)	South African Council for Natural Scientific Professions (SACNASP) Cand. Sci Nat registered (118630)

14.4.2 Objectives of the Study

The objectives of this study included the following:

- Description of the baseline receiving environment specific to the field of expertise (general surrounding area as well as site specific environment);
- Desktop assessment to identify the relevant ecologically important geographical features within the project areas;
- Desktop assessment to compile an expected species list and possible threatened flora and fauna species that occur within the project areas;
- Field survey to ascertain the species composition of the present flora and fauna community within the project areas;
- Delineate and map the habitats and their respective sensitivities that occur within the project areas;
- Identify the manner that the proposed project impacts the flora and fauna community and evaluate the level of risk of these potential impacts; and
- The prescription of mitigation measures and recommendations for identified risks.

14.4.3 Methodology

The assessment included the following tasks (amongst others):

- Existing data layers were incorporated into GIS software to establish how the proposed Project might interact with any ecologically important features;
- A botanical assessment was undertaken, which encompassed an assessment of all the vegetation units and habitat types within the Project area. This focused on an ecological assessment of habitat types as well as identification of any Red Data species within known distribution of the Project area;
- A faunal assessment was undertaken, which included the following:
  - Compilation of expected species lists;
  - Identification of any Red Data or SCC potentially occurring in the area; and
  - Emphasis was placed on the probability of occurrence of species of provincial, national and international conservation importance.
    - The field survey component of the assessment utilised a variety of sampling techniques including, but not limited to, visual observations, identification of tracks and signs and utilization of local knowledge.
    - Site selection for trapping focussed on the representative habitats within the Project area.
- Herpetofauna (reptiles and amphibians) –
    - A herpetofauna desktop assessment of the possible species in the area was undertaken and attention was paid to the SCCs.

- A herpetofauna field assessment was conducted in each habitat or vegetation type within the project area, as identified from the desktop assessment, with a focus on those areas which will be most impacted by the proposed development.

❑ Terrestrial 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 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, vegetation/fauna community or habitat type present on the site) and Receptor Resilience (RR) (its resilience to impacts).

The surveys were conducted in December 2021 and April 2022.

14.4.4 Key Findings of the Study

A description of the terrestrial ecological features in the Project area is contained in **Section 13.8** above. Key findings from the study follow.

14.4.4.1 Vegetation Assessment

Indigenous Flora

For Alternative 1 (Site 1), the species composition of the assessment area was consistent with typical Namaqualand Sand Fynbos and Namaqualand Inland Duneveld vegetation types. Distinctive vegetation communities were observed within these vegetation types and can be classified into Sand Shrubland which contained rocky outcrops. The plant species recorded is by no means comprehensive, and repeated surveys during different phenological periods were not covered, additional surveys may likely yield up to 40% additional flora species for the project area. However, floristic analysis conducted to date is however regarded as a sound representation of the local flora for the project area.

The sand shrubland habitat occurred throughout most of the project area and consisted of short and tall shrubland with succulent and non-succulent plants. Rocky outcrops occurred sporadically throughout the habitat. This habitat generally consisted of species such as *Boophone haemanthoides, Brunsvigia orientalis, Wiborgia obcordata, Gymnosporia buxifolia, Leucadendron brunioides, Salvia lanceolata, Ruschia caroli, R. extensa, R. subpaniculata, Tetragonia fruticosa, Zygophyllum morgsana, Limonium sp, Willdenowia*

incurvata, Ehrharta sp, Gethyllis sp, Babiana sp, Mesembryanthemum guerichianum and *Euphorbia stapelioides* (see **Figure 48** below).

Succulents were ubiquitous throughout the assessment area and occurred within the community described above. Geophytes were particularly lacking due to the timing of the survey however are expected to occur. However, the most species will not be feasible to geotag due to the extent of the number. Moreover, further surveys are likely to reveal additional protected species, especially when undertaken during different seasons and climatic conditions. It can be assumed that the species recorded by Helme, in 2007 and Nemai, 2019 occurred throughout.

It is important to note that many of these growth forms, and their non-succulent relatives, are protected under the Western Cape Legislation.

Figure 48: Photographs illustrating some of the flora recorded within the assessment area. A) *Boophone haemanthoides* (protected), B) *Gethyllis sp*, C) *Limonium sp* and D) *Brunsvigia orientalis* (protected) (TBC, 2022a)

For Alternative 2 (Site 2), the species composition of the assessment area was consistent with typical Namaqualand Sand Fynbos vegetation type. Distinctive vegetation communities were observed within these vegetation types and can be classified into Sand Shrubland which contained rocky outcrops. The plant species recorded is by no means comprehensive, and repeated surveys during different phenological periods were not covered, additional surveys may likely yield up to 20% additional flora species for the project area. However, floristic analysis conducted to date is however regarded as a sound representation of the local flora for the project area.

The sand shrubland habitat occurred throughout most of the project area and consisted of short and tall shrubland with succulent and non-succulent plants. Rocky outcrops occurred sporadically throughout the habitat. This habitat generally consisted of species such as *Boophone haemanthoides, Brunsvigia orientalis, Wiborgia obcordata, Gymnosporia buxifolia, Leucadendron brunioides, Salvia lanceolata, Ruschia caroli, R. extensa, R. subpaniculata, Tetragonia fruticosa, Zygophyllum morgsana, Limonium sp, Willdenowia incurvata, Ehrharta sp, Gethyllis sp, Babiana sp, Mesembryanthemum guerichianum* and *Euphorbia stapelioides* (see **Figure 49** below).

Succulents were ubiquitous throughout the assessment area and occurred within the community described above. Geophytes were particularly lacking due to the timing of the survey however are expected to occur. However, the most species will not be feasible to geotag due to the extent of the number. Moreover, further surveys are likely to reveal additional protected species, especially when undertaken during different seasons and climatic conditions. It can be assumed that the species recorded by Helme, in 2007 and Nemai, 2019 occurred throughout.

It is important to note that many of these growth forms, and their non-succulent relatives, are protected under the Western Cape Legislation, and a permit may be required for the destruction or relocation of these species.

Figure 49: Photographs illustrating some of the flora recorded within the assessment area. A) *Boophone haemanthoides* (protected), B) *Gethyllis sp,* C) *Limonium sp* and D) *Brunsvigia orientalis* (protected) (TBC, 2022a)

Alien and Invasive Plants

No NEMBA Invasive Alien Plant species were recorded within the Site 1 or 2 project areas.

14.4.4.2 Faunal Assessment

Herpetofauna and mammal observations and recordings fall under this section. A separate avifauna assessment was conducted

Amphibians and Reptiles

For Alternative 1 (Site 1), three (3) species of reptiles were recorded in the project area during survey period (**Table 17**) (**Figure 50**). However, there is the possibility of more species being present, as certain reptile species are secretive and require long-term surveys to ensure capture. No amphibian species were recorded during the survey period, this was largely due to the season in which the field survey was carried out as well as the fact that no pitfall trapping was done, surveys relied on opportunistic sightings as opposed to intensive and appropriate sampling methods. The only other method utilised was refuge examinations using visual scanning of terrains to record smaller herpetofauna species that often conceal themselves under rocks, in fallen logs, rotten tree stumps, in leaf litter, rodent burrows, ponds, old termite mounds, this method was also not intensively applied in the field. None of the herpetofauna species recorded are regarded as threatened, albeit 2 are protected under provincial legislation.

The use of the rocky areas by these species on the fine-scale habitats is important to consider for mitigation actions when an area is cleared for placement of the infrastructure

Table 17: Summary of herpetofauna species recorded within the project area (TBC, 2022a)

Family	Species	Common Name	Conservation Status		Western Cape Nature Conservation Laws Amendment Act, 2000*
			Regional (SANBI, 2016)	IUCN (2017)	
Testudinidae	*Chersina angulata*	Angulate Tortoise	LC	LC	Schedule 2
Lamprophiidae	*Homoroselaps lacteus*	Spotted Harlequin Snake	LC	LC	
Cordylidae	*Karusasaurus polyzonus*	Southern Karusa Lizard	LC	LC	Schedule 2

*This Act amends the Nature and Environmental Conservation Ordinance, 1974, the Western Cape Nature Conservation Board Act, 1998 in relation with matters of administration. It redefines the Department of Environmental and Cultural Affairs and Sport and provides for some matters relative to the Western Cape Nature Conservation Board Act.

Figure 50: Photographs illustrating some of the reptiles recorded within the assessment area. A) Spotted Harlequin Snake (*Homoroselaps lacteus*) B) Angulate Tortoise (*Chersina angulata*) (protected), C) Southern Karusa Lizard (*Karusasaurus polyzonus*) (protected) (TBC, 2022a)

For Alternative 2 (Site 2), three (3) species of reptiles were previously recorded in the vicinity of the project area (**Table 16**) (**Figure 51**). However, there is the possibility of more species being present, as certain reptile species are secretive and require long-term surveys to ensure capture. No amphibian species were recorded during the survey period, this was largely due to the season in which the field survey was carried out as well as the fact that no pitfall trapping was done, surveys relied on opportunistic sightings as opposed to intensive and appropriate sampling methods. The only other method utilised was refuge examinations using visual scanning of terrains to record smaller herpetofauna species that often conceal themselves under rocks, in fallen logs, rotten tree stumps, in leaf litter, rodent burrows, ponds, old termite mounds, this method was also not intensively applied in the field. None of the herpetofauna species recorded are regarded as threatened, albeit 2 are protected under provincial legislation.

The use of the rocky areas by these species on the fine-scale habitats is important to consider for mitigation actions when an area is cleared for placement of the infrastructure

Figure 51: Photograph illustrating a reptiles species recorded within the assessment area. Angulate Tortoise (*Chersina angulata*) (protected) (TBC, 2022a)

Mammals

For Alternative 1 (Site 1), three (3) mammal species were observed during the survey of the project area based on either direct observation or the presence of visual tracks and signs (**Table 18**). None of the species recorded are regarded as a SCC, one mammal species is additionally protected provincially (**Figure 52**).

Table 18: Summary of mammal species recorded within the project area (TBC, 2022a)

Species	Common Name	Conservation Status		Western Cape Nature Conservation Laws Amendment Act, 2000*
		Regional (SANBI, 2016)	IUCN (2017)	
Cryptomys hottentotus	Common Mole-rat	LC	LC	
Raphicerus campestris	Steenbok	LC	LC	Schedule 2
Hystrix africaeaustralis	Cape Porcupine	LC	LC	

Figure 52: Photographs illustrating some of the mammals recorded within the assessment area. A) Common Mole-rat (*Cryptomys hottentotus*), B and C) Cape Porcupine (*Hystrix africaeaustralis*), D) Steenbok (*Raphicerus campestris*) (protected) (TBC, 2022a)

For Alternative 2 (Site 2), two (2) mammal species were observed during this survey of the project area based on either direct observation or the presence of visual tracks and signs (**Table 19**). None of the species recorded are regarded as a SCC.

Table 19: Summary of mammal species recorded within the project area (TBC, 2022a)

Species	Common Name	Conservation Status		Western Cape Nature Conservation Laws Amendment Act, 2000*
		Regional (SANBI, 2016)	IUCN (2017)	
Cryptomys hottentotus	Common Mole-rat	LC	LC	
Hystrix africaeaustralis	Cape Porcupine	LC	LC	

14.4.4.3 Habitat Assessment

The main habitat types identified across the project areas were identical. They were initially identified largely based on aerial imagery. These main habitat types were refined based on the field coverage and data collected during the surveys; the delineated habitats can be seen in **Figure 53**. Emphasis was placed on limiting timed meander searches along the proposed project area within the natural habitats and therefore habitats with a higher potential of hosting SCC. The habitats observed, coincide with the vegetation types as described by Mucina & Rutherford in 2006 and SANBI (2019) due to the lack of large-scale transformation.

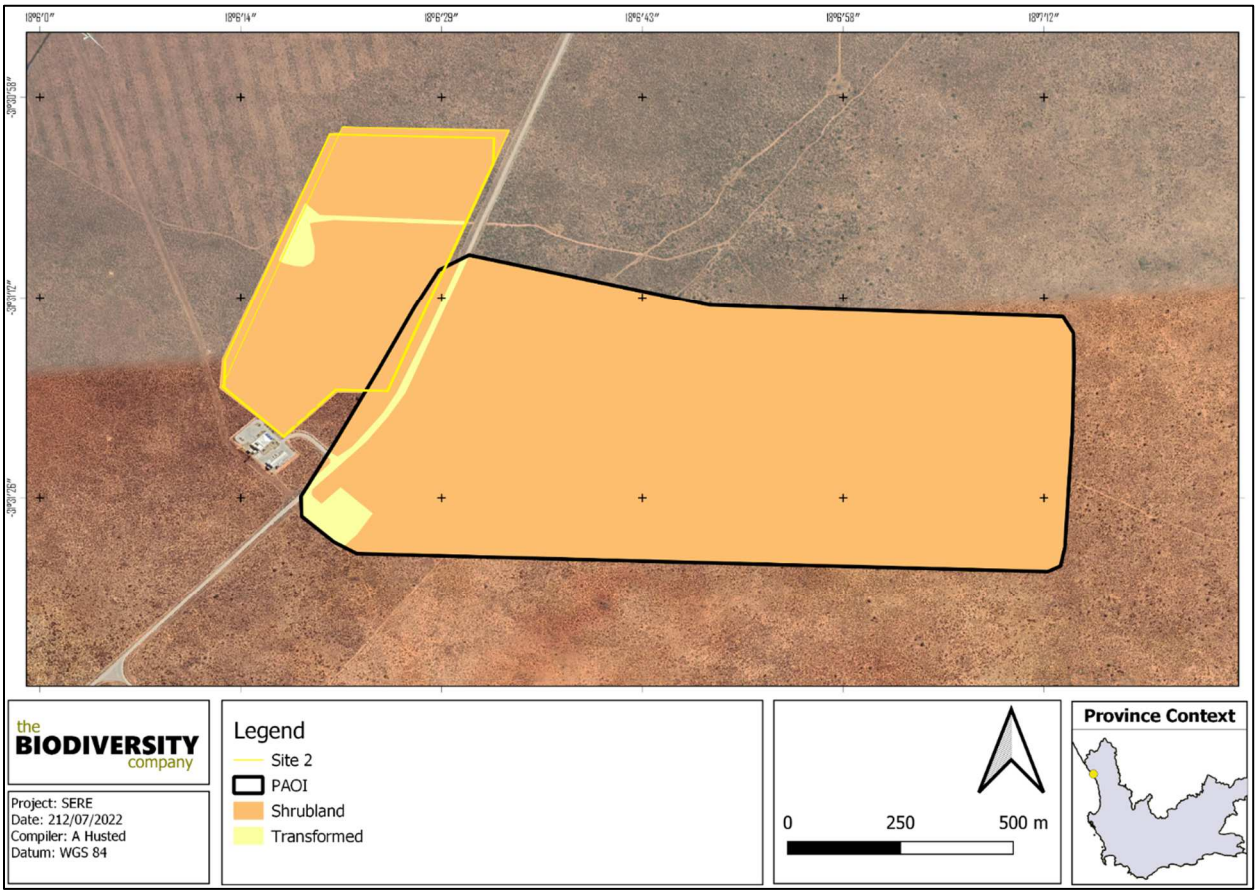


Figure 53: Habitats identified in the project areas (TBC, 2022a)

Namaqua Shrubland

Areas of Namaqualand Sand Fynbos and Namaqualand Inland Duneveld which are intact and with low degree of impacts, have been impacted by some secondary roads, grazing, mismanagement and certain areas have been overgrazed. Even though this habitat is partly disturbed, it supports largely intact vegetation and has a rehabilitation potential. Acts as Corridor for fauna dispersion within the landscape. Acts as buffer for high sensitivity areas. Acts as degraded CBA 1, will recover if left undisturbed. The current ecological condition of this habitat with regard to the main driving forces, are intact, which is evident in the amount of, and importance of the species recorded in the flora and faunal assessment, and also to the type of plant species recorded corresponding to the vegetation type as described by Mucina (2006).

The habitat is used by faunal species as fine-scale habitats and is important to consider for mitigation actions, especially when an area is potentially cleared for placement of the infrastructure. These habitats can be considered as ecological hotspots being an important habitat for fauna and flora, especially plants as well as reptiles.

These habitats, jointly, is important as a movement corridor as it creates a link between the system and its surrounding terrestrial landscape for several faunal species, especially birds and mammals, and plays a vital role as an ecosystem for biodiversity. These units act as greenlands which supports viable plant species populations and is also used for foraging by fauna. This habitat unit can be regarded as highly important, not only within the local landscape, but also regionally.

Transformed

This is the area that has already been altered from their natural state. Transformed areas includes the existing access road that divides the project area and the existing power station.

14.4.4.4 Site Ecological Importance

The biodiversity theme sensitivity, as indicated in the screening report, was derived to be Very High, mainly due to the project area being within a CBA 1 and an ESA (**Figure 54**). Site 2 was derived to be Very High, mainly due to the southern end of the project area being within a CBA 1 and a central portion being an ESA 2. Both sites considered for the project were similar in species composition when compared with the surrounding vegetation. The interaction with CBA 1 area is considerably less in Site 2, and therefore more favourable for development. Further to this, the location of the CBA 1 is in proximity to the SERE Wind Farm and Skaapvlei substation, and disturbances (albeit limited) to the CBA 1 area are evident.

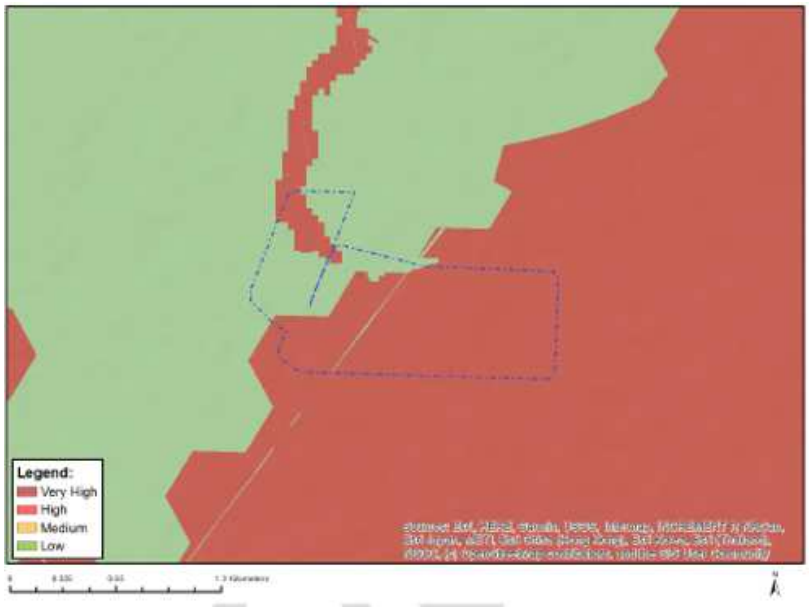


Figure 54: Habitats identified in the project areas (TBC, 2022a)

The sensitivities of the habitat types delineated are illustrated in **Figure 55**. 'High Sensitivity' areas for Site 1 are due to the following (**Table 20**):

- Functional CBA1, NPAES and SKEP.
- Unique, important and low resilience habitats; and
- Protected flora and fauna species were abundant and ubiquitous within the assessment area.

Site 2 was assigned a "Medium Sensitivity" due to the same reasons as above with the exception of the CBA area being in a less intact state (**Table 21**). The guidelines can be seen in **Table 22**.

Table 20: SEI Summary of habitat types delineated within field assessment area of site 1 (TBC, 2022a)

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Namaqua Shrubland	Medium	High	Medium	Low	High
Transformed	Low	Very Low	Very Low	Low	Very Low

Table 21: SEI Summary of habitat types delineated within field assessment area of site 2 (TBC, 2022a)

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Namaqua Shrubland	Medium	High	Medium	Medium	Medium
Transformed	Low	Very Low	Very Low	Low	Very Low

Table 22: Guidelines for interpreting Site Ecological Importance in the context of the proposed development activities (TBC, 2022a)

Site Ecological Importance	Interpretation in relation to proposed development activities
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.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

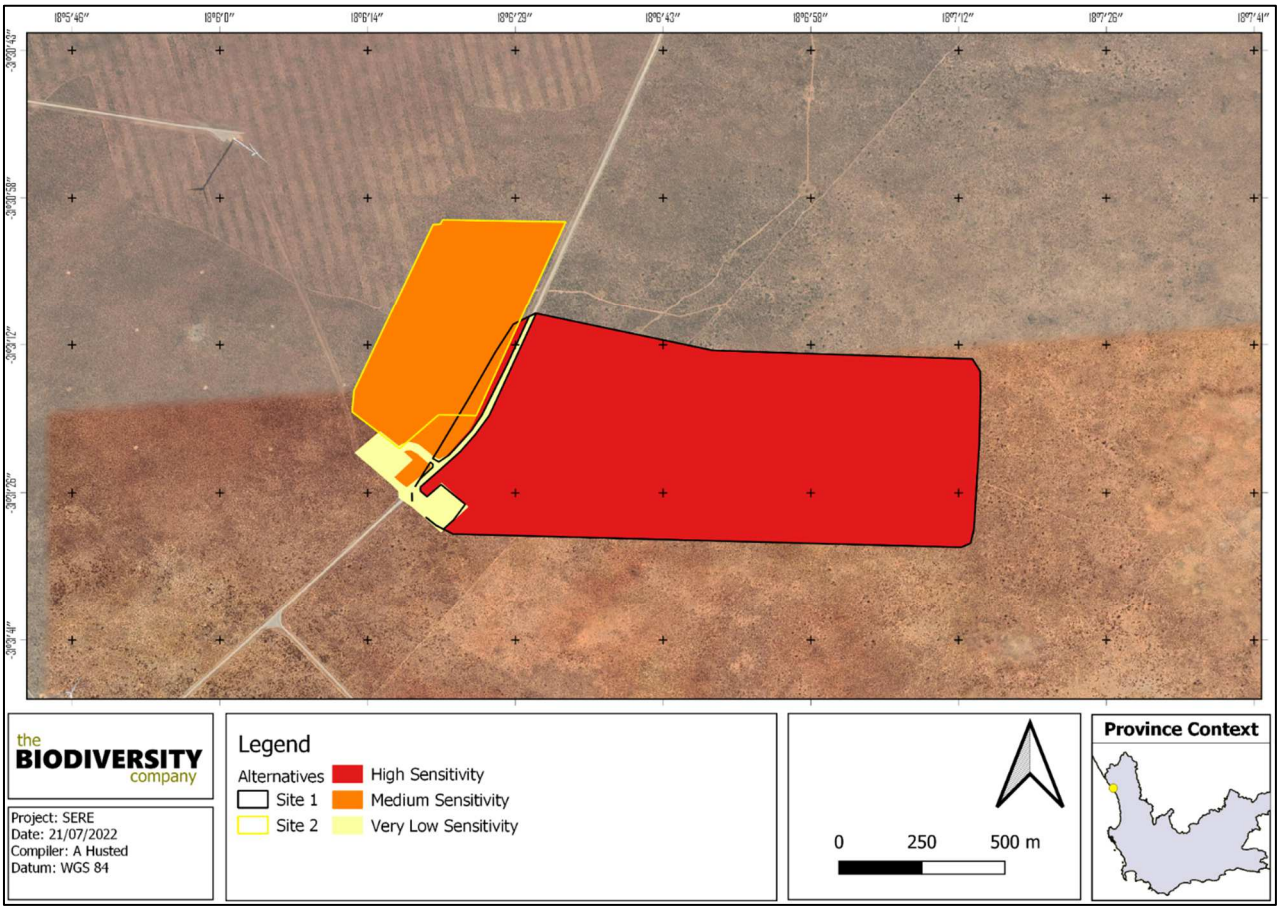


Figure 55: Sensitivity of the project area (TBC, 2022a)

14.4.5 Impact Risk Assessment

Refer to **Section 15.13** below for the results from the impact assessment from this study.

14.4.6 Conclusions

The completion of a comprehensive desktop study, in conjunction with the results from the field survey, suggest there is a good confidence in the information provided. The surveys ensured that there were suitable groundtruth coverage of the assessment areas and most habitats and ecosystems were assessed to obtain a general species (fauna and flora) overview and the major current impacts were observed. The conservation status is classified as Least Concern albeit the protection level is regarded as 'Poorly Protected' Ecosystem. Moreover, the proposed activity overlaps with a CBA1, ESA and SKEP.

The habitat existence and importance of these habitats is regarded as crucial, due to the species recorded as well as the role of this intact unique habitat to biodiversity within the local landscape, not to mention the sensitivity according to various ecological datasets.

The high sensitivity terrestrial areas found in Site 1 still:

- Serve as and represent CBA 1 and ESA as per the Conservation Plan;
- Forms part of NPAES and SKEP;
- Supports and protects fauna and flora (including protected species); and
- Support various organisms and may play a more important role in the ecosystem if left to recover from the superficial impacts.

Any development on the high sensitivity areas will lead the direct destruction and loss of portions of functional CBA, and also the floral and faunal species that are expected to utilise this habitat. Thus, if these areas are not maintained in a natural or near natural state, destroyed or fragmented, then meeting targets for biodiversity features will not be achieved.

Both sites considered for the project were similar in species composition when compared with the surrounding vegetation. The interaction with CBA 1 area is considerably less in Site 2, and therefore the development of Site 2 is more favourable. Further to this, the location of the CBA 1 is in proximity to the SERE Wind Farm and Skaapvlei substation, and disturbances (albeit limited) to the CBA 1 area are evident. Thus it can be said that Site 2 is the preferred option.

The mitigations, management and associated monitoring regarding these operational impacts will be the most important factor of this project and must be considered by the issuing authority.

14.5 Avifaunal Assessment

A summary of the Avifaunal Assessment (TBC., 2021) (contained in **Appendix D2**) follows.

14.5.1 Details of the Specialist

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

Organisation:	The Biodiversity Company		
Name:	Andrew Husted	Martinus Erasmus	Dr Lindi Steyn
Qualifications:	MSc Aquatic Health	B-tech Degree in Nature Conservation	PhD Biodiversity and Conservation
Affiliation (if applicable):	South African Council for Natural Scientific Professions (SACNASP) Pr Sci Nat registered (400213/11)	South African Council for Natural Scientific Professions (SACNASP) Cand. Sci Nat registered (118630)	

14.5.2 Objectives of the Study

The assessment was achieved according to the above-mentioned legislation and the best-practice guidelines and principles for avifaunal assessment within solar energy facilities as outlined by Birdlife South Africa. The scope of the avifaunal assessment included the following:

- Description of the baseline avifaunal community;
- Identification of present or potentially occurring Species of Conservation Concern (SCC);
- Sensitivity assessment and map to identify sensitive areas in the project area; and
- Impact assessment, mitigation measures to prevent or reduce the possible impacts.

14.5.3 Methodology

The survey methodology included the review of a number of resources including previous avifauna assessments undertaken for the Wind Farm, including two available operational bird monitoring data and reports for the Wind Farm, as well as a comprehensive desktop review. This was then supplemented through a ground-truthing field survey undertaken during early December 2021 and an additional survey in April 2022, where pertinent areas associated with the various habitat units were surveyed for condition and potential to support avifaunal biodiversity that has been recorded from the region. Emphasis was placed on ascertaining the potential for the habitat units of supporting Red Data Listed (RDL) species.

14.5.4 Key Findings of the Study

A description of the avifauna desktop analysis in the Project area is contained in **Section 13.8** above. Key findings from the study follow.

14.5.4.1 Avifauna Species

Thirty-five (35) bird species were recorded in the summer survey from 1 December 2021 to 3 December 2021. The full list of species recorded, their threat status, guild and location observed is shown in Appendix B of the Specialist Report. Two of the species recorded were classified as SCCs for this environmental impact assessment based on regional and global red list status, endemism, diurnal birds of prey and big flying birds at risk of collision:

- Twenty Lesser Flamingos were observed flying west, following the Olifants River towards the coast, this observation is located 12.6 km away from the project area; and
- A single Caspian Tern was observed flying east, following the Olifants River away from the coast, this observation is located 12.6 km away from the project area.

Table 23 lists the species of conservation concern as well as their threatened status, **Figure 56** shows photographs of the recorded species.

Table 23: Species of conservation concern observed during the survey (VU, Vulnerable; NT, Near Threatened) (TBC, 2022b)

Common Name	Scientific Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Lesser Flamingo	*Phoeniconaias minor*	NT	NT
Caspian Tern	*Hydroprogne caspia*	VU	LC

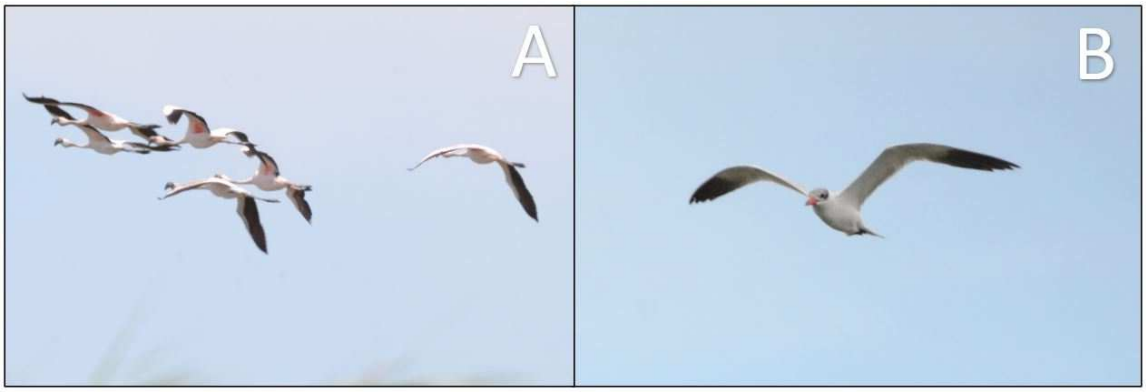


Figure 56: Photographs of recorded species, A) Lesser Flamingo, B) Caspian Tern (TBC, 2022b)

Twenty-five (25) species were recorded in the project area during the April 2022 survey based on direct observation (**Table 24**). No species were listed as provincially protected. Photographs of species recorded for the area are presented in **Figure 57**.

Table 24: Species observed during the second survey (VU, Vulnerable; NT, Near Threatened) (TBC, 2022b)

Common Name	Scientific Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
African Stonechat	*Saxicola torquatus*	LC	LC
Ant-eating Chat	*Myrmecocichla formicivora*	LC	LC
Barn Swallow	*Hirundo rustica*	LC	LC
Black-headed Heron	*Ardea melanocephala*	LC	LC
Blacksmith Lapwing	*Vanellus armatus*	LC	LC
Bokmakierie	*Telophorus zeylonus*	LC	LC
Cape Bulbul	*Pycnonotus capensis*	LC	LC
Cape Sparrow	*Passer melanurus*	LC	LC
Cape Turtle (Ring-necked) Dove	*Streptopelia capicola*	LC	LC
European Bee-eater	*Merops apiaster*	LC	LC

Fiscal Flycatcher	*Melaenornis silens*	LC	LC
Grey-backed Cisticola	*Cisticola subruficapilla*	LC	LC
Karoo Lark	*Calendulauda albescens*	LC	LC
Karoo Prinia	*Prinia maculosa*	LC	LC
Karoo Scrub Robin	*Cercotrichas coryphoeus*	LC	LC
Large-billed Lark	*Galerida magnirostris*	LC	LC
Namaqua Dove	*Oena capensis*	LC	LC
Namaqua Sandgrouse	*Pterocles namaqua*	LC	LC
Pale Chanting Goshawk	*Melierax canorus*	LC	LC
Pied Crow	*Corvus albus*	LC	LC
Pied Starling	*Lamprotornis bicolor*	LC	LC
Spotted Thick-knee	*Burhinus capensis*	LC	LC
Spotted Eagle-Owl	*Bubo africanus*	LC	LC
Southern Double-collared Sunbird	*Cinnyris chalybeus*	LC	LC
Three-banded Plover	*Charadrius tricollaris*	LC	LC

Figure 57: Photographs of recorded species, A) Long-billed Crombec, B) Namaqua Dove (TBC, 2022b)

Table 25 provides lists of the dominant species for the summer survey together with the frequency with which each species appeared in the point count samples. The data shows the Southern Double-collared Sunbird, Lesser Flamingos, Karoo Prinia, Bokmakierie, Karoo Lark and Grey-backed Cisticola were the most abundant species during the survey. Due to the high number of Flamingos recorded, they were the second most abundant species found, their frequency was low as they were only recorded once at the Olifants River. **Figure 58** shows some of the birds that were recorded during the survey.

Table 25: Dominant avifaunal species within the project area during the summer survey as defined as those species whose relative abundances cumulatively account for more than 75.6% of the overall abundance shown alongside the frequency with which a species was detected among point counts (TBC, 2022b)

Common Name	Scientific Name	Conservation Status		Relative Abundance	Frequency
		Regional (SANBI, 2016)	IUCN (2017)		
Southern Double-collared Sunbird	*Cinnyris chalybeus*	LC	LC	0,228	89,47
Lesser Flamingo	*Phoeniconaias minor*	NT	NT	0,157	5,26
Karoo Prinia	*Prinia maculosa*	LC	LC	0,126	57,89
Bokmakierie	*Telophorus zeylonus*	LC	LC	0,110	47,37
Karoo Lark	*Calendulauda albescens*	LC	LC	0,079	26,32
Grey-backed Cisticola	*Cisticola subruficapilla*	LC	LC	0,055	36,84

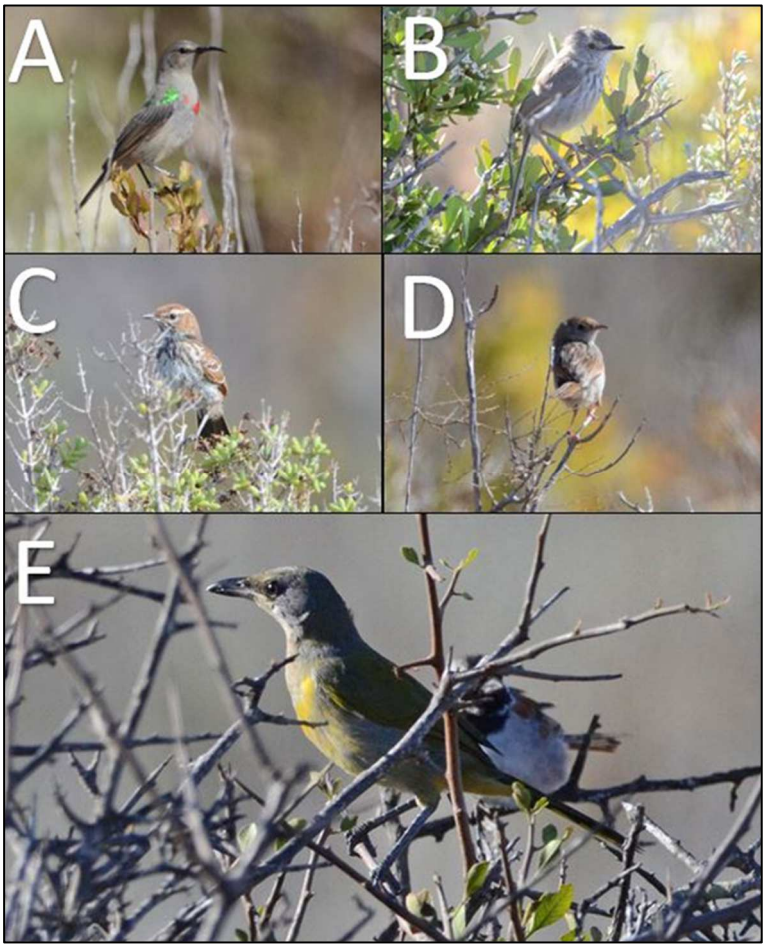


Figure 58: Some of the birds recorded in the project area: A) Southern Double-collared Sunbird, B) Karoo Prinia, C) Karoo Lark, E) Grey-backed Cisticola and E) Bokmakierie (TBC, 2022b)

14.5.4.2 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. The analysis of the major avifaunal guilds reveals that the species composition during the survey was dominated by insectivorous birds that feed on the ground during the day (IGD) (35,3%) (**Figure 59**). Granivores that feed on the ground (GGD), Insectivores that feed in the air and carnivores that are water dependent made up the second highest group (11.7%). It is important to note that all the carnivores that are water dependent were observed at the Olifants River.

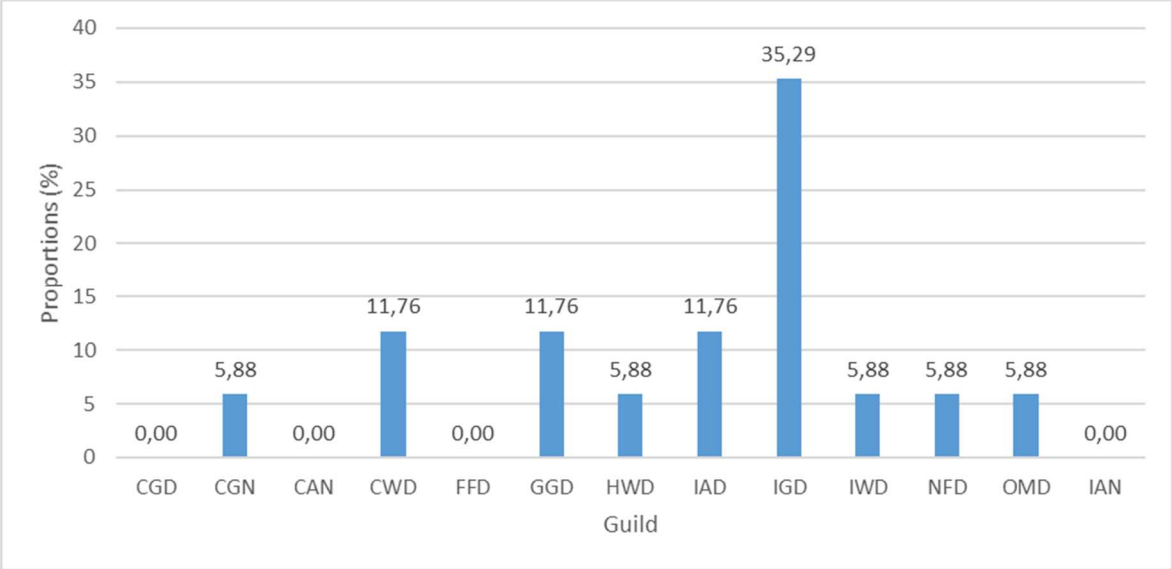


Figure 59: Avifaunal trophic guilds. CGD, carnivore ground diurnal; CGN, carnivore ground nocturnal, CAN, carnivore air nocturnal, CWD, carnivore water diurnal; FFD, frugivore foliage diurnal; GCD, granivore ground diurnal; HWD, herbivore water diurnal; IAD, insectivore air diurnal; IGD, insectivore ground diurnal; IWD, insectivore water diurnal; NFD, nectivore foliage diurnal; OMD, omnivore multiple diurnal; IAN, Insectivore air nocturnal (TBC, 2022b)

14.5.4.3 Risk Species

A number of species were found that would be regarded as high risk species (**Table 26** and **Figure 60**). Risk species are endemic species that would be sensitive to habitat loss and species that are regarded as collision prone species. Potential species along the Olifants River were included as they could very likely be influenced should they be moving between water sources. Even though the panels does not pose an extensive collision risk for larger birds, guidelines (anchor lines) and connection lines does pose a risk. However, the latter would be underground and there will be no guidelines/anchor lines.

Table 26: At risk species found in the survey (TBC, 2022b)

Common Name	Scientific Name	Conservation Status		Endemism	Collision	Disturbance/ Habitat Loss
		Regional (SANBI, 2016)	IUCN (2017)			
Cape Bulbul	*Pycnonotus capensis*	LC	LC	E		x
Cape Long-billed Lark	*Certhilauda curvirostris*	LC	LC	E		x
Pied Starling	*Lamprotornis bicolor*	LC	LC	E		x
Pale Chanting Goshawk	*Melierax canorus*	LC	LC		x	
Rock Kestrel	*Falco rupicolus*	LC	LC		x	
Spotted Eagle-Owl	*Bubo africanus*	LC	LC		x	
Black-headed Heron	*Ardea melanocephala*	LC	LC		x	
Cape Crow	*Corvus capensis*	LC	LC		x	
Namaqua Sandgrouse	*Pterocles namaqua*	LC	LC		x	
Spotted Thick-knee	*Burhinus capensis*	LC	LC		x	
Blacksmith Lapwing	*Vanellus armatus*	LC	LC		x	
Reed Cormorant	*Microcarbo africanus*	LC	LC		x	

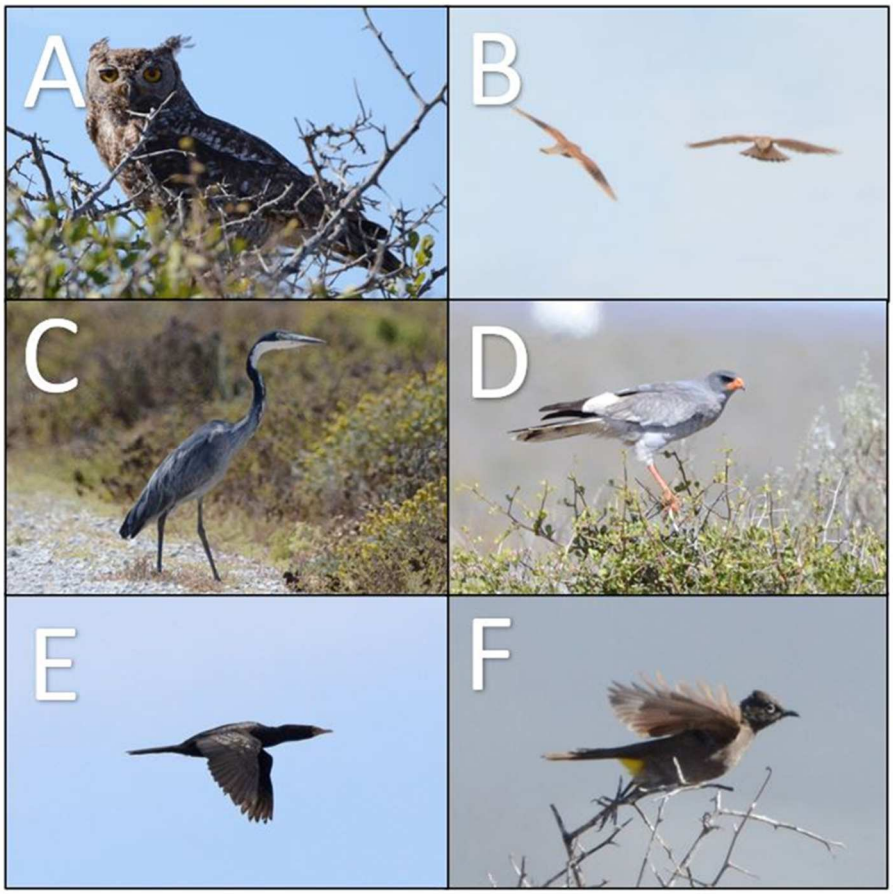


Figure 60: One species at risk for habitat loss and five high collision risk species photographed on site: A) Spotted Eagle-Owl, B) Rock Kestrel, C) Black-headed Heron, D) Pale Chanting Goshawk, E) Reed Cormorant, F) Cape Bulbul (TBC, 2022b)

14.5.4.4 Nest and Flight Analysis

There were no active nests recorded in the project area during the survey. There were however 4 abandoned Common Ostrich nesting spots found on the project area with eggs still present. With regards to flight paths, there were no significant patterns detected on the project area during the survey. There were two flight patterns detected at the Olifants River, the first being a Caspian Tern flying east following the river flying away from the coast, and secondly a flock of twenty Lesser Flamingo flying west following the river towards the coast (**Figure 61**).

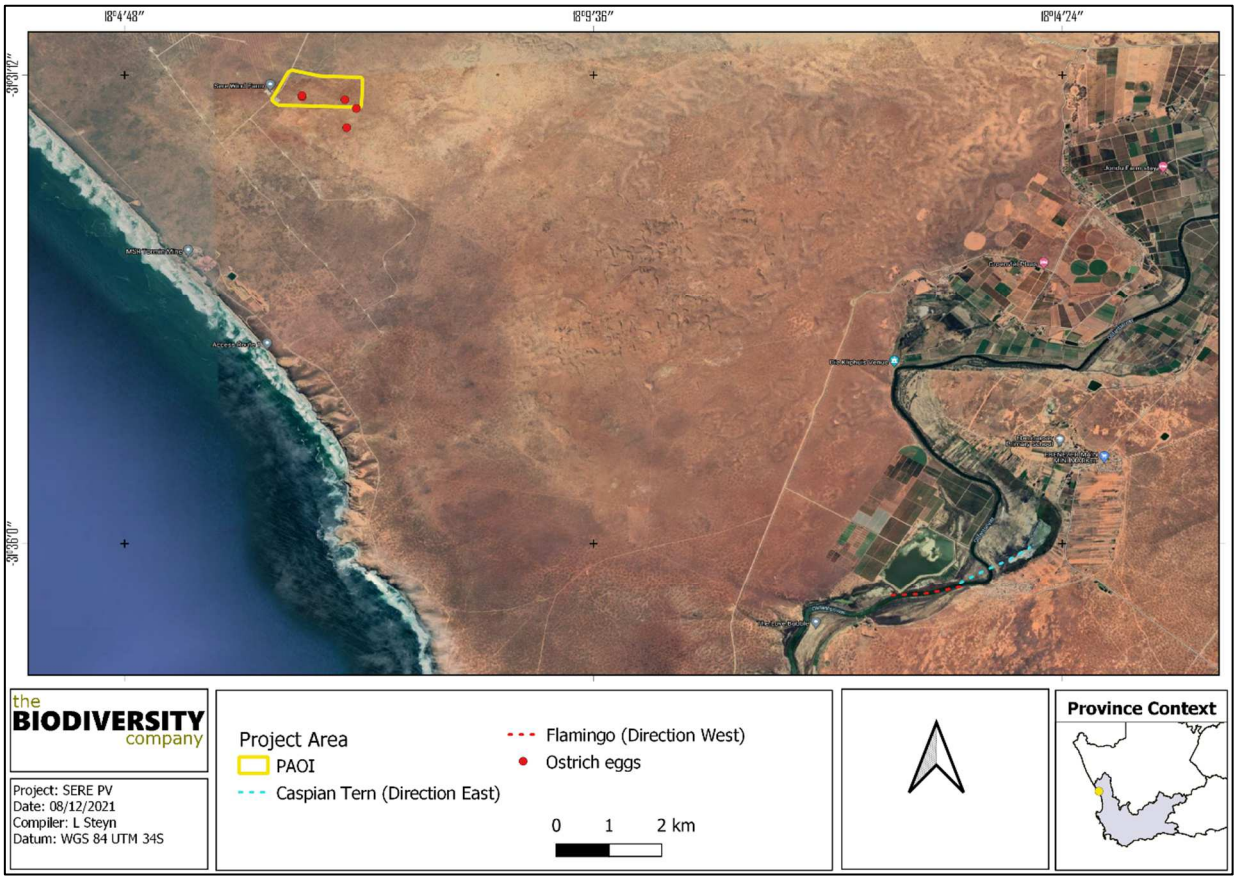


Figure 61: The flight directions observed (TBC, 2022b)

14.5.4.5 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. The assessment area consisted of two habitat types: Namaqua Sand Fynbos and Namaqua Inland Duneveld, these two habitats were similar with regards to the bird species recorded. Two more habitats were planned to be assessed: the coast west of the survey area and the Olifants River. Only the Olifants River was assessed in this survey as access to the coast was not possible due to the property belonging to Tormin Mineral Sand Mine.

The Namaqualand Sand Fynbos, slightly undulating plains comprising both isolated streets and dune fields of aeolian sand. Scattered 1-1.5m tall shrubs 1-3m in diameter, but dominated by Restionaceae in between, can have a dense canopy cover (50%), but is easily overgrazed to a sparse cover (20%). Restioid and asteraceous fynbos predominate, with localised pockets of proteoid fynbos. The overall state of the area was regarded as pristine, with very little degradation noticed while on site. The habitat supported a good level of plant species and insect life. The habitat hosted a number of insectivorous bird

species such as Karoo Prinia, Karoo Lark and Grey-backed Cisticola that was recorded in the project area.

The Namaqualand Inland Duneveld is described as a coastal peneplain with mobile dunes. Vegetation is tall shrubland dominated by non-succulent shrubs (*Berkheya,Eriocephalus, Euclea, Gloveria, Lycium, Searsia, Tetragonia, Tripteris, Zygophyllum*) as well as some grasses (*Ehrharta*) and restioids (*Willdenowia*). The Overall state of the area was regarded as pristine, with a few degraded patches with less plant cover. The habitat supported a good level of plant species and insect life. The habitat hosted a number of insectivorous bird species such as Karoo Prinia, Karoo Lark and Grey- backed Cisticola that was recorded in the project area.

The Olifants River acts as a major water source and habitat for a large number of bird species in this arid landscape. Four species were recorded here that were found exclusively in this habitat type. These species were Lesser Flamingo, Three-banded Plover, Reed Cormorant and Caspian Tern.

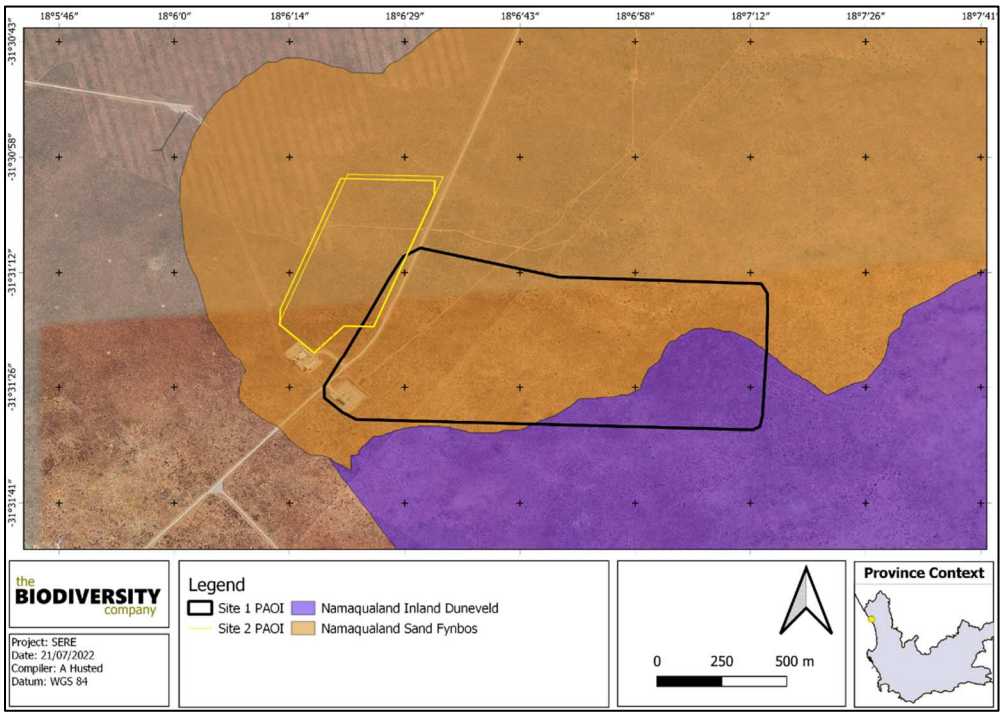


Figure 62: The avifauna habitats found in the project area (TBC, 2022b)

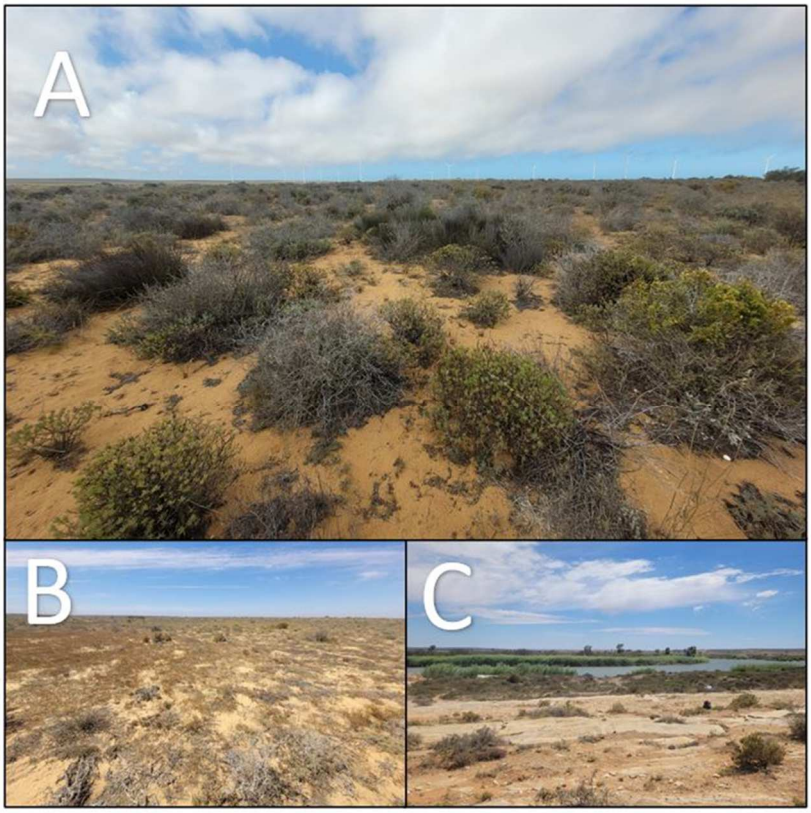


Figure 63: Photographs illustrating examples of A) Namaqua Sand Fynbos, B) Namaqua Inland Duneveld and C) Olifants River (TBC, 2022b)

14.5.4.6 Site Sensitivity

The screening tool provides an avifaunal sensitivity theme. However, this layer is applicable to wind energy developments and for all other projects, the user must evaluate the animal species sensitivity's theme for any avifaunal triggers. The avian species sensitivity theme shows that the project area has a moderate sensitivity.

Figure 64: The screening sensitivity for animals for the two project areas (National Screening Tool) (TBC, 2022b)

In completion of the field assessment, two verified habitat types were subjected to the SEI methods and allocated a sensitivity category (**Table 27** and **28**). The sensitivities of the habitats delineated is illustrated in **Figure 65**.

Table 27: SEI Summary of habitat types delineated within field assessment area of site 1 (TBC, 2022b)

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Namaqua Shrubland	Medium	High	Medium	Low	High
Transformed	Low	Very Low	Very Low	Low	Very Low

Table 28: SEI Summary of habitat types delineated within field assessment area of site 2 (TBC, 2022b)

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Namaqua Shrubland	Medium	High	Medium	Medium	Medium
Transformed	Low	Very Low	Very Low	Low	Very Low

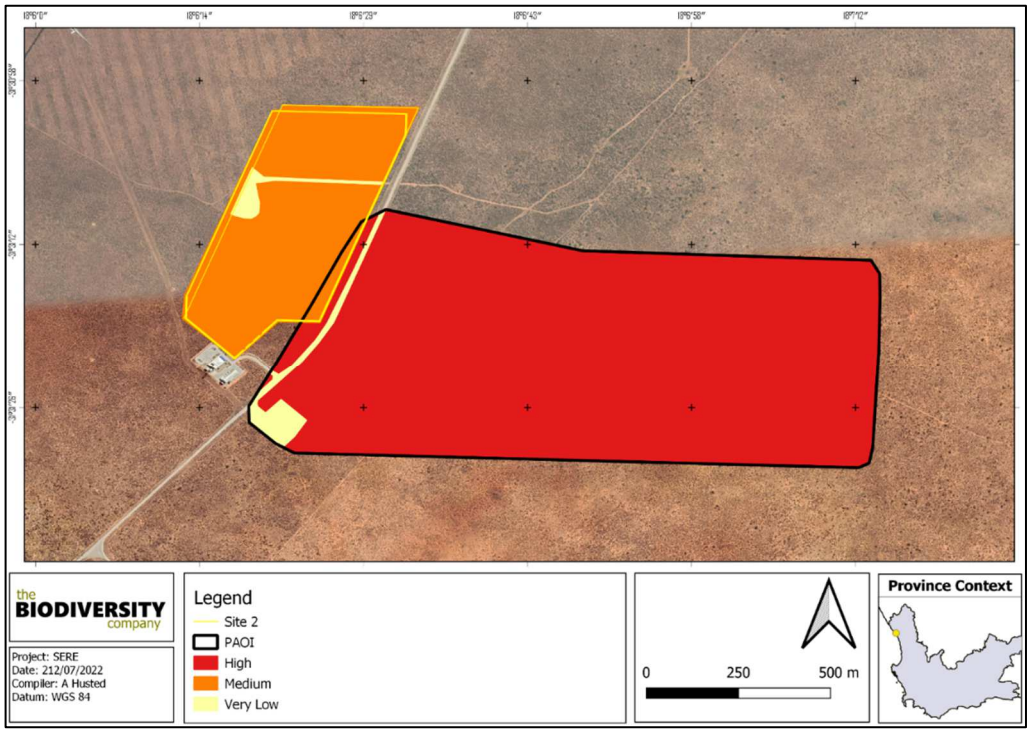


Figure 65: Site Ecological Importance for the project area (TBC, 2022b)

14.5.5 Impact Assessment

Refer to **Section 15.14** below for the results from the impact assessment from this study.

14.5.6 Conclusions

In completion of the report, taking into consideration the results from a desktop perspective as well as review from the nearby assessments and results from the field assessments the following is concluded:

Two main habitat types were verified/identified in the project area, namely Namaqualand Sand Fynbos and Namaqualand Inland Duneveld. The project area overlaps with limited portions of CBA1 and ESA, with the majority of the area OBA and ESA 2. The habitat has experienced some level of disturbance and mismanagement leading from being fenced of and the associated livestock impacts

Site 1 overlaps within sensitive habitats and other areas of high biodiversity potential in the form of a CBA1 area. Site 2 would be considered to have a minor negative impact as it would directly affect small area of the habitat and the faunal species that use these ecosystems.

The development will result in the loss of habitat for these SCCs, it will also lead to sensory disturbance, collision and electrocution risks. Even though the latter three impacts can be mitigated to some extent, the loss of habitat cannot be mitigated. These species could move into surrounding

areas however based on the number of applications and current renewable energy development in the area the cumulative impact is also regarded as being high.
Further avifauna assessments may not be necessary, the review of previous reports and data have adequately supplemented the avifauna considerations for this project, however the final decision can be determined by the issuing authorities.

Considering the above-mentioned information, no fatal flaws are evident for the proposed project. It is the opinion of the specialists that the project location, may be favourably considered on condition that all prescribed mitigation measures and supporting recommendations are implemented. Further avifauna assessments are also no recommended, the review of previous reports and data have adequately supplemented the avifauna considerations for this project.

14.6 Heritage Impact Assessment

A summary of the Heritage Impact Assessment undertaken by Archaeology Contracts Office, Department of Archaeology, University of Cape Town compiled by Tim Hart (ACO, 2007) for the SERE Wind Facility EIA (contained in **Appendix E5**) follows.

14.6.1 Details of the Specialist

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

Organisation:	Archaeology Contracts Office Department of Archaeology University of Cape Town
Name:	Tim Hart
Qualifications:	MA
Affiliation (if applicable):	▪ Professional archaeologist registered with ASAPA (Association of Southern African Professional Archaeologists)

14.6.2 Objectives of the Study

Undertake a heritage assessment of the proposed Wind Energy Facility footprint to meet requirements of Heritage Authorities.

14.6.3 Methodology

Information that has informed this study is derived from two main sources. The first of which is experience derived from a number of significant studies that have taken place close to the study area as well as the general body of information that has been derived from researchers mostly based at the University of Cape Town who have worked in the Elands Bay area since the 1960s.

Major studies on Namakwa Sands property, Transhex, Namaqualand Diamond Mining Corporation and De Beers owned properties have provided a solid background of observations.

The second major source of information is derived from the detailed field survey of the study area itself which took place prior to the compilation of the report. The study area was surveyed over a five-day period by two accredited archaeologists. Assessment of the significance of the archaeological material is based on draft grading guidelines used by both SAHRA and Heritage Western Cape.

14.6.4 Key Findings of the Study

A description of the heritage and cultural features in the Project area is contained in **Section 13.15** above. Key findings from the study follow.

14.6.4.1 Cultural landscape, build environment and historical sites

Colonial period heritage is extremely scarce in the study area and vicinity. There are no built structures close to, or within the study area apart from the provincial road, off-road tracks, stock drinking troughs, grazing camps and wind pump reservoirs. The nearest built settlement is the Skaapvlei farm (just to the north of the site) and the Transhex mining camp a number of kilometers to the south of the site. Neither of these places can be considered to be significant heritage resources, although buildings and family graves at Skaapvlei located outside of the study area may be more than 60 years old. Most of the Skaapvlei structures show evidence of ad hoc modernisation and are not worthy of high conservation status. The buildings have little aesthetic or historical value so the nearby presence of the wind energy facility will not compromise their cultural landscape qualities.

14.6.4.2 Pre-colonial archaeology

Previous research has revealed that the bulk of archaeological sites (mainly Late Stone Age middens) lie within half a kilometer of the coast. Their frequency drops off rapidly with distance away from the coast. This spatial patterning reflects that people (typically in an arid environment) tended to focus their settlements, which were mostly of short seasonal duration, close to resource rich areas. Inland of the coast above the coastal escarpment archaeological sites are quite scarce being limited to ephemeral scatters situated in occasional deflation hollows. Where there is a rocky outcrop with shelters or overhangs, or any place that has the potential for providing a water source evidence of occupation is prolific. Within the study area, the general patterning of pre-colonial occupation is very much in keeping with what would be expected in an arid area. Some 65 observations of archaeological material (see Appendix A of the HIA Report) were recorded during the study

(**Figure 66**). Many of these are ephemeral scatters which will not be impacted by the proposed activity. The inland areas of the landscape are almost devoid of surface archaeological material, however ephemeral occurrences of mostly MSA material were noted associated with low ferricrete rafts, particularly in the central eastern part of the area. Almost every blowout/deflation that was inspected showed evidence of pre-colonial Late Stone Age occupation. These sites are generally ephemeral typically consisting of no more than 20-60 fragments of flaked quartz or silcrete with very little shell or bone.

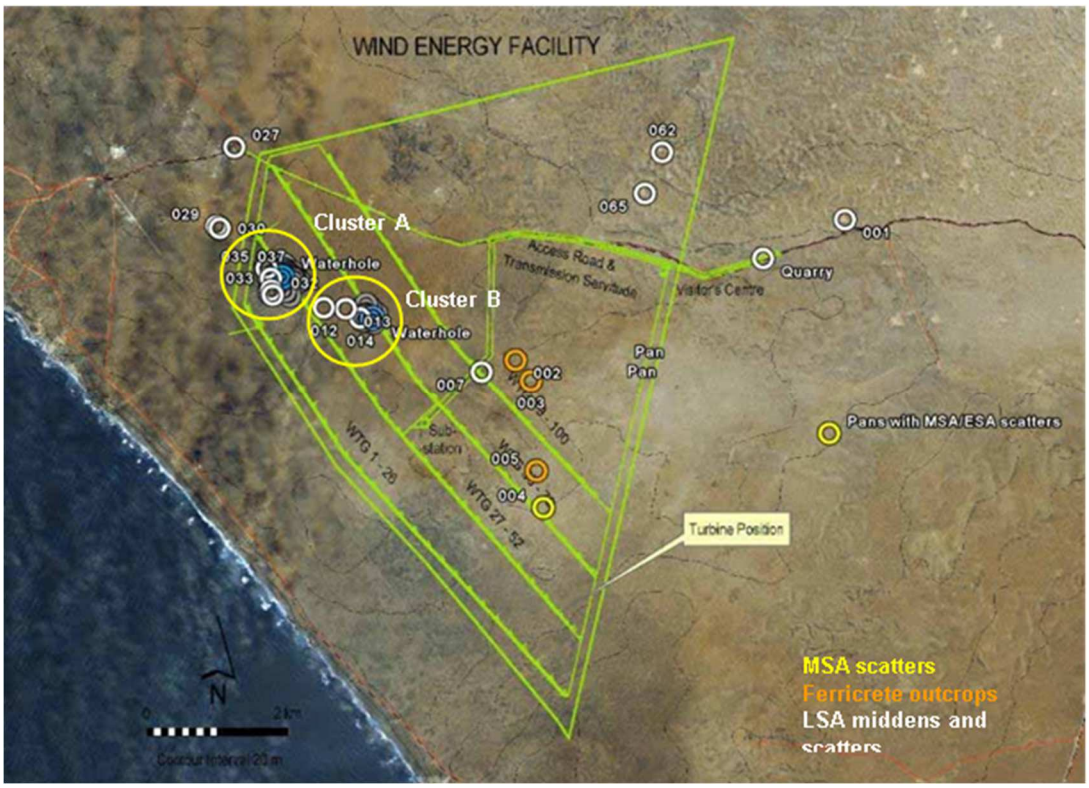


Figure 66: Satellite photograph of study area showing distribution of archaeological sites (ACO, 2007)

14.6.4.3 Late, Middle and Early Stone Age sites

Late Stone Age sites were identified to the northwest of the SERE PV Project areas, associated with the presence of two dried springs that were once waterholes with potable water. Each one of these had attracted a concentration of small shell middens. The contents of the sites are varied – many are ephemeral limpet dominated shell scatters. Stone artefacts are present on all sites associated with the waterholes. The raw materials used are wide ranging – notably quartz, crystal quartz, very high quality silcrete, hornfels, quartzite as well as cryptocrystalline silicates. Fragments of animal bone have been noted on the denser sites. The assemblages tend to be informal despite the high grades of raw material available. Ceramics are present on many of the waterhole associated sites

indicating that part of the occupation span took place within the last 2 000 years. The value of the waterhole related sites is that they represent two complete systems of occupation which are of scientific value in terms of their potential to provide information about the cultural affinities of the people who lived there, and the time depth of their occupancy of the area.

Older archaeological material dating from the Middle and Early Stone Ages has been found in areas where sand mining or overburden excavation/removal has resulted in the exposure of previous land surfaces. However due to the large amounts of aeolian sands that cover the study area none of this material is visible. Ephemeral occurrences of Middle Stone Age artefacts were noted within the Wind Farm study area associated with low outcrops of ferricrete, however none of these are considered significant.
None of these sites were identified within the PV Project footprints proposed.

14.6.5 Impact Assessment

Refer to **Section 15** below for the results from the impact assessment based on the results/findings of this study.

14.6.6 Conclusions

Controlling of impacts to buried archaeological material such as stone artefacts scatters on the Doorbank horizon will require the commitment of both site staff and archaeologists. However, the resource is considered to be widespread and the cumulative impact is not excessive. In terms of impacts to the natural cultural landscape qualities of the site, impacts are expected. This may be mitigated by the fact the study area is set back from the scenic coastal escarpment (which is most frequently used by people).

14.7 Desktop Paleontological Impact Assessment

A summary of the Desktop Palaeontological Impact Assessment (Banzai Environmental, 2022) (contained in **Appendix D3**) follows.

14.7.1 Details of the Specialist

The details of the specialist that undertook the Desktop Palaeontological Impact Assessment follow.

Name:	Elize Butler
Qualifications:	M. Sc. Cum laude (Zoology), 2009

Affiliation (if applicable):	Palaeontological Society of South Africa (PSSA)

14.7.2 Objectives of the Study

The Terms of Reference for this study were to undertake a Palaeontological Impact Assessment and provide feasible management measures to comply with the requirements of SAHRA.

14.7.3 Methodology

The aim of a desktop study is to evaluate the risk to palaeontological heritage in the proposed development. This includes all trace fossils and fossils. All available information is consulted to compile a desktop study and includes Palaeontological impact assessment reports in the same area, aerial photos, and Google Earth images, topographical as well as geological maps.

14.7.4 Key Findings of the Study

A description of the palaeontological features and geological context in the Project area is contained in **Section 13.16** above. Key findings from the study follow.

The proposed Sere PV Plant is underlain by West Coast Group. According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) database the Palaeontological Sensitivity of the West Coast Group is Very High (Almond and Pether 2008, SAHRIS website).

Two Layout alternatives for the proposed Sere Photovoltaic Plant have been proposed. All alternatives are underlain by the West Coast Group. The geology of the proposed site alternatives is the same and thus no preferences on the grounds of palaeontological fossil heritage, for any specific alternative layout under consideration was identified. The PalaeoMap on the South African Heritage Resources Information System (SAHRIS) database indicates that the Palaeontological Sensitivity of the West Coast Group is Very High (Almond and Pether 2008, SAHRIS website) (**Figure 67**). However, the geotechnical report conducted for the Sere Wind Energy Farm (BKS Palace Consortium, 2010) found that bedrock occurs between 14 m and at a depth greater than 102m. The depth of the sand in the development area was found up to 20 m, while the approximate excavation depths for the Sere PV project are 1.5m.

It is thus anticipated that excavations will not extend into the underlying bedrock of the PV project and that the Palaeontological Significance of the proposed development will thus be LOW.

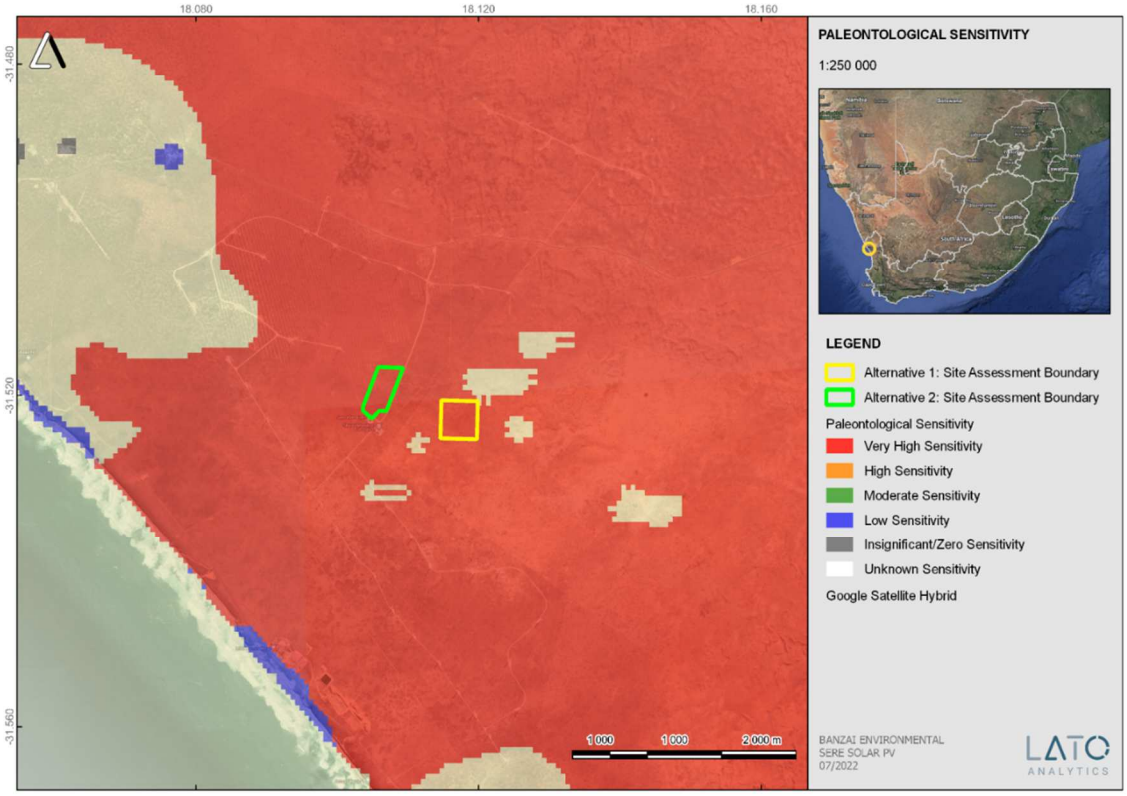


Figure 67: Extract of the 1:250 000 SAHRIS PalaeoMap map (Council of Geosciences) indicating the proposed development.

14.7.5 Impact Assessment

Refer to **Section 15.17** below for the results from the impact assessment from this study.

14.7.6 Conclusions

It is therefore considered that the proposed development will not lead to detrimental impacts on the palaeontological resources of the area. The construction and operation of the project may be authorised, as the whole extent of the development footprint is not considered sensitive in terms of palaeontological heritage.

However, if any fossil remains or trace fossils are discovered during any phase of construction or operation, either on the surface or exposed by excavations, a Chance Find Protocol must be implemented by the ECO in charge of this development. These discoveries should be protected (if possible, in situ) and the ECO must report such discovery to SAHRA.

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.

14.8 Visual Impact Assessment

A summary of the Visual Impact Assessment (Eco Elementum, 2022) (contained in **Appendix D4**) follows.

14.8.1 Details of the Specialist

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

Organisation:	Eco Elementum
Name:	Neel Breitenbach
Qualifications:	B.Sc. Geography
Affiliation (if applicable):	-

14.8.2 Objectives of the Study

- Describe the existing visual characteristics of the proposed sites and its environs;
- Viewshed and viewing distance using GIS analysis up to 30 km from the proposed structures.
- Visual Exposure Analysis comprising the following aspects:
  - Terrain Slope;
  - Slope angle is determined from the Digital Terrain Model (DTM) and the location of the proposed structures given a ranking depending on the steepness of the slope.
  - Aspect of structure location;
  - Aspect of the slope where the structures are to be built, are calculated from the DTM and given a ranking determined by the Sun angle.
  - Landforms;
  - Landform of the location of the proposed structures are determined from the DTM and ranked according to the type of landform. Structures built on certain landforms, e.g. ridges, will be more visible than structures built in valleys.
  - Slope Position of structure;
  - Using GIS analysis, the position of the proposed structure is determined and ranked according to the position on the slope the structure is to be built.
  - Relative elevation of structure;
  - Using the DEM the elevation of the proposed structure relative to the surrounding elevation is determined and ranked according to the difference in height of the surrounding areas.
  - Terrain Ruggedness;

- The terrain ruggedness is determined from the DEM and given a ranking based on the homogeneousness of the terrain.
- Viewer Sensitivity;
- The Viewer sensitivity ranking of the surrounding areas is determined using various land cover and land use datasets and ranked according to the sensitivity of the related structures to the environment.
- Overall Visual Impact;
- Combing all the above dataset a final visual impact of the proposed structures is calculated.

- Compare both site-layouts and recommend the one with the least impact.

14.8.3 Methodology

The following sequence was employed in this Visual Assessment Report:

- Viewshed and viewing distance using GIS analysis up to 30 km from the proposed structures utilizing ArcGIS Pro and Spatial Analyst extension.
- In order to model the decreasing visual impact of the structures, concentric radii zones of 1 km to 30 km from the activities were superimposed on the viewshed to determine the level of visual exposure. The closest zone to the proposed structures indicates the area of most significant impact, and the zone further than 15 km from the structures indicates the area of least impact. The visual ratings of the zones have been defined as follows:
  - <1 km (very high);
  - 1 - 2 km (high);
  - 2 - 5 km (moderate);
  - 5 -10 km (moderate-low);
  - 10 - 15 km (low) and
  - >30km (insignificant).

- A Visual Exposure Analysis were conducted that included the following parameters:
- Terrain Slope
  - Slope angle is determined from the Digital Terrain Model (DTM) and the location of the proposed structures given a ranking depending on the steepness of the slope;
  - Structures built on steep slopes are assumed to be more visible and exposed than those on flat surfaces.
- Aspect of structure location
  - Aspect of the slope where the structures are to be built, are calculated from the DTM and given a ranking determined by the Sun angle.
  - Structures on flat surface are illuminated by the sun the whole day and thus visible from all directions. In the southern hemisphere structures on North facing slopes

are less visible from the south, structures on East and West facing slopes are only illuminated during half of the day thus less visible where structures on the southern slopes are mostly in the shade.

- Landforms
  - Landform of the location of the proposed structures are determined from the DTM and ranked according to the type of landform. Structures built on certain landforms, e.g. ridges, will be more visible than structures built in valleys.
- Slope Position of structure
  - Using GIS analysis, the position of the proposed structure is determined and ranked according to the position on the slope the structure is to be built.
- Relative elevation of structure
  - Using the DEM the elevation of the proposed structure relative to the surrounding elevation is determined and ranked according to the difference in height of the surrounding areas. Structures built on higher ground are more visible than those built in low lying areas.
- Terrain Ruggedness
  - The terrain ruggedness is determined from the DEM and given a ranking based on the homogeneousness of the terrain. Rugged terrain has a tendency to increase the visual absorption characteristics of the terrain.
- Visual Absorption Capacity
  - To simulate the Visual Absorption Capacity (VAC) of the landscape, land cover data of the area were assigned a VAC ranking. The Visual Exposure results and VAC rankings of the landscape were use in an algorithm to determine a quantitative visual exposure for each sensitive receptor.
- Overall Visual Impact
  - Combing all the above dataset a final visual exposure ranking was determined for each of the identified sensitive receptor areas.

- Compare the visual impact exposure rating at the relevant sensitive receptors to determine the site layout with the least impact (impact assessment).

14.8.4 Key Findings of the Study

Through the analysis undertaken, each identified sensitive receptor is then overlaid on the Visual Exposure Ranking and the value extracted to that pixel to give a quantitative ranking for each of the identified sensitive receptors. Ranking is done from 1 to 10, 1 being very low and 10 very high. The viewpoints have been identified based on the sensitivity of the areas to visual disturbance and areas that can be negatively impacted by the related structures.

From the GIS analysis it is modelled that from none of the identified sensitive receptors, the proposed PV installation would be visible. Factors like real time and micro scale vegetation are not taken into account, thus it should be noted that in real life a different outcome may be possible.

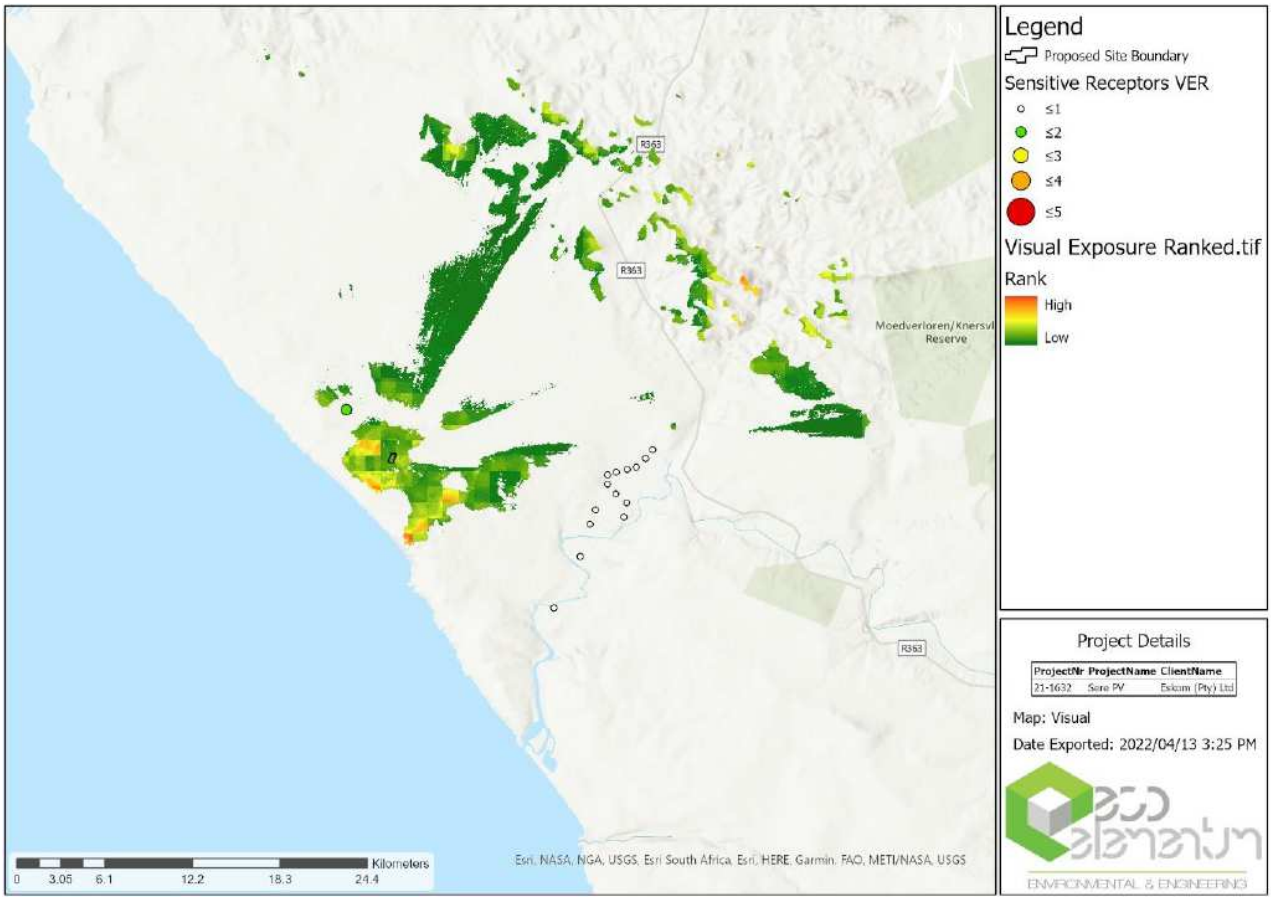


Figure 68: Viewpoint sensitive receptors overlaid on the Visual Exposure Ranking, Alternative Layout 1

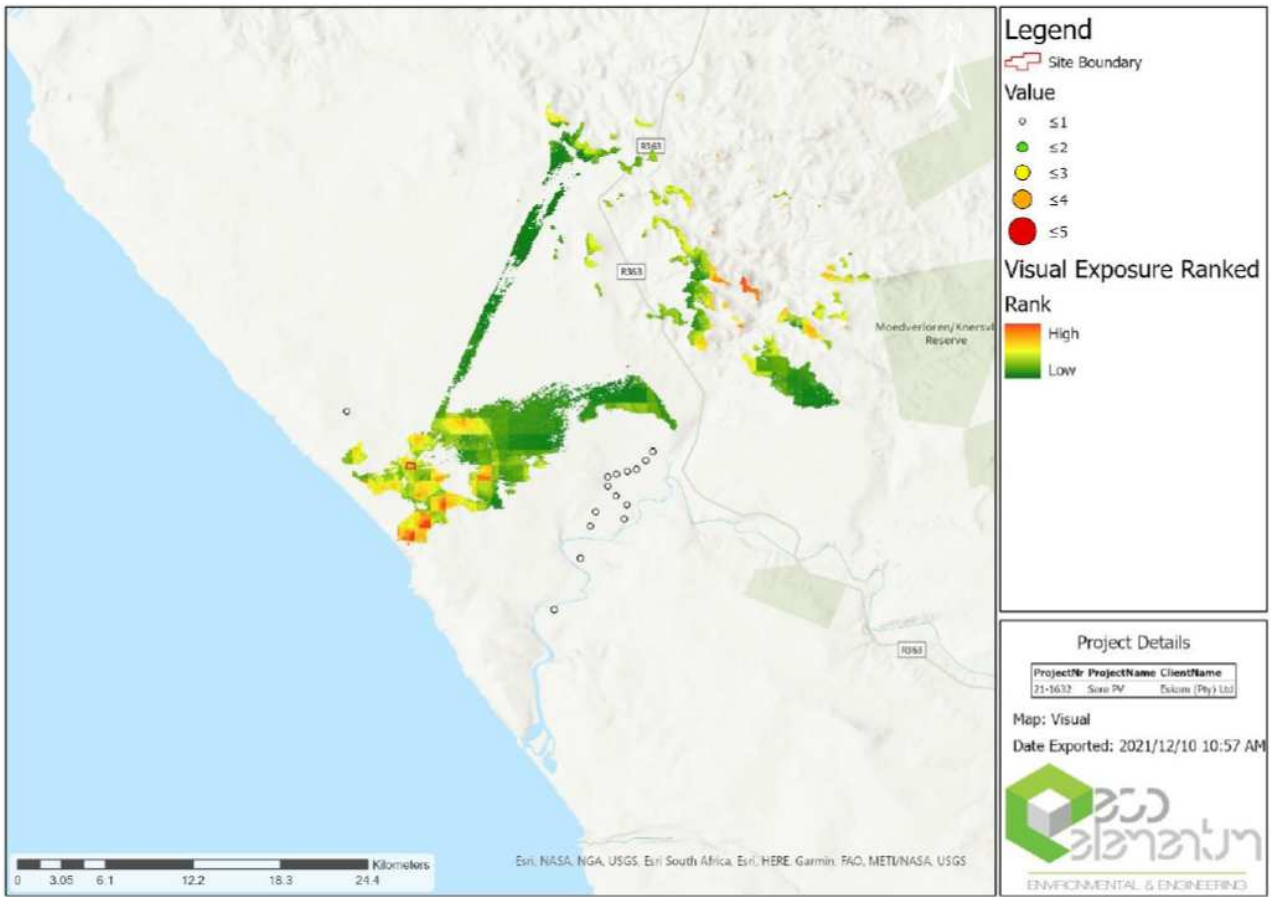


Figure 69: Viewpoint sensitive receptors overlaid on the Visual Exposure Ranking, Alternative Layout 2

The Visual Exposure Rating (VER) at each of the identified sensitive receptor for both the alternative 1 and 2 scenarios was determined. Only 1 receptor of a total of 15 had a VER for the Alternative 2 scenario. None of the rest of the receptors are modelled as having any VER for both the Alternative 1 and 2 scenarios.

Receptor 1 is predicted to have a VER of 1.45, which is considered low. Therefore, the impact difference is considered negligible.

14.8.5 Impact Assessment

Refer to **Section 15.18** below for the results from the impact assessment from this study.

14.8.6 Conclusions

The Visual Impact due to the proposed solar PV project and associated infrastructure can be seen as having a MODERATE impact on the surrounding environment before mitigation measures are implemented. After mitigation, the visual impact can be seen as MODERATE although lower. Thus,

mitigation measures are very important and one of the most significant mitigation measures are the rehabilitation of the area at end of project life. If the rehabilitation of the impact is not done correctly and the final landform do not fit into the surrounding area then the visual impact will remain high and become a concern. However, with correct rehabilitation, the impact will be minimal and there should be no visual impact after the landform has been restored

Taking into account the modelled data, the visual impact on the identified sensitive receptors can be seen as insignificant for both the proposed and alternative scenarios.

15 IMPACT ASSESSMENT

15.1 General

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

Impacts were identified as follows:

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

15.2 Impacts associated with Listed Activities

As mentioned, the Project requires Environmental Authorisation for certain activities listed in the EIA Regulations of 2014 (as amended), which serve as triggers for the Basic Assessment. The potential impacts associated with the key listed activities are broadly stated in **Table 29** below. The potential impacts were elaborated on in the specialist studies that were undertaken as part of the Basic Assessment.

Table 29: Potential Impacts associated with the key listed activities

Listed Activities	Potential Impact Overview
GN No. R. 983 of 4 December 2014 (as amended) (Listing Notice 1)	
GN No. R.983 – Activity 1 *The development of facilities or infrastructure for the generation of electricity from a renewable resource where—* *(i) the electricity output is more than 10 megawatts but less than 20 megawatts*	• Impacts associated with the footprint of the physical infrastructure (PV site). • Visual impact associated with the physical infrastructure. • Potential loss of sensitive environmental features (e.g. sensitive fauna and flora species).

Listed Activities	Potential Impact Overview
GN No. R.983 – Activity no. 11(i): *The development of facilities or infrastructure for the transmission and distribution of electricity—* *(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or* *(ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more;* *excluding the development of bypass infrastructure for the transmission and distribution of electricity where such bypass infrastructure is —* *(a) temporarily required to allow for maintenance of existing infrastructure;* *(b) 2 kilometres or shorter in length;* *(c) within an existing transmission line servitude; and* *(d) will be removed within 18 months of the commencement of development.*	• Impacts associated with the footprint of the physical infrastructure (cable route). • Potential loss of sensitive environmental features (e.g. sensitive fauna and flora species).
GN No. R.983 – Activity no. 27: *The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for-* *(i) the undertaking of a linear activity; or* *(ii) maintenance purposes undertaken in accordance with a maintenance management plan.*	• Clearance of areas consisting of indigenous vegetation associated with the construction footprint. • Potential loss of sensitive environmental features (e.g. sensitive fauna and flora species, ecosystems). • Visual impacts. • Soil destabilisation and subsequent erosion. • Proliferation of alien and invasive species.
GN No. R.983 – Activity no. 28(ii): *Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:* *(i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or* *(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;* *excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.*	• Clearance of large areas associated with the construction footprint on land used for agricultural purposes, outside of an urban area. • Loss of agricultural land. • Socio-economic impacts associated with construction activities.
GN No. R. 985 of 4 December 2014 (as amended) (Listing Notice 3)	
GN No. R.985 – Activity 4(i) - (ii)(aa): *The development of a road wider than 4 metres with a reserve less than 13,5 metres.*	Impacts associated with building access roads in areas containing indigenous vegetation, including the loss of biodiversity.
GN No. R.985 – Activity 10 (i) (ii): *The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres.* *i. Western Cape* *ii. All areas outside urban areas;*	Potential impacts to receiving environment should significant spillages occur.
GN No. R.985 – Activity no. 12 (i) (ii): *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.* *i. Western Cape*	The clearance of large tracts of indigenous vegetation and potential loss of sensitive fauna and flora species within areas within CBAs.

Listed Activities	Potential Impact Overview
ii. Within critical biodiversity areas identified in bioregional plans;	

15.3 Issues raised by Environmental Authorities and IAPs

The Comments and Responses Report (CRR) (contained in **Appendix I**) includes comments received from authorities and I&APs to date.

The CRR will be updated to include all comments received during the public review of the draft BAR and the Final CRR included in the Final BAR for submission to DFFE.

15.4 Project Activities

In order to understand the impacts related to the Project it is necessary to unpack the activities associated with the project life-cycle, which is done in the sub-sections to follow.

15.4.1 Project Phase: Pre-construction

Some of the main Project activities, as well as high-level environmental activities, to be undertaken in the pre-construction phase are listed in **Table 30** below.

Table 30: Simplified List of Activities associated with Pre-construction Phase

Project Phase: Pre-construction
Project Activities
Detailed engineering design.
Detailed geotechnical investigations.
Survey and mark development.
Survey and map topography for determination of post-construction landscape, rehabilitation and shaping (where necessary).
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.
The building of a site office and ablution facilities.
Confirmation of the location and condition of all structures and infrastructure.
Determining and documenting the conditions of the roads to be used during construction.
Fencing off PV site.
High Level Environmental Activities
Diligent compliance monitoring of the EMPr, Environmental Authorisation and other relevant environmental legislation
Develop a Search and Rescue Plan for Protected Plants occurring within the Project footprint.
Obtain permits for impacts to Species of Conservation Concern (SCC) and Protected Species, if avoidance is not possible
Implement the plant Search and Rescue Plan
Develop Environmental Monitoring Programme (e.g. avifauna)
On-going consultation with I&APs
Other activities as per EMPr

15.4.2 Project Phase: Construction

Some of the main Project activities, as well as high-level environmental activities, to be undertaken in the construction phase are listed in **Table 31** below.

Table 31: Simplified List of Activities associated with Construction Phase

Project Phase: Construction
Project Activities
Site establishment.
Prepare access roads.
Relocation of existing subterranean infrastructure, as relevant.
Establish construction laydown area.
Bulk fuel storage.
Delivery of construction material.
Transportation of equipment, materials and personnel.

Project Phase: Construction
Storage and handling of material.
Construction employment.
Site clearing (as necessary).
Construction of PV Plant infrastructure.
Construction of site access road.
Excavation and installation of the interconnection cable.
Concrete Works, as required.
Erection of steel structures, as required.
Mechanical and Electrical Works.
Electrical supply.
Material delivery and offloading.
Rehabilitation of construction laydown area.
Stockpiling.
Waste and wastewater management.
High Level Environmental Activities
Diligent compliance monitoring of the EMPr, Environmental Authorisation and other relevant environmental legislation.
Implement Environmental Monitoring Programme (e.g. avifauna).
Reinstatement and rehabilitation of construction domain.
On-going consultation with IAPs.
Other activities as per EMPr.

15.4.3 Project Phase: Operation

Some of the main Project activities, as well as high-level environmental activities, to be undertaken in the operational phase are listed in **Table 32** below.

Table 32: Simplified List of Activities associated with Operational Phase

Project Phase: Operation
Project Activities
Testing and commissioning the Project's components.
Cleaning of PV modules
Servitude access arrangements and requirements.
Routine maintenance inspections of interconnection cable.
Controlling vegetation.
Managing stormwater and waste.
Conducting preventative and corrective maintenance.
Monitoring of the PV facility's performance.
High Level Environmental Activities
On-going consultation with I&APs.

Project Phase: Operation
Other activities as per EMPr for Operational Phase.

15.5 Environmental Aspects

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

The environmental aspects that have been identified for the Project, which are linked to the project activities (refer to **Section 15.4** above), are provided in **Table 33** below. Note that only high level aspects are provided.

Table 33: Environmental Aspects associated with Project Life-Cycle

Project Phase: Pre-construction
Environmental Aspects
Inadequate consultation with landowners, affected parties, stakeholders and authorities.
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.
Absence of relevant permits (e.g. for protected plants, heritage resources - if encountered).
Poor waste management.
Absence of, or poorly maintained, ablution facilities.

Project Phase: Construction
Environmental Aspects
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.
Disturbance of topsoil.
Poor management of excavations.
Inadequate storage and handling of material.
Inadequate storage and handling of hazardous material.

Project Phase: Construction
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.
Damage to significant flora (if encountered).
Damage to significant fauna (if encountered).
Inadequate stormwater management.
Damage to surrounding environmentally sensitive areas.
Damage to cultural heritage and palaeontological features (if encountered).
Poor reinstatement and rehabilitation.

Project Phase: Operation
Environmental Aspects
Inadequate environmental and compliance monitoring.
Inadequate management of routine maintenance and maintenance works.
Inadequate management of vegetation.
Inadequate stormwater management.
Pollution caused by cleaning of panels.
Pollution caused by dangerous goods stored on site
Inadequate management of light pollution.
Failure to comply with health, safety and environmental specifications.

15.6 Potentially Significant Environmental Impacts

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

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

The potentially significant environmental impacts associated with the Project, as listed in **Table 34** below, were identified through an appraisal of the following:

- Project-related components and infrastructure (see **Section 5.4**) as well as the resources and services required (see **Section 5.6**);

- Activities (see **Section 15.4**) and aspects (see **Section 15.5**) 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 13**);
- Findings from specialist studies (see **Section 14**);
- Understanding of direct and indirect effects of the Project as a whole (see **Section 15**);
- Comments received during public participation from authorities and I&APs; and
- Legal and policy context (see **Section 8**).

Note that the list of impacts in **Table 34** below is elaborated on in the impact assessments that follow in **Sections 15.9 – 15.26** below.

Table 34: Potentially Significant Environmental Issues

Environmental Factor	Construction Phase Potential Issues / Impacts	Operational Phase Potential Issues / Impacts
Land Use	▪ Permanent change in land use at PV site and along power line route. ▪ Sterilisation of land.	▪ Sterilisation of land for other land use types up to the decommissioning of the Project (if applicable).
Geology	▪ Suitability of geological conditions to support the proposed infrastructure.	▪ Suitability of geological conditions to support the infrastructure.
Geohydrology	▪ Groundwater pollution due to spillages and poor construction practices.	▪ Groundwater pollution due to poor operation and maintenance practices.
Topography	▪ Visual impact. ▪ Erosion of areas cleared for construction purposes.	▪ Visual impact caused by proposed Project infrastructure and landscape transformation.
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 site.	▪ Alteration of drainage over site.
Flora & Fauna	▪ Habitat loss / fragmentation. ▪ Potential loss, disturbance or displacement of 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. ▪ Chemical pollution associated with cleaning the PV panels. ▪ Proliferation of invasive alien species in disturbed areas. ▪ Pollution from use of herbicides.
Socio-economic Environment	▪ Influx of people seeking employment and associated impacts (e.g. foreign	▪ Direct and indirect economic opportunities as a result of the Project (addition of MW to the national grid).

Environmental Factor	Construction Phase Potential Issues / Impacts	Operational Phase Potential Issues / Impacts
	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).	
Air Quality	▪ Dust from the use of dirt roads by construction vehicles. ▪ Dust from bare areas that have been cleared for construction purposes. ▪ Emissions from construction equipment and machinery. ▪ Tailpipe emissions from construction vehicles.	▪ The efficiency of the solar plant could be reduced if the modules are soiled (covered) by particulates/dust. ▪ Impacts to air quality caused by the operation and maintenance of the facility include dust from the use of dirt roads and tailpipe emissions from vehicles.
Noise	▪ Localised increases in noise may be caused by construction activities.	N/A
Agriculture	▪ Soil erosion. ▪ Loss of topsoil. ▪ Risk of harm to livestock (associated with informal grazing) from construction activities.	▪ Soil erosion due to inadequate stormwater management.
Historical and Cultural Features	▪ Potential 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. ▪ 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.
Civil Aviation	▪ Impact on Air Traffic Navigation and Communication. ▪ Sun glare off PV panels blinding aircraft pilots.	
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. ▪ Poor water and sanitation. ▪ Communicable diseases. ▪ Safety and security.	▪ Hazards related to operation and maintenance work.

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. As can be seen from the various impact assessments performed by the specialists, there are a cross-cutting impacts that are addressed in a number of these studies, with particular reference to the land use, terrestrial ecology and socio-economic effects of the Project. The mitigation measures proposed by the specialists for these similar types of impacts are regarded as complementary and they are aligned with best practices and principles.

15.7 Impact Assessment Methodology

The impacts and the proposed management thereof are first discussed in **Section 15.9** to **Section 15.26** below on a qualitative level and thereafter quantitatively assessed by evaluating the nature, extent, magnitude, duration, probability and ultimately the significance of the impacts (refer to methodology provided in **Table 35** below). Where applicable, the impact assessments and significance ratings provided by the respective specialists are included.

In the case of the specialist studies, some of the impact assessment methodologies deviated from the approach shown in **Table 35** below. However, the quantitative basis for these specialist evaluations of the impacts to specific environmental features still satisfied the intention of the EIA.

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

Table 35: Quantitative Impact Assessment Methodology

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

15.8 Impact Mitigation

15.8.1 Mitigation Hierarchy

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

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

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

The proposed mitigation of the impacts associated with the Project includes specific measures identified by the environmental specialists and the technical team (including engineering solutions), 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 J**) 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 BAR.

15.8.2 EMPr Framework

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

The content of an EMPr must either contain the information set out in Appendix 4 of GN No. R. 982 of 4 December 2014, as amended, or must be a generic EMPr relevant to an application as identified and gazetted by the Minister in a Government Notice. Once the Minister has identified, through a Government Notice, that a generic EMPr is relevant to an application for Environmental Authorisation, that generic EMPr must be applied by all parties involved in the EA process, including, but not limited to, the Applicant and the Competent Authority.

In accordance with the above, the following EMPr was developed for the Project:

- EMPr for the Solar PV Project (contained in **Appendix J**);

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

15.9 Land Use

Land is required for constructing the proposed infrastructure associated with the PV Project. In addition.

The dominant land use and land cover in the areas earmarked for the project infrastructure is presented in **Section 13.2** above. The proposed PV site is located on Eskom (Applicant) owned land, which has historically been used for limited stock grazing and a failed attempt at cultivation of crops.

To minimise impacts to the receiving environment and current land uses, the proposed power line/cable route is aligned adjacent to existing transmission line servitudes and roads as far as possible.

Table 36: Assessment of Land Use Impacts

Environmental Feature	**Land Use**
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**
• Permanent change in land use at PV site and along power line route. • Sterilisation of land.	• Rehabilitation post operation.

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

15.10 Soils

The land at the proposed PV site consists of predominantly loose sandy soil, which has a high or moderate sensitivity or susceptibility to water erosion, but given the relatively flat terrain, water erosion is expected to be relatively limited. However, susceptibility to wind erosion if exposed is expected to be relatively high.

During the construction phase areas will be cleared of vegetation, which may lead to soil erosion under certain circumstances. Erosion could also take place in the absence of suitable stormwater

management. The EMPr includes stormwater 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, oil).

Table 37: Assessment of Soil Impacts

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 (wind) • Soil compaction • Soil contamination	• Stabilisation of cleared areas to prevent and control erosion. • Incremental site clearance to prevent significant wind erosion of large bare surfaces. • Placement of wind breaks and dust suppression to prevent wind erosion of bare surfaces. • Manage drainage from sites to minimise erosion. • Reinstate and rehabilitate disturbed areas within development footprint to uncompact soil and prevent future erosion. • See mitigation measures regarding hazardous substances & waste.

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

15.11 Geohydrology

Given that the groundwater table appears to be very deep it is unlikely that groundwater will be a significant factor on this project.
Groundwater may however be impacted by the Project as follows:

- Potential contamination of groundwater during construction and operational phases as a result of inadequate management of wastewater and spillages of dangerous goods.

Since there is no surface water in the vicinity of the proposed sites, the impact is considered negligible and was not assessed.

Table 38: Assessment of Geohydrology Impacts

Environmental Feature	**Geohydrology**
Relevant Alternatives & Activities	**Construction and operational activities**
Project life-cycle	**Construction & operational phases**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Groundwater pollution.	• Suitable protection of groundwater during excavations should ingress be observed. • All storage tanks containing hazardous materials must be placed in bunded containment areas with impermeable surfaces. The bunded area must be able to contain 110% of the total volume of the stored hazardous substance. • Provide sufficient and suitable sanitation facilities during construction and operational phases, which shall conform to all relevant health and safety standards and codes. • Regular servicing of sanitation facilities by a registered service provider. • In the event of dewatering of excavations - reduce sediment loads in water from dewatering operations. All dewatering should be done through temporary sediment traps (e.g. constructed out of geo-textiles and hay bales).

Alternative 1	**+/- Impacts**	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	-	local	medium	long-term	unlikely	3
After Mitigation	-	local	low	long-term	rare	1
Alternative 2	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	local	medium	long-term	unlikely	3
After Mitigation	-	local	low	long-term	rare	1

15.12 Terrestrial Ecology

The following impact assessment has been extracted from the Terrestrial Ecological Impact Assessment report (**Appendix D1**).

Potential impacts were evaluated against the data captured during the desktop and field assessments to identify relevance to the project area. The relevant impacts associated with the proposed development were then subjected to a prescribed impact assessment methodology which is available on request.

Anthropogenic activities drive habitat destruction causing displacement of fauna and flora and possibly direct mortality. Land clearing destroys local wildlife habitat and can lead to the loss of local breeding grounds, nesting sites and wildlife movement corridors such as rivers, streams and drainage lines, or other locally important features. The removal of natural vegetation may reduce the habitat available for fauna species and may reduce animal populations and species compositions within the area.

The following potential main impacts on the biodiversity (based on the framework above) were considered for the construction phase of the proposed development. This phase refers to the period during construction when the proposed features are constructed; and is considered to have the largest direct impact on biodiversity. The main anticipated impact includes the clearing of vegetation, thus will ultimately lead to the loss of CBA 1, proliferation of alien plant species along the roads and cleared areas as well as the severing of movement corridors for fauna, loss of fauna and flora SCCs and the fragmentation of habitat. The following potential impacts to terrestrial biodiversity were considered:

- Destruction, further loss and fragmentation of the of habitats, ecosystems and vegetation community;
- Introduction of alien species, especially plants;
- Destruction of protected plant species;
- Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and poaching); and
- Chemical pollution associated with dust suppressants (if used).

The operational phase of the impact of daily activities is anticipated to further spread the IAP, as well as the deterioration of the habitats due to the increase of dust and edge effect impacts. Dust reduces the ability of plants to photosynthesize and thus leads to degradation/retrogression of the veld. Moving maintenance and mining vehicles do not only cause sensory disturbances to fauna, affecting their life cycles and movement, but will lead to direct mortalities due to collisions. The use of non-environmentally friendly chemical for the cleaning of the PV panels can lead to the pollution of water sources and ultimately death of fauna and flora.

The following potential impacts were considered:

- Continued fragmentation and degradation of habitats and ecosystems ;
- Spread of alien and/or invasive species; and
- Ongoing displacement and direct mortalities of faunal community due to disturbance (road collisions, collisions with substation, noise, light, dust, vibration).
- Chemical pollution associated with measures to keep PV clean.

Table 39: Assessment of significance of potential impacts on the terrestrial fauna and flora associated with the construction phase – Alternative 1 (TBC, 2022a)

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

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
collisions, noise, light, dust, vibration);												
	4	4	4	3	4		2	2	2	2	1	
Chemical pollution associated with dust suppressants	Life of operation or less than 20 years: Long Term	Regional within 5 km of the site boundary / < 2000ha impacted	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Highly likely	**Moderately High**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Highly unlikely	**Absent**

Table 40: Assessment of significance of potential impacts on terrestrial fauna and flora associated with the operational phase – Alternative 1 (TBC, 2022a)

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Continued fragmentation and degradation of habitats and ecosystems	5	3	4	4	4		4	3	3	3	3	
	Permanent	Local area/ within 1 km of the site boundary / < 5000ha impacted /	Great / harmful/ ecosystem structure and function largely altered	Ecology highly sensitive /important	Highly likely	**Moderately High**	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Moderate**
	4	3	3	4	3		2	2	2	2	3	
Spread and/or establishment of alien and/or invasive species	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted /	Significant / ecosystem structure and function moderately altered	Ecology highly sensitive /important	Likely	**Moderate**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with substation, noise, light, dust, vibration)	4	3	3	4	3		3	2	2	2	2	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted /	Significant / ecosystem structure and function moderately altered	Ecology highly sensitive /important	Likely	**Moderate**	One year to five years: Medium Term	Development specific/ within the site boundary / < 100 ha impacted	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Possible	**Low**
Chemical pollution associated with measures to keep PV clean	4	3	3	4	3		2	2	2	2	3	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted /	Significant / ecosystem structure and function moderately altered	Ecology highly sensitive /important	Likely	**Moderate**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Likely	**Low**

Table 41: Assessment of significance of potential impacts on the terrestrial fauna and flora associated with the construction phase – Alternative 1 (TBC, 2022a)

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Destruction, fragmentation and degradation of	5	3	4	3	5		4	2	3	4	4	
	Permanent	Local area/ within 1 km of the site boundary /	Great / harmful/ ecosystem structure	Ecology moderately sensitive/ /important	Definite	**Moderately High**	Life of operation or less than 20	Development specific/ within the site	Significant / ecosystem structure and	Ecology highly sensitive /important	Highly likely	**Moderate**

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

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
		< 5000ha impacted / Linear features affected < 1000m	moderately altered				Short Term	boundary / < 100 ha impacted / Linear features affected < 100m	function largely unchanged			
Chemical pollution associated with dust suppressants	4	4	4	3	4		2	2	2	2	2	
	Life of operation or less than 20 years: Long Term	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Highly likely	**Moderately High**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Possible	**Absent**

Table 42: Assessment of significance of potential impacts on terrestrial fauna and flora associated with the operational phase – Alternative 1 (TBC, 2022a)

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

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

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

Table 43: Mitigation Measures – Terrestrial Ecology (TBC, 2022a)

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Management outcome: Vegetation and Habitats				
Areas rated as High sensitivity within Site 1, should be declared as 'no-go' areas.	Construction Phase	Project manager, Environmental Officer	Development footprint	Ongoing
Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible. All activities must be restricted too within the low/medium sensitivity areas. No further loss of very high/high sensitivity areas should be permitted. It is recommended that areas to be developed be specifically demarcated so that during the construction phase, only the demarcated areas be impacted upon.	Life of operation	Project manager, Environmental Officer	Areas of indigenous vegetation	Ongoing
Existing access routes, especially roads must be made use of.	Construction/Operational Phase	Environmental Officer & Design Engineer	Roads and paths used	Ongoing
All laydown, chemical toilets etc. should be restricted to medium sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction phase has been concluded. No permanent construction phase structures should be permitted. Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated project areas.	Construction/Operational Phase	Environmental Officer & Design Engineer	Laydown areas	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood and wind events. This will also reduce the likelihood of encroachment by alien invasive plant species. All livestock must always be kept out of the project area, especially areas that have been recently re-planted	Operational phase	Environmental Officer & Contractor	Assess the state of rehabilitation and encroachment of alien vegetation	Quarterly for up to two years after the closure
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. Construction activities and vehicles could cause spillages of lubricants, fuels and waste material potentially negatively affecting the functioning of the ecosystem. All vehicles and	Life of operation	Environmental Officer & Contractor	Spill events, Vehicles dripping.	Ongoing

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area.				
It should be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.	Life of operation	Project manager, Environmental Officer	Any instances	Ongoing
A fire management plan needs to be complied and implemented to restrict the impact fire might have on the surrounding areas.	Life of operation	Environmental Officer & Contractor	Fire Management	During Phase
Any individual of the protected plants that are present needs a relocation or destruction permit in order for any individual that may be removed or destroyed due to the development. Hi visibility flags must be placed near any threatened/protected plants in order to avoid any damage or destruction of the species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program. Infrastructure, development areas and routes where protected plants cannot be avoided, these plants many being geophytes or small succulents should be removed from the soil and relocated/ re-planted in similar habitats where they should be able to resprout and flourish again. All protected and red-data plants should be relocated, and as many other geophytic species as possible.	Life of operation	Project manager, Environmental Officer	Protected Tree/Plant species	Ongoing
A pre-construction survey in the flowering season (July-September) should be conducted in order to ensure that a more comprehensive floral presence confirmation. For the threatened species that may not be destroyed, it is recommended that professional service providers that deal with plant search and rescue be used to remove such plants and use them either for later rehabilitation work other conservation projects.	Planning Phase, Pre-Construction	Project manager, Environmental Officer & Contractor	Flora species	During Phase
Management outcome: Fauna				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
A qualified environmental control officer must be on site when construction begins. A site walk through is recommended by a suitably qualified ecologist prior to any construction activities, preferably during the wet season and any SSC should be noted. In situations where the threatened and protected plants must be removed, the proponent may only do so after the required permission/permits have been obtained in accordance with national and provincial legislation. In the abovementioned situation the development of a search, rescue and recovery program is suggested for the protection of these species. Should animals not move out of the area on their own	Construction Phase	Environmental Officer, Contractor	Presence of any floral or faunal species.	During phase

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
relevant specialists must be contacted to advise on how the species can be relocated				
The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments, • Signs must be put up to enforce this	Construction/Operational Phase	Project manager, Environmental Officer	Infringement into these areas	Ongoing
The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on fauna.	Construction	Project manager, Environmental Officer & Design Engineer	Construction/Closure Phase	Ongoing
Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to amphibian species and nocturnal mammals	Construction/Operational Phase	Environmental Officer	Noise levels	Ongoing
No trapping, killing, or poisoning of any wildlife is to be allowed • Signs must be put up to enforce this;	Life of operation	Environmental Officer	Evidence of trapping etc	Ongoing
Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided and sodium vapor (green/red) lights should be used wherever possible.	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Light pollution and period of light.	Ongoing
Try incorporating motion detection lights as much as possible to reduce the duration of illumination. Heights of light columns to be minimised to reduce light spill. Baffles, hoods or louvres to also be used to reduce light spill	Construction Phase	Environmental Officer & Design Engineer	Light pollution	Ongoing
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited.	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing
Schedule activities and operations during least sensitive periods, to avoid migration, nesting and breeding seasons.	Life of operation	Project manager, Environmental Officer & Design Engineer	Activities should take place during the day in the case.	Ongoing
All areas to be developed must be walked through prior to any activity to ensure no nests or fauna species are found in the area. Should any Species of Conservation Concern not move out of the area or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken.	Construction and Operational phase	Project manager, Environmental Officer	Presence of Nests and faunal species	Planning, Construction and Rehabilitation
Any holes/deep excavations must be dug and planted in a progressive manner and shouldn't be left open overnight; • Should the holes overnight they must be covered temporarily to ensure no small fauna species fall in.	Planning and Construction	Environmental Officer & Contractor, Engineer	Presence of trapped animals and open holes	Ongoing
Ensure that cables and connections are insulated successfully to reduce electrocution risk.	Life of project	Environmental Officer & Contractor, Engineer	Presence of electrocuted fauna	Ongoing
Any exposed parts must be covered (insulated) to reduce electrocution risk.	Life of project	Environmental Officer & Contractor, Engineer	Presence of electrocuted fauna	Ongoing

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Heat generated from the substations must be monitored to ensure it does not negatively affect the local fauna	Life of operation	Environmental Officer & Contractor	Heat generated by substations	Ongoing
Use environmentally friendly cleaning and dust suppressant products	Construction and operation	Environmental Officer & Contractor, Engineer	Presence of chemicals in and around the project area	Ongoing
Fencing mitigations: • Top 2 strands must be smooth wire • Routinely retention loose wires • Minimum 30cm between wires • Place markers on fences	Planning, construction and operation	Environmental Officer & Contractor, Engineer	Monitor fences for slack wires	Ongoing
Management outcome: Alien species				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Compilation of and implementation of an alien vegetation management plan.	Life of operation	Project manager, Environmental Officer & Contractor	Assess presence and encroachment of alien vegetation	Twice a year
The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprint of the roads must be kept to prescribed widths.	Construction/Operational Phase	Project manager, Environmental Officer & Contractor	Footprint Area	Life of operation
Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site	Life of operation	Environmental Officer & Health and Safety Officer	Presence of waste	Life of operation
A pest control plan must be put in place and implemented; it is imperative that poisons not be used due to the likely presence of SCCs	Life of operation	Environmental Officer & Health and Safety Officer	Evidence or presence of pests	Life of operation
Management outcome: Dust				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes wetting of exposed soft soil surfaces. • No non environmentally friendly suppressants may be used as this could result in pollution of water sources	Life of operation	Contractor	Dustfall	Dust monitoring program.
Management outcome: Waste management				
Impact Management Actions	**Implementation**		**Monitoring**	

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

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

15.13 Avifauna

A separate Avifaunal Assessment (contained in **Appendix D2**) was undertaken and the findings from this study are presented below.

The following potential impacts on the biodiversity were considered for the construction phase. This phase refers to the period during construction when the proposed infrastructure is constructed, and the area's surface is cleared. This phase usually has the largest direct impact on biodiversity: The following potential impacts were considered:

- Destruction, fragmentation and degradation of habitats;
- Displacement of avifaunal community (Including several SCC) due to disturbance such as noise, light, dust, vibration;
- Collection of eggs and poaching;
- Roadkill.
- The destruction of the habitat was rated as High pre-mitigation for Site 1, and Moderate for Site 2. The post-mitigation impacts for habitat loss for Site 1 and Site 2 are Moderately-High and Moderate. This impact can however not be mitigated completely as the habitat will still be lost.
- The use of environmentally friendly dust suppressants can reduce the risk of chemical pollution to a Low residual impact for both sites.
- The post-mitigation impacts caused by sensory disturbances, roadkill and egg poaching was also determined to be low for both sites.
- The construction phase of the road and cable route were assessed separately for the two alternatives. A Moderately-High impact significance is expected for the "Destruction, fragmentation and degradation of habitats" at Site 1. The habitat loss and degradation could be mitigated to Low impact for both site alternatives.

The operational phase of the impact of daily activities is anticipated to lead to collisions and electrocutions. Moving vehicles don't only cause sensory disturbances to avifauna, affecting their life cycles and movement, but will lead to direct mortalities due to collisions. The area surrounding the direct footprint will be maintained to prevent uncontrolled events such as fire, this practice will however result in the disturbance and displacement of breeding and non-breeding species. The pre-mitigation impact ratings are 'generally' higher for Site 1 when compared to Site 2, this is largely attributed to the assigned sensitivities of the two areas. The overall residual risk for Site 2 is Low, with the residual risk for habitat fragmentation and deterioration for Site 1 determined to remain Moderate. The following potential impacts were considered:

- Collisions with PV panels, associated powerlines and connection lines and fences;
- Electrocution with solar plant connections, although cables will be positioned below ground;
- Roadkill during maintenance procedures; and
- Habitat degradation and displacement of resident, visiting and breeding species (as well as SCCs).

- The risk of collisions, habitat loss and the construction of fencing all has a high risk prior to mitigations. With the successful implementation of the mitigations these impacts can be reduced to Low or Absent.

Table 44: The impacts associated with the construction phase for Site 1 (TBC, 2022b)

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

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

Table 45: The impacts associated with the operational phase for Site 1 (TBC, 2022b)

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Habitat Loss (Destroy, fragment and degrade habitat,	5	4	4	3	4		4	3	3	3	3	
	Permanent	Regional within 5 km of the site boundary /	Great / harmful/ ecosystem structure	Ecology moderately sensitive/ /important	Highly likely	**High**	Life of operation or less than 20	Local area/ within 1 km of the site boundary / <	Significant / ecosystem structure	Ecology moderately sensitive/ /important	Likely	**Moderate**

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

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

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
		affected < 1000m						features affected < 100m				
	5	4	4	4	5		2	3	3	3	3	
Fencing of PV site	Permanent	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	Great / harmful/ ecosystem structure and function largely altered	Ecology highly sensitive /important	Definite	**High**	One month to one year: Short Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Low**

Table 46: Impacts associated with the routes for the cable and road for Site 1 (TBC, 2022b)

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
	4	3	3	3	4		3	2	3	3	3	
Habitat Loss: Destroy, fragment and degrade habitat	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Highly likely	**Moderate**	One year to five years: Medium Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Low**

Table 47: The impacts associated with the construction phase for Site 2 (TBC, 2022b)

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

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

Table 48: The impacts associated with the operational phase for Site 2 (TBC, 2022b)

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

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

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
								affected < 1000m				
Chemical pollution associated with measures to keep PV clean	4	3	4	3	3		2	2	2	2	2	
	Life of operation or less than 20 years: Long Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Likely	**Moderate**	One month to one year: Short Term	Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	Small / ecosystem structure and function largely unchanged	Ecology with limited sensitivity/importance	Possible	**Absent**
Fencing of PV site	4	4	4	3	3		2	3	3	3	3	
	Life of operation or less than 20 years: Long Term	Regional within 5 km of the site boundary / < 2000ha impacted / Linear features affected < 3000m	Great / harmful/ ecosystem structure and function largely altered	Ecology moderately sensitive/ /important	Likely	**Moderate**	One month to one year: Short Term	Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	Significant / ecosystem structure and function moderately altered	Ecology moderately sensitive/ /important	Likely	**Low**

Table 49: Impacts associated with the cable route and permanent and construction road routes for Site 2 (TBC, 2022b)

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
Habitat Loss: Destroy, fragment	4	3	3	3	3		3	2	3	3	3	
	Life of operation	Local area/ within 1 km	Significant / ecosystem	Ecology moderately	Likely	**Moderate**	One year to five	Development specific/ within	Significant / ecosystem	Ecology moderately	Likely	**Low**

Impact	Prior to mitigation						Post mitigation					
	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance	Duration of Impact	Spatial Scope	Severity of Impact	Sensitivity of Receiving Environment	Probability of Impact	Significance
and degrade habitat of permanent route	or less than 20 years: Long Term	of the site boundary / < 5000ha impacted / Linear features affected < 1000m	structure and function moderately altered	sensitive/ /important			years: Medium Term	the site boundary / < 100 ha impacted / Linear features affected < 100m	structure and function moderately altered	sensitive/ /important		
Habitat Loss: Destroy, fragment and degrade habitat of temporary access route	4 Life of operation or less than 20 years: Long Term	3 Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear features affected < 1000m	3 Significant / ecosystem structure and function moderately altered	3 Ecology moderately sensitive/ /important	3 Likely	**Moderate**	3 One year to five years: Medium Term	2 Development specific/ within the site boundary / < 100 ha impacted / Linear features affected < 100m	2 Small / ecosystem structure and function largely unchanged	3 Ecology moderately sensitive/ /important	3 Likely	**Low**

Table 50: Summary of management outcomes pertaining to impacts to avifauna and their habitats (TBC, 2022b)

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Management outcome: Habitats				
Areas outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible.	Life of operation	Project manager, Environmental Officer	Areas of indigenous vegetation	Ongoing
The development footprint must be used for storage and the contractors' camps as well. This may not be outside the direct project area to ensure the disturbance area is as small as possible.	Construction	Project manager, Environmental Officer	Project footprint	During Stage
Where possible, existing access routes and walking paths must be made use of.	Construction/Operational Phase	Environmental Officer & Design Engineer	Roads and paths used	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during	Closure Phase/Rehabilitation phase	Environmental Officer & Contractor	Assess the state of rehabilitation and encroachment of alien vegetation	Quarterly for up to two years after the closure

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
flood and wind events. This will also reduce the likelihood of encroachment by alien invasive plant species.				
Any woody material removed can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion.	Closure Phase/ Post Closure Phase	Environmental Officer & Contractor	Road edges and project area footprint	During Phase
Rehabilitation of the disturbed areas existing in the project area must be made a priority. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are endemic to this vegetation type.	Operational/Closure Phase	Environmental Officer & Contractor	Road edges and footprint	During Phase
Erosion control and alien invasive management plan must be compiled.	Life of operation	Environmental Officer & Contractor	Erosion and alien invasive species	Ongoing
Environmentally friendly dust suppressants need to be utilised	Operational phase	Environmental Officer & Contractor	Water pollution	During Phase
A fire management plan needs to be compiled and implemented to restrict the impact fire might have on the surrounding areas.	Life of operation	Environmental Officer & Contractor	Fire Management	During Phase
Management outcome: Avifauna				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments. Signs must be put up to enforce this.	Construction/Operational Phase	Project manager, Environmental Officer	Infringement into these areas	Ongoing
All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting, or hunting terrestrial species (e.g., guineafowl and francolin), and owls, which are often persecuted out of superstition. Signs must be put up to enforce this.	Life of operation	Environmental Officer	Evidence of trapping etc	Ongoing
Any powerlines or connection lines must have bird flappers installed. This must be inline with the designs as advised by Birdlife South Africa.	Life of operation	Environmental Officer	Evidence of bird carcasses	Ongoing
The duration of the construction should be kept to a minimum to avoid disturbing avifauna.	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Construction/Closure Phase	During Phase
Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided and sodium vapor (red/green) lights should be used wherever possible.	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Light pollution and period of light.	During Phase

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limit (40km/h), to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited.	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing
Schedule or limit (where feasible) activities and operations during least sensitive periods, to avoid migration, nesting and breeding seasons (June – August)	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Activities should take place during the day in winter.	During Phase
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	During Phase
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.	Planning, Construction and Decommissioning	Project manager, Environmental Officer	Presence of Nests and faunal species	During Phase
The design of the proposed PV must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa (Jenkins *et al.*, 2015).	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds or bird strikes	During Phase
Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used.	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of bird collisions	During phase
All the parts of the infrastructure must be nest proofed and anti-perch devices placed on areas that can lead to electrocution	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds	During phase
Use environmentally friendly cleaning and dust suppressant products	Construction and operation	Environmental Officer & Contractor, Engineer	Presence of chemicals in and around the project area	During phase
Fencing mitigations: • Top 2 strands must be smooth wire • Routinely retention loose wires • Minimum 30cm between wires • Place markers on fences	Planning, construction, and operation	Environmental Officer & Contractor, Engineer	Presence of birds stuck /dead in fences Monitor fences for slack wires	During phase
As far as possible power cables within the project area should be thoroughly insulated and preferably buried.	Planning and construction	Environmental Officer & Contractor, Engineer	Exposed cables	During phase
Any exposed parts must be covered (insulated) to reduce electrocution risk	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds	During phase
White strips should be placed along the edges of the panels, to reduce similarity to water and deter birds and insects (Horvath *et al,* 2010). Consider the use of bird deterrent devices to limit collision risk.	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of dead birds in the project area	During phase

15.14 Agricultural

Based on the information extracted from the Soil and Agricultural Study (see **Section 13.18** and **Appendix D5**), the soils on the site exhibit low fertility and the area receives low rainfall. Therefore, agricultural potential is low. The site is used on occasion for ad hoc small livestock grazing.

The actual loss or sensitivity related to high potential land, grazing land, agricultural production or the loss of farming infrastructure due to the EP Proposed Projects, is very small and insignificant

Table 51: Assessment of agricultural impacts

Environmental Feature	**Agriculture**
Relevant Alternatives & Activities	**Construction and Operational domain of development footprint**
Project life-cycle	**Construction and Operational phase**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Soil erosion. • Loss of topsoil with seedbank. • Risk of harm to livestock (associated with informal grazing) from construction activities.	• Stabilisation of cleared areas to prevent and control erosion. • Incremental site clearance to prevent significant wind erosion of large bare surfaces. • Storage of upper soil horizon (topsoil) for rehabilitation activities post construction. • Placement of wind breaks to prevent wind erosion of bare surfaces. • Reinstate and rehabilitate disturbed areas within development footprint to uncompact soil and prevent future erosion. • Barricade or fence construction footprint to prevent livestock from coming into contact with construction activities and machinery.

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

15.15 Heritage, Archaeological and Cultural

The findings from the Heritage Impact Assessment (see **Section 13.15** and **14.6** and **Appendix D6**) were taken into account in the impact assessment below. The proposed Project sites were positioned in order to avoid identified locations of heritage and archaeological findings. Based on this, and the letter received from the authors of the study (see **Appendix D6** and **D7**), the impact to heritage and archaeological sites is considered low. Should chance finds be discovered during construction, mitigation measures are described below and within the EMPr.

There are no historical structures within the proposed project footprint, therefore there ware no impacts expected for the built environment, therefore they have not been assessed.

Table 52: Assessment of Heritage, Archaeological and Cultural impacts

Environmental Feature	**Heritage, Archaeological and Cultural Features**
Relevant Alternatives & Activities	**Construction and Operational domain of development footprint**
Project life-cycle	**Construction and Operational phase**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Potential direct impacts on below-ground archaeological deposits 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.	• Active monitoring by the appointed independent ECO during site clearing activities to identify any potential archaeological features. • Photograph and report any potential finds, including potential human remains, on site to the Province Archaeologist at HWC and/or the projects heritage consultant must be consulted immediately so that mitigatory action can be determined and be implemented if necessary. Cordon off the affected area until an appropriate way forward is established. • If an important find is made, it may be necessary to divert plant to allow the necessary time to collect/record the find. • Designate known archaeological sites as no-go areas. • Pre-construction walkthrough of the site by a qualified independent heritage/archaeological specialist. • Position the proposed infrastructure as close as possible to existing infrastructure to avoid impacting on the broader cultural landscape.

Alternative 1	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	local	low	permanent	unlikely	1
After Mitigation	-	local	low	permanent	rare	1
Alternative 2	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	local	low	permanent	unlikely	1
After Mitigation	-	local	low	permanent	rare	1

15.16 Palaeontology

The impact assessment from the Desktop Palaeontological Impact Assessment (PIA) (contained in **Appendix D3**) follow.

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

The impact assessment rating system can be found in Table 6 of the PIA under **Appendix D3**, which details the criteria used in the impact assessment contained in **Table 53** below.

Table 53: Summary of paleontological impacts assessed

	Site	Probability	Duration	Magnitude	Reversibility	Irreplicable Loss	Cumulative Effect	Significance	Significance
Pre-mitigation	1	1	4	4	4	4	2	64	Negative high Impact
Post-mitigation	1	1	1	1	1	1	2	16	Negative low Impact

The geotechnical report conducted for the Sere Wind Energy Farm (BKS Palace Consortium, 2010) found that the sand depth of the development area is 0-22m, while the approximate excavation depths for the Sere PV project are 1.5m. It is thus anticipated that excavations will not extend into the underlying bedrock of the PV project.
It is therefore considered that the proposed development will not lead to detrimental impacts on the palaeontological resources of the area. The construction and operation of the project may be authorised, as the whole extent of the development footprint is not considered sensitive in terms of palaeontological heritage.

However, if any fossil remains or trace fossils are discovered during any phase of construction or operation, either on the surface or exposed by excavations, a Chance Find Protocol must be implemented by the ECO in charge of this development. These discoveries should be protected (if possible, in situ) and the ECO must report such discovery 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). Suitable mitigation (e.g. recording and collection) will consequently be undertaken by a palaeontologist.

Preceding any collection of fossil material, the palaeontologist 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 required by SAHRA.

The Chance Finds Protocol included in the PIA has been included in the EMPr.

15.17 Visual Impact Assessment

The impact assessment from the Visual Impact Assessment (contained in **Appendix D4**) follows.

Visibility is determined by a line of sight where nothing obscures the view of an object. Exposure is defined by the degree of visibility, in other words "how much" of it can be seen. This is influenced by topography and the incidence of objects such as trees and buildings that obscure the view partially or in total.

Table 54: Summarizing the significance of visual impacts on a viewpoint that may be visible in the real world during the Construction phase (Eco Elementum, 2022)

Nature of impact: Potential visual impact of the proposed Solar PV project for the construction phase.			
		Unmitigated	**Mitigated**
Assessment Criteria	**Severity** [Insignificant / non-harmful (1); Small / potentially harmful (2); Significant / slightly harmful (3); Great / harmful (4); Disastrous / extremely harmful / within a regulated sensitive area (5)]	2	2
	Spatial Scale [Area specific (at impact site) (1); Whole site (entire surface right) (2); Local (within 5km) (3); Regional / neighbouring areas (5 km to 50 km) (4); National (5)]	1	1
	Duration [One day to one month (immediate) (1); One month to one year (Short term) (2); One year to 10 years (medium term) (3); Life of the activity (long term) (4); Beyond life of the activity (permanent) (5)]	2	2
	Frequency of Activity [Annually or less (1); 6 monthly (2); Monthly (3); Weekly (4); Daily (5)]	4	4
	Frequency of Incident/Impact [Almost never / almost impossible / >20% (1); Very seldom / highly unlikely / >40% (2); Infrequent / unlikely / seldom / >60% (3); Often / regularly / likely / possible / >80% (4); Daily / highly likely / definitely / >100% (5)	4	3
	Legal Issues [No legislation(1); Fully covered by legislation (5)]	1	1
	Detection [Immediately(1); Without much effort (2); Need some effort (3); Remote and difficult to observe (4); Covered (5)]	3	3
Consequence	Severity + Spatial Scale + Duration	5	5
Likelihood	Frequency of Activity + Frequency of impact + Legal issues + Detection	12	11
Risk	Consequence * Likelihood	MODERATE (60)	LOW (55)
Mitigation:	The visual impact can be minimized creating a visual barrier. The construction area will be cleared as soon as construction of the infrastructure is finished.		
Cumulative Impact:	The construction of the proposed Sere PV project with its associated infrastructure will increase the cumulative visual impact of Solar PV type infrastructure within the region. In context of the existing wind farm and desert landscape the construction phase of Sere PV structures will contribute to a regional increase in heavy vehicles on the roads in the region, with construction activity noticeable.		

The impact on the surrounding land users will be more significant but can still be seen as LOW because of the short time the proposed activity will be undertaken. Although the construction activities will be highly visible, the time of exposure is short and thus the impact on the users will be low after mitigation measures have been implemented.

Below the permanent impact of each alternative is presented in **Table 52** and **53** below.

Table 55: Impact table summarising the significance of the structures on users of roads and land-users for Alternative 1 (Eco Elementum, 2022)

Nature of impact: Potential visual impact of the proposed Solar PV project.			
		Unmitigated	**Mitigated**
Assessment Criteria	**Severity** [Insignificant / non-harmful (1); Small / potentially harmful (2); Significant / slightly harmful (3); Great / harmful (4); Disastrous / extremely harmful / within a regulated sensitive area (5)]	**2**	**2**
	Spatial Scale [Area specific (at impact site) (1); Whole site (entire surface right) (2); Local (within 5km) (3); Regional / neighbouring areas (5 km to 50 km) (4); National (5)]	**4**	**2**
	Duration [One day to one month (immediate) (1); One month to one year (Short term) (2); One year to 10 years (medium term) (3); Life of the activity (long term) (4); Beyond life of the activity (permanent) (5)]	**4**	**4**
	Frequency of Activity [Annually or less (1); 6 monthly (2); Monthly (3); Weekly (4); Daily (5)]	**5**	**5**
	Frequency of Incident/Impact [Almost never / almost impossible / >20% (1); Very seldom / highly unlikely / >40% (2); Infrequent / unlikely / seldom / >60% (3); Often / regularly / likely / possible / >80% (4); Daily / highly likely / definitely / >100% (5)	**4**	**3**
	Legal Issues [No legislation(1); Fully covered by legislation (5)]	**1**	**1**
	Detection [Immediately(1); Without much effort (2); Need some effort (3); Remote and difficult to observe (4); Covered (5)]	**3**	**3**
Consequence	Severity + Spatial Scale + Duration	**10**	**8**
Likelihood	Frequency of Activity + Frequency of impact + Legal issues + Detection	**13**	**12**
Risk	Consequence * Likelihood	**MODERATE (130)**	**MODERATE (96)**
Mitigation:	Painting the supporting building dark natural colours.		
Cumulative Impact:	The construction of the proposed Sere PV structures with its associated infrastructure will increase the cumulative visual impact of Solar PV infrastructure within the region. In context of the existing wind farm, and desert landscape, the added structures will contribute to an increase in visual impact on the immediate land users.		

Table 56: Impact table summarising the significance of the structures on users of roads and land-users for Alternative 2 (Eco Elementum, 2022)

Nature of impact: Potential visual impact of the proposed Solar PV project.			
		Unmitigated	**Mitigated**
Assessment Criteria	**Severity** [Insignificant / non-harmful (1); Small / potentially harmful (2); Significant / slightly harmful (3); Great / harmful (4); Disastrous / extremely harmful / within a regulated sensitive area (5)]	**2**	**2**
	Spatial Scale [Area specific (at impact site) (1); Whole site (entire surface right) (2); Local (within 5km) (3); Regional / neighbouring areas (5 km to 50 km) (4); National (5)]	**4**	**2**
	Duration [One day to one month (immediate) (1); One month to one year (Short term) (2); One year to 10 years (medium term) (3); Life of the activity (long term) (4); Beyond life of the activity (permanent) (5)]	**4**	**4**
	Frequency of Activity [Annually or less (1); 6 monthly (2); Monthly (3); Weekly (4); Daily (5)]	**5**	**5**
	Frequency of Incident/Impact [Almost never / almost impossible / >20% (1); Very seldom / highly unlikely / >40% (2); Infrequent / unlikely / seldom / >60% (3); Often / regularly / likely / possible / >80% (4); Daily / highly likely / definitely / >100% (5)	**4**	**3**
	Legal Issues [No legislation(1); Fully covered by legislation (5)]	**1**	**1**
	Detection [Immediately(1); Without much effort (2); Need some effort (3); Remote and difficult to observe (4); Covered (5)]	**3**	**3**
Consequence	Severity + Spatial Scale + Duration	**10**	**8**
Likelihood	Frequency of Activity + Frequency of impact + Legal issues + Detection	**13**	**12**
Risk	Consequence * Likelihood	**MODERATE (130)**	**MODERATE (96)**
Mitigation:	Painting the supporting building dark natural colours.		
Cumulative Impact:	The construction of the proposed Sere PV structures with its associated infrastructure will increase the cumulative visual impact of Solar PV infrastructure within the region. In context of the existing wind farm, and desert landscape, the added structures will contribute to an increase in visual impact on the immediate land users.		

Potential permanent visual impact on the Viewpoints is expected to have a MODERATE impact before mitigation and MODERATE significance after mitigation, as indicated in the table below. The structures will be MODERATE visible from the Viewpoints, the time of exposure is permanent and thus the impact on the users will still remain MODERATE.

The modelling of visibility is merely conceptual. Being based on DEM and Land cover data, it does not take into account the real world effect of buildings, trees etc. that could shield the structures from being visible or could have changed over time.

The viewshed analysis therefore signifies a worst-case scenario. The immediate landscape surrounding the observer has a determining influence on long distance views. It is expected that different land cover may offer some degree of visual screening, especially where tall trees occur

around farmsteads. This influence was quantified using the land cover data, it must however be noted that this can change on a micro scale or land cover may have changed over time.

Mitigation measures may be considered in two categories:

- Primary measures that intrinsically comprise part of the development design through an iterative process. Mitigation measures are more effective if they are implemented from project inception when alternatives are being considered.
- Secondary measures designed to specifically address the remaining negative effects of the final development proposals.

Primary measures that will be implemented will mainly be measures that will minimise the visual impact by softening the visibility of the structures by “blending” with the surrounding areas. Such measures will include rehabilitation of the area at end of life and painting the supporting infrastructure buildings dark natural colours.

Secondary measures will include final rehabilitation, after care and maintenance of the vegetation and to ensure that the final landform is maintained.

The Visual Impact due to the proposed solar PV project and associated infrastructure can be seen as having a MODERATE impact on the surrounding environment before mitigation measures are implemented. After mitigation, the visual impact can be seen as MODERATE although lower. Thus, mitigation measures are very important and one of the most significant mitigation measures are the rehabilitation of the area at end of project life. If the rehabilitation of the impact is not done correctly and the final landform do not fit into the surrounding area then the visual impact will remain high and become a concern. However, with correct rehabilitation, the impact will be minimal and there should be no visual impact after the landform has been restored

Taking into account the modelled data, the visual impact on the identified sensitive receptors can be seen as insignificant for both the proposed and alternative scenarios.

15.18 Air Quality

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

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

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

- Construction phase –
  - Dust from the use of dirt roads by construction vehicles;

- Dust from bare areas that have been cleared for construction purposes; and
- Emissions from construction equipment and machinery.

❑ Operational phase –

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

Mitigation measures are included in the EMPr to ensure that the air quality impacts during the construction phase are suitably managed. 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 PV Plant, local atmospheric pollution may reduce the irradiation received or contain airborne corrosive substances. The efficiency of the solar plant can be reduced if the modules are soiled (covered) by particulates/dust.

Table 57: Assessment of Air Quality Impacts

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, particularly during prolonged periods of dry, windy weather. Dust suppression to be undertaken for all bare areas, including construction area and access roads. • Incremental site clearance to prevent significant wind erosion of large bare surfaces. • Placement of wind breaks and dust suppression to prevent wind erosion of bare surfaces. • Reinstate and rehabilitate disturbed areas within development footprint to uncompact soil and prevent excessive wind erosion. • 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.

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

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

15.19 Noise

Sensitive receptors to noise impacts in the study area include people residing in the surrounding rural areas (although located far from the site given the very low population density in the area), the operational staff at the SERE Wind Facility, as well as ecological receptors (fauna).

During construction, localised increases in noise will be caused by earthworks, establishment and operating of site construction laydown area, construction of proposed infrastructure, transportation of construction workers and material, activities at the construction camp, and general construction noise.

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.

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.

Table 58: Assessment of Noise Impacts

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 apply although the site is not within audible distance of residents. • 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. • 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.

Alternative 1	**+/- Impacts**	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	-	local	low	short-term	Almost certain	2
After Mitigation	-	local	low	short-term	unlikely	1
Alternative 2	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	local	low	short-term	Almost certain	2
After Mitigation	-	local	low	short-term	moderate	1

The closest sensitive receptor is the SERE Wind Facility O&M buildings and office; therefore, it is expected that the staff of the Wind Facility will be most affected. Since Alternative 2 is situated closer to the O&M buildings, it is anticipated that the impact will be slightly higher than for Alternative 1 despite mitigation.

15.20 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 may include oil, fuel, solvents and pesticides (amongst others).

General construction waste will comprise of surplus or off-specification materials (e.g. concrete, wooden pallets, packaging paper or plastic, wood, metals, etc.) and construction debris. Domestic

waste will include food waste, plastic, glass, aluminum cans and waste paper. A small proportion of the waste generated during construction phase will be hazardous and may include used oil, hydraulic fluids, waste fuel, grease and waste oil containing rags. Wastewater, including water adversely affected in quality through construction-related activities and human influence, will include sewage, water used for washing purposes (e.g. equipment, staff) and drainage over contaminated areas (e.g. workshop, equipment storage areas).

Waste types likely to be generated during routine operation and maintenance activities include dielectric fluids, clearing agents, oils, solvents, wastewater, defunct / damaged PV cells and domestic waste.

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

Table 59: Assessment of Hazardous Substances and Waste Impacts

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. • Drip trays should be placed under construction vehicles and machinery to collect ad hoc leaks. Machinery and vehicles should be serviced and in good working condition to prevent leaks. • Storage and use of hazardous materials will be strictly controlled to prevent environmental contamination and will adhere to the requirements stipulated on the Material Safety Data Sheets. • In the event of spillages of hazardous substances the appropriate clean up and disposal measures shall be implemented. • Waste to be disposed of at a licenced waste disposal facility. • Water used for cleaning of PV panels will not contain any harmful chemicals or additives. • Wastewater to be properly disposed of. Contaminated water will not be discharged to the environment. • Used PV panels are to be removed by the suppliers and suitably disposed of or recycled.

Alternative 1	**+/- Impacts**	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	-	local	medium-high	long-term	likely	3
After Mitigation	-	local	low	long-term	unlikely	1
Alternative 2	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	local	medium-high	long-term	likely	3
After Mitigation	-	local	low	long-term	unlikely	1

15.21 Existing Structures and Infrastructure

Potential impacts of the Project will be limited to Eskom's own existing structures and infrastructure, aside from the use of the district road north of the site. Potential impacts include:

- Disruptions to services or damage caused as a result of construction activities;
- Disruptions to traffic on roads to be used by construction vehicles.

The above impacts will be limited to the construction phase.

Table 60: Assessment of Existing Structures and Infrastructure Impacts

Environmental Feature	**Existing Structures and Infrastructure**
Relevant Alternatives & Activities	**All activities that affect existing structures and infrastructure**
Project life-cycle	**Construction phases**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Disruption of existing services • Damage to existing structures and infrastructure • Traffic disruptions	• Identify and record existing services and infrastructure. • Ensure access to infrastructure is always available to Eskom for maintenance and operational purposes. • Immediately notify Eskom of disturbance or damage to services and infrastructure. Rectify disturbance/damage to services/infrastructure, in consultation with Eskom. Maintain a record of all disturbances/damage and remedial actions on site. • Adequate reinstatement and rehabilitation of affected environment. • Adhere to the traffic laws and speed limits of roads at all times.

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

15.22 Health and Safety

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;
- Poor water and sanitation services to construction workers; and
- Communicable diseases;

These risks are addressed through mitigation measures identified under other environmental features, such as socio-economic environment, 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.

Other health and safety related 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.);
- Emergency fire hazards;
- RFI although localised to inverters and not expected to be hazardous to the health of operational staff and contractors; and
- Electrocution of workers.

Table 61: Assessment of Health and Safety Impacts

Environmental Feature	**Health and Safety**
Relevant Alternatives & Activities	**Construction activities**
Project life-cycle	**Construction phase**
Potential Aspects & Impacts	**Proposed Management Objectives / Mitigation Measures**
• Health and safety risks during construction	• Dedicated Occupational Health and Safety system to be implemented by the Contractor. • Undertake a hazard identification and risk assessment and identify preventive and protective measures. • Conduct basic safety awareness training with construction workers. • Provide all workers with the necessary Personal Protective Equipment (PPE). • Prevent environmental contamination. • Provide potable water and sanitation services to workers. • All workers shall be clearly identifiable and to remain within construction domain during working hours. • Prepare an Emergency Response Plan. • Ensure adequate control of communicable diseases. • Maintain access control to construction domain.

Alternative 1	**+/- Impacts**	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	-	local	high	short-term to permanent	likely	3
After Mitigation	-	local	low	short-term	unlikely	1
Alternative 2	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	local	high	short-term to permanent	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. • Maintain servitude. • Control access to the facility.

Alternative 1	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	local	high	long-term	likely	3
After Mitigation	-	local	low	long-term	unlikely	1
Alternative 2	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	local	high	long-term	likely	3
After Mitigation	-	local	low	long-term	unlikely	1

15.23 Socio-Economic Environment

The following socio-economic impacts are anticipated in association with the proposed project:

- ❑ Influx of people seeking employment and associated impacts (e.g. foreign workforce, cultural conflicts, squatting, demographic changes).
- ❑ Nuisance from dust and noise.
- ❑ Safety and security.
- ❑ Consideration of local labourers and suppliers in area (positive impact).
- ❑ Transfer of skills (positive impact).
- ❑ Economic growth due to electricity generation (positive impact).

Table 62: Assessment of Socio-Economic Impacts

Environmental Feature		Economic opportunities arising from the construction phase				
Project life-cycle		Construction phase				
Potential Impact		**Proposed Management Objectives / Mitigation Measures**				
SMME Participation		• Local SMMEs should be given an opportunity to participate in the construction of the project through the supply of services, material or equipment.				
Job Creation and Skills Development		• The main contractor should employ non-core labour from the regional study area as far as possible during the construction phase.				
Alternative 1	**Nature +/-**	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**

Before Mitigation	Positive	Regional	Medium	Short Term	Likely	1
After Mitigation	Positive	Regional	Large	Short Term	Likely	3
Alternative 2	**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	Disturbance arising from the construction phase
Project life-cycle	Construction phase
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Increase in Dust	• Dust and disturbance can be mitigated through the use of appropriate dust suppression mechanisms. • Adherence to road signage can be added as an advantage and a measure to manage the increase in dust levels.
Influx of workers	• All employment of locally sourced labour should be controlled on a contractual basis. If possible, and if the relevant Ward Councillors deem it necessary, the employment process should include the affected Ward Councillors. • People in search of work may move into the area, however, the project will create a limited number of job opportunities. Locally based people should be given opportunities and preferences over others. • No staff accommodation should be allowed on site. • Influx of workers could may lead to increased diseases and HIV/AIDSs & STI as well as STD infections, therefore awareness programmes should be implemented through the local educational institutions and for the workers as well.
Worker Health and Safety	• The provisions of the OHS Act 85 of 1993 and the Construction Regulations of 2014 should be implemented on site; • Contractors should establish HIV/AIDS awareness programmes at their site camps. • Gender sensitive workplace practises should be planned for and adopted on site. Employment practises should be demonstrated free of coercion or harassment.
Security	• The camp site for the project should be fenced for the duration of construction. • All contractors' staff should be easily identifiable through their respective uniforms. • A project policy on management of workers should be developed. This would include education and awareness to be conducted with regards crime, trespassing and not gathering outside the site could be conducted.
Noise impacts	• 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 parties should take place.

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

Environmental Feature		Disturbance arising from the construction phase				
Project life-cycle		Construction phase				
Potential Impact		**Proposed Management Objectives / Mitigation Measures**				
Before Mitigation	Negative	Local	Medium	Short Term	Likely	2
After Mitigation	Negative	Local	Low	Short Term	Moderate	1

Environmental Feature		Economic Impacts (positive)				
Project life-cycle		Operational Phase				
Potential Impact		**Proposed Management Objectives / Mitigation Measures**				
Economic		• The solar PV site will stimulate the local economy through the provision of jobs and through local procurement • It will contribute to the improvement of the national electricity supply at a price that has been set by a competitive bidding process				
Local Procurement		• Local SMMEs should be given an opportunity to participate in the operation of the project through the supply of services, material or equipment.				
		• A procurement policy promoting the use of local business where possible, should be put in place and applied throughout the operational phases of the project.				
Job Creation and Skills Development		• Women should be given equal employment opportunities and encouraged to apply for positions.				
		• A skills transfer plan should be put in place at an early stage and workers should be given the opportunity to develop skills whilst in employment.				
Alternative 1	**Nature**	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	Positive	Regional	High	Long Term	Likely	3
After Mitigation	Positive	Regional	High	Long Term	Likely	3
Alternative 2	**Nature**	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	Positive	Regional	High	Long Term	Likely	3
After Mitigation	Positive	Regional	High	Long Term	Likely	3

15.24 "No-Go" Impacts

The "no-go option" is the alternative of not implementing the activity. The "no-go option" also provides the baseline against which the impacts of other alternatives are compared.

The "no go option" needs to be considered in view of the motivation (see **Section 3** above) as well as the need and desirability of the Project (see **Section 7** above). Some key considerations in this regard include:

- South Africa has identified the need to supply a diversified power generation that includes renewable energy technologies, such as proposed by the Project. This is in light of the country's

endeavour and commitment to reduce the carbon footprint created by the current heavy reliance on coal to produce electricity.

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 the Project would, however, 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.

15.25 Cumulative Impacts

15.25.1 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.

15.25.2 Other Renewable Energy Projects in Proximity to the Proposed PV Sites

Cumulative impacts can be identified by combining the potential environmental implications of the Project with the impacts of projects and activities that have occurred in the past, are currently occurring, or are proposed in the future within the Project area.

Other renewable energy applications in relation to the Project are discussed in **Section 9.8** above. According to the REEA Database, renewable energy applications have been made for properties that are located within 50km of the Project site. The closest application is located 15km to the southeast, but this application lapsed/was withdrawn. The next closest site, which was approved, is a Wind Generation Project 21km to the north west of the Project. Eight other approved renewable energy applications are located within in 50 km, mainly to the south east of the Project, comprising 4 Solar PV projects and 4 Wind Facility projects. A Wind Farm facility is also already in operation by Eskom on the same property as the proposed Project.

From a desktop scan it can be seen that these other renewable energy project sites are similar in nature to the proposed PV site. Cumulative impacts may be caused by these various developments, including loss of biodiversity and habitat fragmentation, visual and landscape character impacts, noise, reduction in air quality, traffic disruptions, impacts to civil aviation, as well as pressures on local facilities, goods and services. Although these impacts are dispersed over a large area (50km radius from the proposed Project, thus a 100km linear distance along the west coast). The aforementioned impacts in relation to the Project have been assessed individually in **Section 15.9** to **Section 15.26** above and mitigation measures have been developed for each of the impact areas.

The Visual Impact Assessment (Eco Elementum, 2022) evaluated a 30km radius around the Project site, and the proposed Sere PV structures with its associated infrastructure will increase the cumulative visual impact of Solar PV infrastructure within the region. The study further states that cumulative visual intrusion of the proposed Sere PV structures, will be MODERATE as it is a Solar PV project. The site location is however near a wind farm and far away from human habitation which decrease the visual impact further. The visual impact and impact on sense of place of the proposed project will contribute to the cumulative negative effect on the aesthetics of the study area. It is recommended however, that the environmental authorities consider the overall cumulative impact on the character and the areas sense of place before a final decision is taken with regard to the optimal number of solar activities in the area.

15.25.3 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 vegetative cover for the Project's development footprint will exacerbate erosion, which is already encountered in the greater area as a result of other land use disturbances. Mitigation measures to control erosion are included in the EMPr.
- There will be an increase in the dust levels during the construction phase, as a result of vegetation clearance, earthworks, use of haul roads and other gravel roads, stockpiles, etc. Measures to manage dust are included in the EMPr.
- 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. Mitigation measures are included in the EMPr.
- Cumulative effects in terms of the electromagnetic fields may occur as a result of aligning the proposed Project's power line alongside existing high-voltage power lines. Although it is anticipated that the electromagnetic fields are mainly associated with localised influences within the servitude width, and the interconnection cable will be underground. The cumulative impact is not quantified within this report.
- There is a potential for positive cumulative economic effects from the construction of multiple developments in the area. The increased creation of jobs and economic input into local businesses would provide a benefit to local communities.
- 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 moderate cumulative impact, due to the wind farm and

existing substations in the area. Cumulatively these developments will be responsible for the destruction of a large portion of shrubland in the area.

- Long-term cumulative impacts due to the large number of renewable energy developments in the vicinity can lead to the loss of endemic and threatened species, loss of habitat and vegetation types and even degradation of well conserved areas. A number of renewable energy plants and powerlines can already be found around the broader project area, this combination of obstacles increases the risk of bird collisions and habitat loss as well as territorial disputes (species forced out of the one area to just again be forced out). In the light of all above, the expected cumulative impact is expected to be highly detrimental for Site 1, a mitigated Moderate impact for Site 2. The cumulative impact assessment can be found in the Avifauna Impact Assessment (**Appendix D2**).
- The PIA (**Appendix D3**) provided a low cumulative impact for the Project, which was deemed to result in insignificant cumulative effects regarding palaeontological features.
- The HIA (**Appendix D6**), noted that the Doornbank horizon resource is considered to be widespread, and the cumulative impact, should this resource be impacted on, was not deemed excessive.

16 ANALYSIS OF ALTERNATIVES

16.1 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 the BPEO as the alternative that "*provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term*".

16.2 Layout / Design Alternatives

16.2.1 Environmental Sensitivity

As discussed in **Section 6.2** above, the PV site location was initially based on desktop selection, taking known sensitivities into account, and one site location was considered for the Project (Alternative 1). However, after Specialist field investigation found that the initial site was of high sensitivity, a second site location was determined as an alternative (Alternative 2).

Site access roads and the interconnection cable routes were also re-routed to minimise the impact to the received environment, by making the access roads as short as possible, and by aligning the cable route to follow parallel road infrastructure.

For the visual, heritage, and paleontological studies, there was no preference between the two alternative site locations, however, the terrestrial ecological and avifauna studies favoured site alternative 2 as the preferred alternative.
In terms of the Impact Assessment undertaken in this report, Alternative 2 is the preferred layout alternative based on the impacts to the receiving environment.

16.2.2 Technical Factors

Alternative site 1 and 2 can be technically considered as alternatives for the development of the solar PV plant. Technical advantages and disadvantages between the two alternatives are outlined under **Section 6.3** above.

The following technology options were considered from a technical perspective:

- **Fixed tilt structures**
- **Single axis trackers**

It is important to note that the technology / design options listed above are **not considered as alternatives** in this assessment. Each site alternative consists of two technology options, each with a slightly different layout. As such, a larger assessment area was considered for each alternative to include both technology option layouts. The choice in technology will only be determined once the Construction contractor is appointed. Therefore, should an alternative be authorised, only one of the proposed technologies will be developed in the corresponding layout within the assessed area. Each technology option layout footprint is less than 20 ha. The associated infrastructure, namely the interconnection cable and access road, remain unchanged between the two technology options.
No specialist study expressed a preference in terms of the above technology alternatives.

16.3 "No-Go" Option

The implications of the "no-go" option are discussed in **Section 15.24** above.

The "no go option" is not preferred, as the objectives of the Project will not be met, and the associated benefits will not materialise. Although not proceeding with the Project would avoid the adverse environmental impacts, these impacts are considered to be manageable through the provisions contained in the BAR and EMPr. No fatal flaws for the preferred alternative (alternative 2) were identified.

16.4 BPEO

Based on the recommendations of the specialists, technical considerations and the comparison of the impacts, the following alternative was identified as the BPEO:

- Alternative 2 – the site location to the north of the existing substation.

The BPEO also includes the revised layout, which avoids the sensitive areas identified through the specialist studies as far as possible.

The BPEO provides a balance between technological, energy and environmental aspects, while retaining the flexibility required in the final design stage of the Project.

17 PUBLIC PARTICIPATION

17.1 General

The purpose of public participation includes the following:

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

The public participation process for the proposed Project is governed by NEMA and GN No. R 982 of 4 December 2014 (as amended). **Figure 70** below outlines the public participation process for the Basic Assessment, which illustrates the notifications that were undertaken for the project. During the draft BAR review phase (**01 August 2022** – **31 August 2022**), IAPs and Authorities will be invited to indicate their interest in attending a public meeting. Should requests be received by the date specified, a public meeting will be held to present the draft BAR and provide a platform for project related discussions.

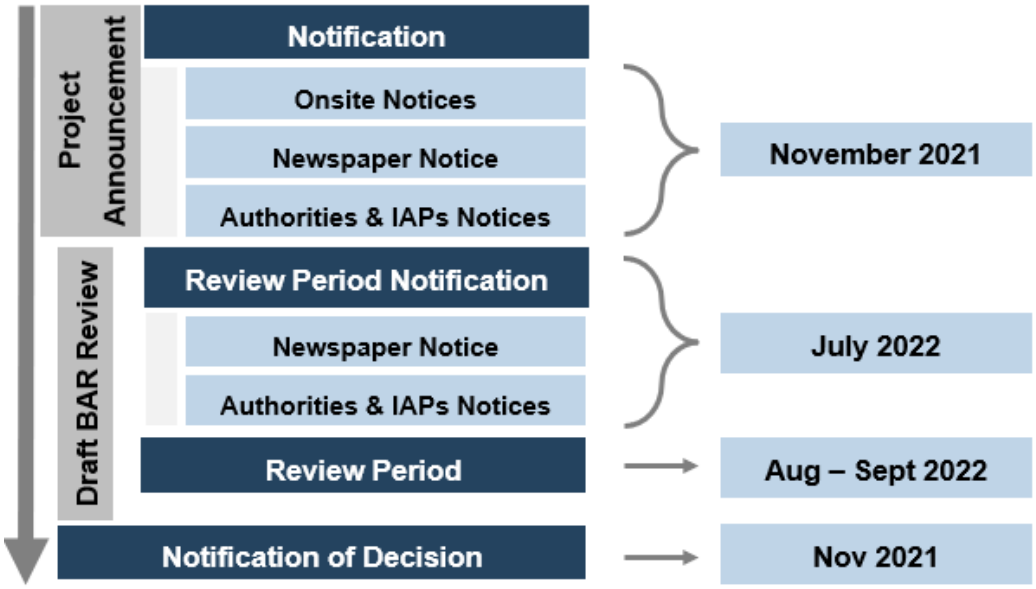


Figure 70: Outline of Public Participation Process

Comments on the Draft BAR can be submitted in writing to Nemai Consulting by the **31 August 2022**.

17.2 Adherence to the National State of Disaster declared for the COVID-19 Pandemic

The Minister of Environment, Forestry and Fisheries published the Directions regarding measures to address, prevent and combat the spread of COVID-19 relating to National Environmental Management Permits and Licences in GN No. 650 of 5 June 2020.

Although now no longer a requirement, a Public Participation Plan for the Basic Assessment for the proposed Project was compiled in terms of the abovementioned Directions, which was submitted to DFFE and subsequently approved by the Department.

17.3 Database of I&APs

A database of I&APs, which includes authorities, different spheres of government (national, provincial and local), parastatals, ward councillors, stakeholders, landowners (where information was available), interest groups and members of the general public, was prepared for the Project and is contained in **Appendix G**.

17.4 Landowner Consent

According to Regulation 39(1) of GN No. R 982 of 4 December 2014 (as amended), if the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an Environmental Authorisation in respect of such activity, obtain the written consent of the landowner or person in control of the land to undertake such activity on that land. This requirement does not apply *inter alia* for linear developments (e.g. pipelines, power lines, roads, etc.) or if it is a SIP as contemplated in the Infrastructure Development Act, 2014.

The proposed PV project does not require landowner consent since the Applicant is the landowner.

17.5 Notification of DFFE's 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.

18 CONCLUSIONS & RECOMMENDATIONS

18.1 Outcomes of the EIA Phase

The following key tasks were undertaken during the Basic Assessment Process to date for the proposed Project:

- Specialist studies were undertaken and the findings were incorporated into the BAR in terms of understanding the environmental status quo and sensitive features, assessing the potential impacts and establishing concomitant mitigation measures;
- Potentially significant impacts pertaining to the pre-construction, construction and operational phases of the Project were identified and assessed, and mitigation measures were provided;
- Alternatives for achieving the objectives of the proposed activity were considered; and
- Authorities and I&APs were identified and notified of the review of the Draft BAR.

The outcomes of these tasks are captured below.

18.2 Sensitive Environmental Features

Some of the sensitive and significant environmental features and aspects that are associated with the Project's receiving environment are highlighted, for which mitigation measures are included in the BAR and EMPr (as relevant):

- The proposed Solar PV Site Alternative 1 overlaps with a NPAES focus area, while Site Alternative 2 falls just outside the NPAES area.
- In terms of the WCBSP, the PV Site Alternative 1 falls entirely within a CBA1, while Site Alternative 2 overlaps with a small section of CBA1 (approx. 400m^2), and an ESA1, ESA2 and ONA area.
- Provincially projected fauna and flora species where identified to occur in the Project area during the field assessment survey.
- Faunal and floral SCC have the potential to occur in the Project area.
- The entire Project falls within a SKEP area of a near endemic habitat for mammals.
- Archaeological occurrences were identified in the vicinity of the site but none within the Project footprints of either alternative.
- One sensitive receptor from a visual impact perspective showed a VER larger than zero. This was the SERE Wind Farm Facility with a VER of 1.45 out of 10, which was considered insignificant.
- The site is underlain by the West Coast Group, a geology that is considered to have a very high palaeontological sensitivity. However, data from sampling undertaken in the proposed Project footprints showed an extensive aeolian sand depth above the West Coast Group of 20m on average. It was deemed unlikely that palaeontological resources would be impacted on by the Project.

- The Site Ecological Importance (SEI) determined by the specialist was deemed high for the Namaqua Shrubland habitat in Alternative Site 1 and medium for Alternative Site 2.
- The closest farm/smallholding dwelling is located more than 6km east of Alternative site 1.
- A district road runs east-west to the north of the proposed Project, which forms the access road to the SERE Wind Facility property. This road joins with the R363 a number of kilometres to the east.
- The nearest town is Koekenaap, located 16km to the east (direct distance).

The sensitivity maps are provided in **Figure 71** and **Figure 72** below.

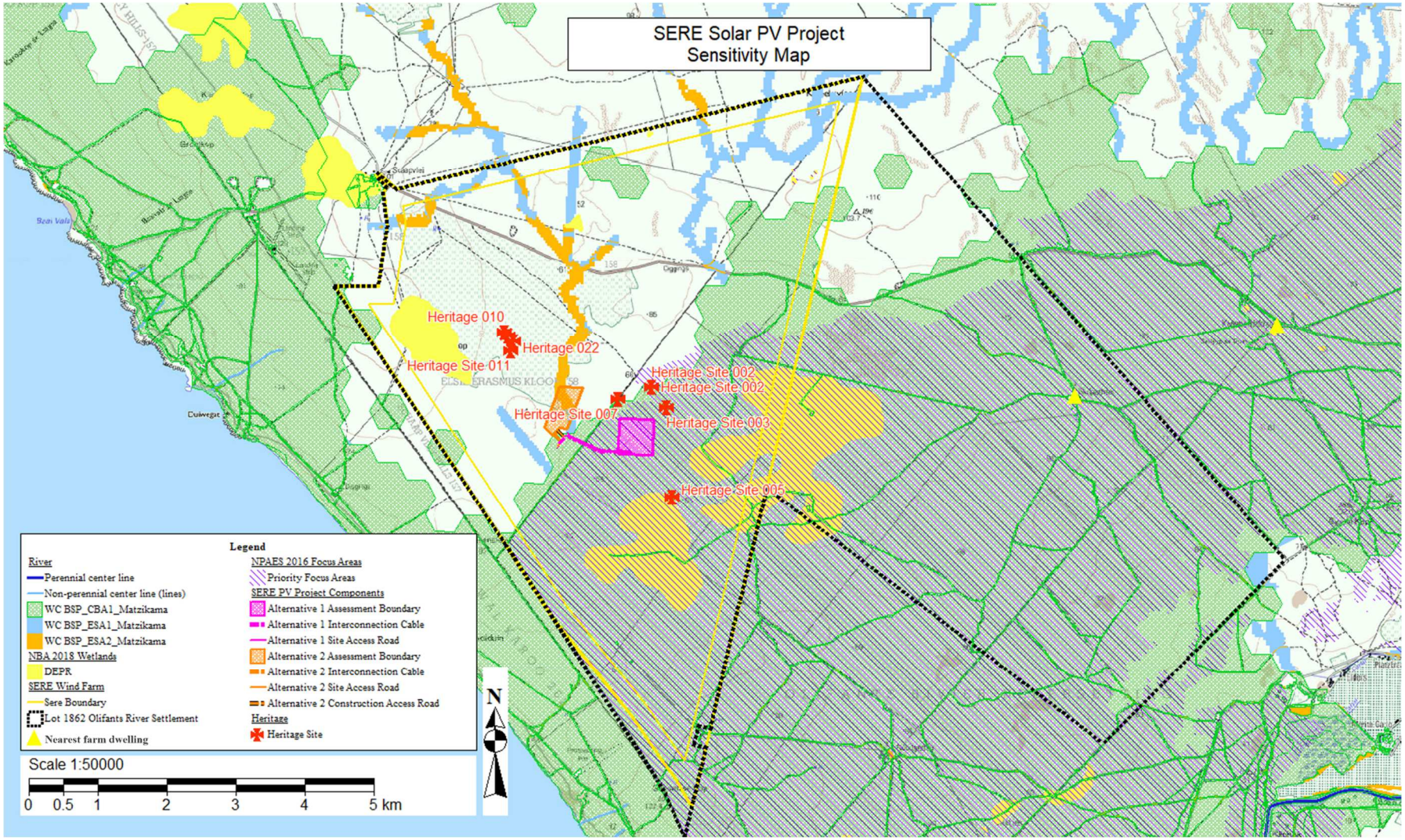


Figure 71: Sensitivity map for PV Site Alternatives

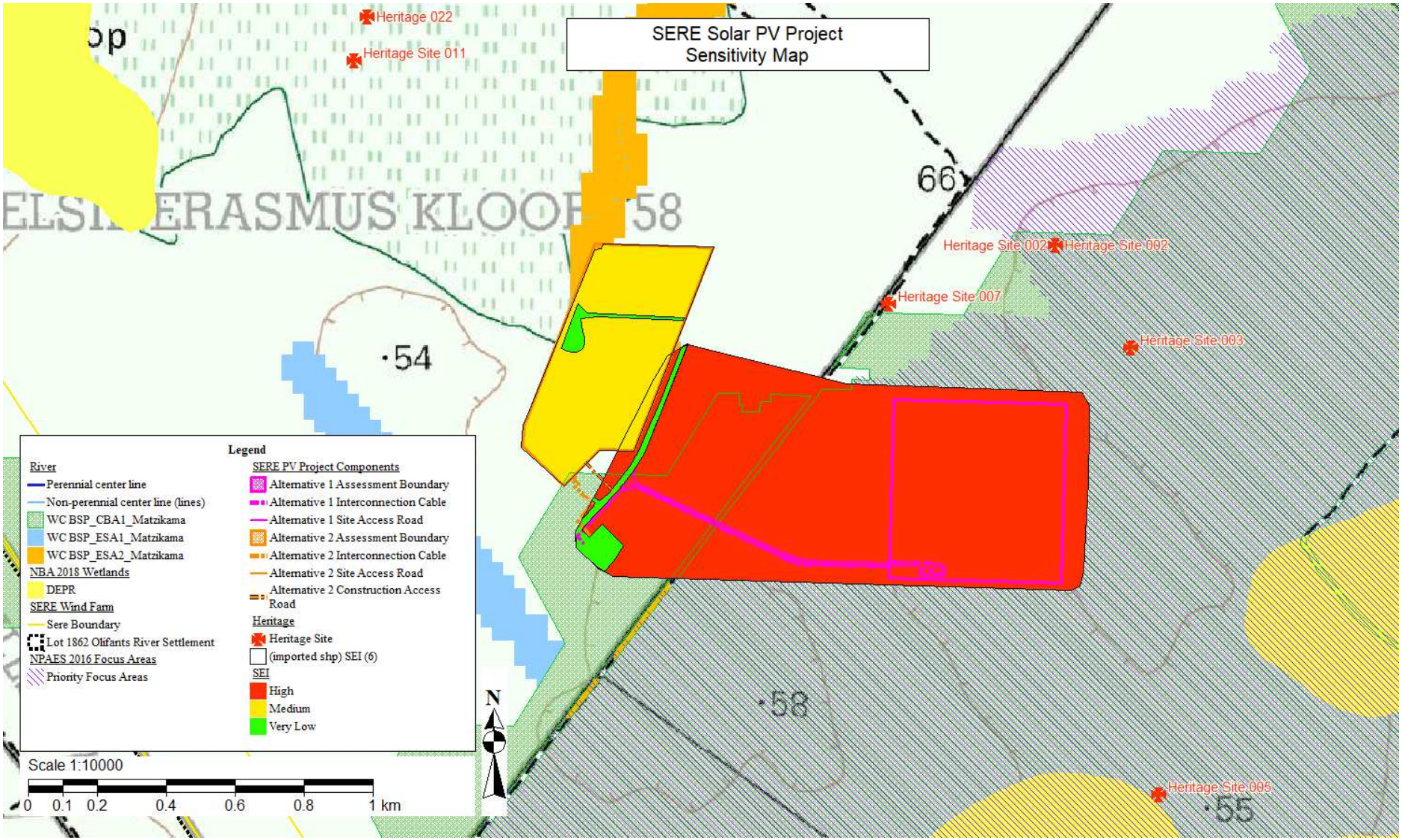


Figure 72: Sensitivity map2 for PV Site Alternatives

18.3 Environmental Impact Statement

The overall Project's strategic intent is linked to the SA Government's pursuit of honouring its 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 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. The hybridisation of the existing Sere Wind Farm with the installation of PV capacity was identified as one of the Renewable initiatives in the Eskom Corporate Plan. This project is applicable for the first phase (Phase 1A) of the Sere PV project. Phase 1A aims to address Eskom's urgent need for additional generating capacity.

The rationale for the siting of the overall Project is based on its suitable geographic location, including the area's high solar yield area, relatively flat topography, sparsely populated land, grid connection, and its location within an existing renewable energy generation facility owned by Eskom.

The PV site alternatives that were assessed as part of the Basic Assessment were based on the layouts that were compiled through incorporation of specialist input to avoid the environmentally sensitive features, including visual, palaeontology, archaeology, geological, biophysical and social, as far as possible.

Based on the recommendations of the specialists, technical considerations, and the comparison of the impacts, Alternative 2 (located north of the existing Skaapvlei substation) was identified as the BPEO.

The potentially significant environmental impacts were investigated through the relevant specialist studies. Key findings from the Basic Assessment, which may also influence the conditions of the Environmental Authorisation (if granted), include the following:

- A site walk through is recommended by a suitably qualified ecologist prior to any construction activities, preferably during the wet season and any SSC should be noted. In situations where the threatened and protected plants must be removed, the proponent may only do so after the required permission/permits have been obtained in accordance with national and provincial legislation. In the abovementioned situation the development of a search, rescue and recovery program is suggested for the protection of these species.
- Pre-construction walkthrough of the approved site by a qualified independent heritage/archaeological specialist to confirm the results of the 2007 HIA undertaken and undertake recommendations from the walkthrough prior to commencing with construction.
- Bird monitoring should continue at the Wind Farm and incorporate the Solar PV site in said monitoring.

- Avoid all archaeological sites identified in the surrounding area.
- In accordance with good practice (in the event that tracking technology is used), the tracking panels must remain at the full 60° tilt to the west for 15 minutes after the sun has set in order to mitigate the yellow glare that could impact receptors.
- Suitable measures need to be implemented to prevent erosion, manage site drainage and rehabilitate cleared areas during the project life-cycle.

The Project is considered to be compatible with existing land uses encountered in the area (e.g. Wind Energy Facility). The impacts and risks assessed as part of the Basic Assessment process that was undertaken for the Project are considered manageable with the effective implementation of the measures stipulated in this BAR and EMPr.
With the selection of the BPEO, the adoption of the mitigation measures included in the BAR and the dedicated implementation of the EMPr, it is believed that the significant environmental aspects and impacts associated with this Project can be suitably mitigated. With the aforementioned in mind, it can be concluded that there are no fatal flaws associated with the Project and that Environmental Authorisation can be issued for Alternative 2, based on the findings of the specialists and the impact assessment, through the compliance with the identified environmental management provisions.

It is further the opinion of the EAP and EIA team that the Basic Assessment was executed in an objective manner and that the process and BAR conform to the requirements stipulated in the EIA Regulations of 2014 (as amended).

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APPENDICES