Lesaka 1 Solar Energy Facility (Pty) Ltd

Lesaka 1 Solar Energy Facility and Associated Infrastructure near Loeriesfontein, Northern Cape Province

Visual Impact Assessment Report

DFFE Reference: **TBC**
Report Prepared by: Kelly Armstrong and Chris Dalgliesh
Issue Date: 30 August 2023
Version No.: 3

Lesaka 1 Solar Energy Facility (Pty) Ltd

Lesaka 1 Solar Energy Facility and Associated Infrastructure near Loeriesfontein, Northern Cape Province

Visual Impact Assessment Report

EXECUTIVE SUMMARY

Lesaka 1 Solar Energy Facility (Pty) Ltd propose to develop the Lesaka 1 Solar Energy Facility (SEF). The SEF will comprise a Photovoltaic (PV) array with a maximum export capacity of 240 MW, Battery Energy Storage System (BESS), on-site Independent Power Producer (IPP) substation and associated grid infrastructure. Lesaka 1 SEF will occupy 591 ha and will be located on Farm Kluitjes Kraal No. 264 (the SEF property) approximately 35 km north of Loeriesfontein, in the Hantam Local Municipality, in the Northern Cape Province.

Enertrag South Africa (Pty) Ltd (Enertrag) on behalf of Lesaka 1 Solar Energy Facility (Pty) Ltd has appointed SiVEST (SA) (Pty) Ltd (SiVEST) is undertake an Environmental Impact Assessment (EIA) process required in terms of the National Environmental Management Act 107 of 1998 (NEMA) for Lesaka 1 SEF. SRK Consulting (South Africa) (Pty) Ltd (SRK) has been appointed by SiVEST to undertake Visual Impact Assessments (VIAs) to inform the EIA processes.

The property lies at an elevation of ~750 m amsl and is mostly flat. Elevation increases towards the northern and southern boundaries of the property and a fairly prominent ridge is located on the eastern boundary of the property. Regionally, elevation ranges more significantly, particularly to the south-west and south-east. Isolated koppies, ridgelines and escarpments are a feature of the surrounding landscape.

The area around the SEF property and powerline corridor is predominantly characterised by grazing lands (natural vegetation), with supporting infrastructure (roads, powerlines and a railway line). A road (AP 2972) extends northwards from Loeriesfontein and to the east of the SEF property. The Sishen-Saldanha railway line is routed adjacent to the Klein-Rooiberg River bisecting the northern portion of the SEF property. Existing large-scale powerlines are also present around the SEF property and powerline corridor, increasing in concentration nearer the existing Helios MTS. Approximately 12 approved renewable energy projects within 35 km north of the SEF property.

The visual character of the project area is provided by the topography, vegetation and land use of the area which is a rural environment characterised by the sparsely vegetated prominences and ridgelines separated by often, wide flat expanses interspersed with farmstead and some infrastructure. The project area can therefore be defined as a natural transition landscape as it is mostly rural with few isolated farmsteads and some powerlines, roads and railway line visible in the landscape.

The visual quality of the area can be experienced through long closed views across plains of low vegetation and prominences, escarpments and ridgelines defining the horizon. Though there are limited anthropogenic features (road, fences, powerlines and railway line), they impact significantly on the visual quality of the area as they interrupt views and are discordant with the natural landscape. Though not always visible, the very long, noisy trains using the railway line bisecting the property, detract significantly from visual quality.

Based on the surrounding land uses, the receptors have been identified; *viz.* farmstead residents, railway passengers and staff, and motorists and tourists. The farmsteads are interspersed throughout the area surrounding the SEF and the powerline corridor properties, none, however, are identified within the foreground of the project. Two roads are located in close proximity to the project site. The AP 2972 is routed to the east of the property and an unnamed gravel road branches off the AP 2972 towards the site to the west.

The region has scenic value in terms of the rugged natural landscape and large portions of agricultural land. The sense of place of the surrounding area is strongly influenced by the surrounding land use, which can generally be described as a natural agricultural area, on natural grazing land, i.e. not managed (irrigated) pastures.

The impacts of the proposed project on the surrounding visual environment during the construction, operational and decommissioning phases were identified and assessed. The cumulative impacts of the project and the associated infrastructure (powerlines and Main Transmission Substation) have also been assessed. The impacts are summarised in Table 1 below.

Table 1: Summarised visual impacts

Impact	**Significance**	
	Without mitigation	**With mitigation**
Construction phase		
Altered sense of place and visual intrusion caused by construction activities associated with the SEF components.	Medium	Low
Operational phase		
Altered sense of place and visual intrusion caused by the PV array.	Medium	Medium
Altered sense of place and visual intrusion caused by the BESS, IPP substation and internal grid infrastructure.	Low	Low
Impaired visibility and/or visual discomfort caused by glint and glare from the PV array.	Low	Low
Altered visual quality caused by light pollution from the SEF at night.	Medium	Low
Decommissioning phase		
Altered sense of place caused by decommissioning activities for the SEF	Medium	Low
Cumulative Impact		
Altered sense of place caused by the SEF and associated infrastructure	Medium	Low

The project is moderately congruent with and marginally affects the integrity of the landscape, as there are a number of approved renewable energy facilities around or near the proposed site, with two operational WEFs and a SEF under construction. This project will alter visual quality during the construction and decommissioning phases, as well as alter sense of place, visual quality and result in visual intrusion during the operational phase, which have been assessed to be of ***low*** to ***medium*** significance. The impact of visual discomfort and impaired visibility is assessed to be of ***low*** significance. The cumulative impact, assessing the proposed project as well as the proposed associated infrastructure (including powerlines and MTS) is assessed to be of ***low*** significance after mitigation. The impacts of the project are deemed to be acceptable on the assumption that the mitigation measures listed in this report are implemented.

NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) AND ENVIRONMENTAL IMPACT REGULATIONS, 2014 (AS AMENDED) - REQUIREMENTS FOR SPECIALIST REPORTS (APPENDIX 6)

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	**Section of Report**
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	1.3
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Page vi
c) an indication of the scope of, and the purpose for which, the report was prepared;	1
(cA) an indication of the quality and age of base data used for the specialist report;	1.4.1
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	4
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	1.4.1
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	1.4
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	6
g) an identification of any areas to be avoided, including buffers;	N/A
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	N/A
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	2
j) a description of the findings and potential implications of such findings on the impact of the proposed activity, (including identified alternatives on the environment) or activities;	8
k) any mitigation measures for inclusion in the EMPr;	7.6

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	Section of Report
l) any conditions for inclusion in the environmental authorisation;	8.1
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	7.6
n) a reasoned opinion- i. (as to) whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	8.1
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	N/A
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A
q) any other information requested by the competent authority.	N/A
2) Where a government notice *gazetted* by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	N/A

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

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

PROJECT TITLE

Lesaka 1 Solar Energy Facility and Associated Infrastructure near Loeriesfontein, Northern Cape Province

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

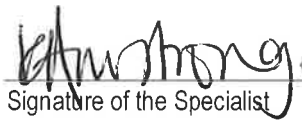
1. SPECIALIST INFORMATION

Specialist Company Name:	SRK Consulting (South Africa) (Pty) Ltd			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	1	Percentage Procurement recognition	135%
Specialist name:	Kelly Armstrong			
Specialist Qualifications:	BSocSc (Hons) Environmental Science			
Professional affiliation/registration:	N/A			
Physical address:	183 Main Road, Albion Spring Close, Rondebosch, 7700			
Postal address:	Postnet Suite #206, P. Bag X18, Rondebosch, 7701			
Postal code:	7700	Cell:	076 114 9254	
Telephone:	021 659 3060	Fax:	086 530 7003	
E-mail:	karmstrong@srk.co.za			

2. DECLARATION BY THE SPECIALIST

I, ____Kelly Armstrong_____, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the Specialist

SRK Consulting (South Africa) (Pty) Ltd

Name of Company:

6 March 2023

Date:

3. UNDERTAKING UNDER OATH/ AFFIRMATION

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

Signature of the Specialist

SRK Consulting (South Africa) (Pty) Ltd

Name of Company

6 March 2023

Date

Signature of the Commissioner of Oaths

2023-03-06

Date

SUID-AFRIKAANSE POLISIEDIENS
STASIEBEVELVOERDER
2023 -03- 0 6
STATION COMMANDER
RONDEBOSCH K.P./S.P.
SOUTH AFRICAN POLICE SERVICES

Lesaka 1 Solar Energy Facility (Pty) Ltd

Lesaka 1 Solar Energy Facility and Associated Infrastructure near Loeriesfontein, Northern Cape Province

Visual Impact Assessment Report

Contents

List of Tables

List of Figures

List of Appendices

Glossary of Terms

This list contains definitions of symbols, units, abbreviations, and terminology that may be unfamiliar to the reader.

After-image	Visual illusion that refers to an image continuing to appear after exposure to the original image as ceased.
Azimuth Angle	Direction (in degrees) measures clockwise from true north.
Glint	A momentary flash of bright light caused by a reflection of light off a surface.
Glare	A continuous source of bright light generally associated with a stationary object.
Landscape Integrity	The compatibility of the development/visual intrusion with the existing landscape.
Sense of Place	The identity of a place related to uniqueness and/or distinctiveness. Sometimes referred to as genius loci meaning 'spirit of the place'.
Viewshed	The topographically defined area from which the project could be visible.
Visibility	The area from which the project components would actually be visible and which depends upon topography, vegetation cover, built structures and distance.
Visual Absorption Capacity	The potential for the area to conceal the proposed development.
Visual Character	The elements that make up the landscape including geology, vegetation and land-use of the area.
Visual Exposure	The zone of visual influence or viewshed. Visual exposure tends to diminish exponentially with distance.
Visual Impact	A change to the existing visual, aesthetic or scenic environment, either adverse or beneficial, that is directly or indirectly due to the development of the project and its associated activities.
Visual Intrusion	The effect of the artificial insertion (construction) of an object into a landscape, typically – but not always - reducing the visual quality of the environment, and sense of place.
Visual Obtrusion (or Obstruction)	The effect of the artificial insertion (construction) of an object into a landscape, typically blocking and/or foreshortening views.
Visual Quality	The experience of the environment with its particular natural and cultural attributes.
Visual Receptors	Potential viewers (individuals or communities) who are subjected to the visual influence of a project.

List of Abbreviations

BESS	Battery Energy Storage System
DFFE	Department of Forestry, Fisheries and the Environment
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
IPP	Independent Power Producer
LILO	Loop-in Loop-out
MTS	Main Transmission Substation
NEMA	National Environmental Management Act 107 of 1998
PV	Photovoltaic
REDZ	Renewable Energy Development Zone
SEF	Solar Energy Facility
SiVEST	SiVEST (SA) (Pty) Ltd
SRK	SRK Consulting (South Africa) (Pty) Ltd
ToR	Terms of Reference
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment
WEF	Wind Energy Facility

Lesaka 1 Solar Energy Facility (Pty) Ltd

Lesaka 1 Solar Energy Facility and Associated Infrastructure near Loeriesfontein, Northern Cape Province

Visual Impact Assessment Report

1. INTRODUCTION

Lesaka 1 Solar Energy Facility (Pty) Ltd and Lesaka 2 Solar Energy Facility (Pty) Ltd propose to develop one Solar Energy Facility (SEF) each: Lesaka 1 SEF and Lesaka 2 SEF. Each SEF will have a maximum nameplate capacity of 240 MW, a Battery Energy Storage System (BESS), on-site Independent Power Producer (IPP) substation and associated grid infrastructure. Both SEFs will be located on Farm Kluitjes Kraal No. 264, approximately 35 km north of Loeriesfontein, in the Hantam Local Municipality, in the Northern Cape Province (Figure 1-1).

Enertrag South Africa (Pty) Ltd (Enertrag) on behalf of Lesaka 1 Solar Energy Facility (Pty) Ltd and Lesaka 2 Solar Energy Facility (Pty) Ltd has appointed SiVEST (SA) (Pty) Ltd (SiVEST) to undertake separate Environmental Impact Assessment (EIA) processes required in terms of the National Environmental Management Act 107 of 1998 (NEMA) for Lesaka 1 SEF and Lesaka 2 SEF, for which separate Environmental Authorisations (EAs) will be sought. SRK Consulting (South Africa) (Pty) Ltd (SRK) has been appointed by SiVEST to undertake Visual Impact Assessments (VIAs) to inform the EIA processes.

This VIA relates to the Lesaka 1 SEF and associated infrastructure (see Section 3.2).

1.1 Scope and Objectives

The primary aims of the study are to describe the visual baseline, assess the potential visual impacts of the project and identify effective and practicable mitigation measures. The VIA informs the EIA process required in terms of NEMA and conducted by SiVEST.

Figure 1-1: Locality map

1.2 Terms of Reference

The Terms of Reference (ToR) for the VIA are as follows:

- Describe the baseline visual characteristics of the study area, including landform, visual character and sense of place, and place this in a regional context;
- Identify potential impacts of the project on the visual environment through analysis and synthesis of the following factors:
    - Visual exposure;
    - Visual absorption capacity (VAC);
    - Sensitivity of viewers (visual receptors);
    - Viewing distance and visibility;
    - Landscape integrity; and
    - Solar reflection;
- Map visually sensitive areas to inform the location of the SEF;
- Assess potential the impacts of the project on the visual environment and sense of place using SiVEST's impact assessment methodology;
- Identify and assess the direct, indirect and cumulative impacts (pre- and post-mitigation) of the proposed project (and alternatives, if applicable) on visual resources in relation to other proposed and existing developments in the surrounding area;
- Compile a report compliant with Appendix 6 of the EIA Regulations and any relevant legislation and guidelines; and
- Recommend practicable mitigation measures to avoid and/or minimise impacts and/or optimise benefits.

1.3 Specialist Credentials

The VIA was conducted by professional personnel listed in Table 2.

Table 2: VIA personnel

Staff	Role	Qualification
Christopher Dalgliesh	Project Review and Director	Chris Dalgliesh is a Partner and Principal Environmental Consultant with over 36 years' experience, primarily in South Africa, Southern Africa, West Africa and South America (Suriname). Chris has worked on a wide range of projects, notably in the natural resources, Oil & Gas, waste, infrastructure (including rail and ports) and industrial sectors. He has managed and regularly reviews Visual Impact Assessments. He has directed and managed numerous Environmental and Social Impact Assessments (ESIAs) and associated management plans, in accordance with international standards. He regularly provides high level review of

		ESIAs, frequently directs Environmental and Social Due Diligence studies for lenders, and also has a depth of experience in Strategic Environmental Assessment, State of Environment Reporting and Resource Economics. He holds a BBusSci (Hons) and M Phil (Env) and is a registered Environmental Assessment Practitioner.
Kelly Armstrong	Specialist Consultant	Kelly Armstrong is an Environmental Consultant at SRK Consulting. She has five years' experience in managing Basic Assessment, Environmental Impact Assessment and Water Use Authorisation processes and acting as an Environmental Control Officer in the renewable energy, residential, aquaculture, marine and mining sectors. She also manages and contributes to Visual Impact Assessments for infrastructure, renewable energy and mining projects. Kelly holds a BSocSc (Hons) in Environmental and Geographical Studies from the University of Cape Town.

1.4 Methodology

Visual impacts are a function of the physical transformation of a landscape on account of the introduced structures and the experiential perceptions of viewers. The following method was used to assess the visual context (baseline) and preliminary impacts for the project:

1. Describe the project using information supplied by the proponent (Enertrag) and EIA consultants;
2. Collect and review visual data, including data on topography, vegetation cover, land-use and other background information;
3. Undertake a mapping exercise to define the visual character of the study area;
4. Undertake fieldwork, comprising a reconnaissance of the study area, particularly the project site and key viewpoints. The objectives of the fieldwork are to:
    - Familiarise the specialist with the site and its surroundings;
    - Identify key viewpoints / corridors; and
    - Determine and groundtruth the existing visual character and quality in order to understand the sensitivity of the landscape;

    Visual 'sampling' using photography will be undertaken to illustrate the likely zone of influence and visibility. The locations of the viewpoints will be recorded with a GPS; and
5. Identify sensitive receptors.

The following method was used to assess the visual impact of the project:

1. Determine the visual zone of influence or exposure by superimposing the proposed upgrades on aerial imagery, and as verified during the site visit.
2. At key viewpoints determine the likely distance at which visual impacts will become indistinguishable;
3. Conduct glare modelling to simulate receptors' potential exposure to (and duration of) glare from the Photovoltaic (PV) panels, if any;

4. Rate impacts on the visual environment and sense of place based on professional judgment and the prescribed impact rating methodology;
5. Recommend practicable mitigation measures to avoid and/or minimise impacts; and
6. Recommend environmental management measures to be included in the Environmental Management Programme (EMPr) for the project.

1.4.1 Glare Analysis Methodology

Glare can be modelled geometrically to accurately predict whether reflection will be experienced by receptors using the following parameters:

- The earth's orbit around the sun;
- The earth's rotation and orientation;
- The location of the PV array;
- The orientation of the PV panels and the azimuth angle[1]; and,
- Local topography including (comparative) receptor and PV array heights above mean sea level.

The glare model provides a quantified assessment of:

- When and where glare will occur throughout the year for a prescribed PV installation; and
- Intensity of the effects on the human eye at those locations where glare occurs.

ForgeSolar's GlareGauge modelling software was used to model the anticipated intensity and duration of glare from the PV array. The results of the glare analysis are detailed in Section 6.6.

1.4.2 Site Visit and Data Acquisition

A site visit was undertaken on 12 January 2023. The site visit duration and timing were appropriate to provide the specialist with a representative impression of the site and surroundings.

The following information sources were used to inform the baseline and sensitivities identified:

- Maps indicating the location and layout of the project;
- Topographic data, including spatial files with 5 m contours obtained from the Department of Rural Development and Land Reform;
- Aerial images; and
- Other available data on geology, vegetation, land use, receptors etc..

The information is sufficiently recent and detailed for the purposes of this VIA.

[1] Direction (in degrees) measures clockwise from true north.

2. ASSUMPTIONS AND LIMITATIONS

As is standard practice, the VIA is based on a number of assumptions and is subject to certain limitations, which should be borne in mind when considering information presented in this report. These assumptions and limitations include:

- VIA is not, by nature, a purely objective, quantitative process, and depends to some extent on subjective judgments. Where subjective judgments are required, appropriate criteria and motivations for these have been clearly stated;
- The study is based on technical information supplied to SRK, which is assumed to be accurate. This includes the proposed site and project components;
- The glare analysis does not account for smaller physical obstructions between the PV panels and the receptors (e.g. buildings or tree cover);
- The glare analysis assumes clear, sunny skies year-round;
- The PV array tracking model assumes the modules move instantaneously when tracking the sun, and then revert to the rest position;
- The study area is defined as the area within a 5 km around the SEF property and powerline corridor alignments, as the visual impact beyond this distance is considered negligible; and
- This study does not provide motivation for or against the project.

The findings of the VIA are not expected to be affected by these assumptions and limitations.

3. TECHNICAL DESCRIPTION

This section provides a concise description of the proposed project as provided at the time of assessment, focusing on elements relevant to the VIA. A more detailed description is provided in the EIA Report for the project.

3.1 Project Location

Lesaka 1 is proposing to construct the 240 MW Lesaka 1 SEF, BESS and IPP substation on Farm Kluitjes Kraal No. 264 (the SEF property), ~35 km north of Loeriesfontein, in the Hantam Local Municipality, in the Northern Cape Province (Figure 1-1:). Environmental constraints and buffers (shown in Figure 3-3) have informed the location of the proposed SEF within the SEF property. The SEF will comprise up to four parcels of PV arrays with a total combined footprint of 591 ha.

This project is not located within one of the 11 Renewable Energy Development Zones (REDZ). The REDZ are geographically defined areas in which the South African Government has encouraged the development of PV and wind renewable energy projects by promulgating a streamlined authorisation approach. As such, the REDZ have become areas in which the development of PV projects is considered more acceptable.

The SEF property is located south of a large cluster of approved renewable projects comprising; nine Wind Energy Facilities (WEFs) and three SEFs. Another approved SEF project is located ~15 km south of the proposed Lesaka 1 SEF property (Figure 3-1). These 12 renewable projects are situated within a 35 km radius of the Lesaka 1 SEF property and have a total generation capacity of ~1 683 MW according to the Department

of Forestry, Fisheries and the Environment (DFFE) South African Renewable Energy EIA Application Database. Only two WEFs of the 12 renewable facilities are operational, while construction of one SEF has commenced.

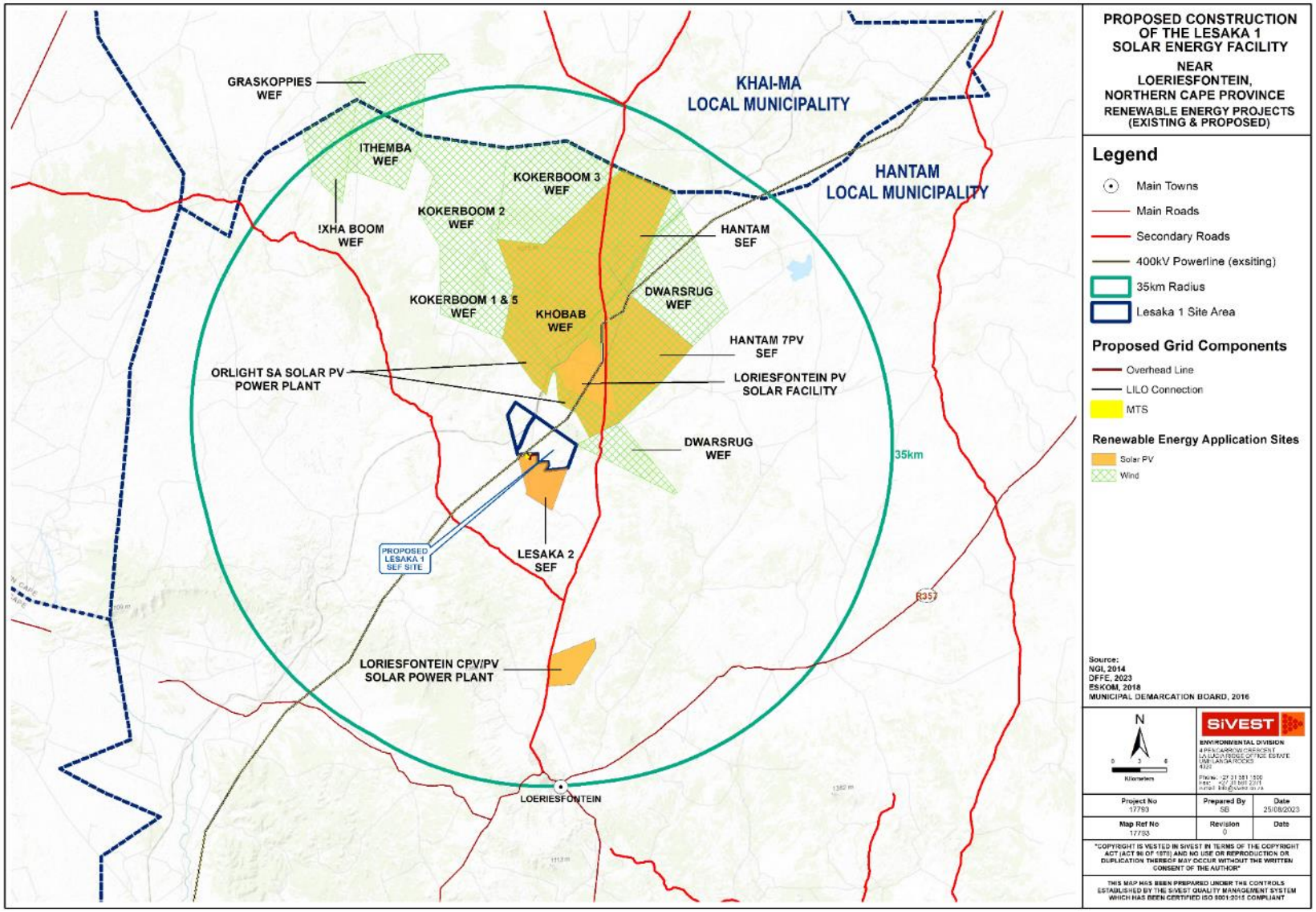


Figure 3-1: Approved renewable energy projects within 35 km of the site

3.2 Project Description

The Lesaka 1 SEF will comprise several PV arrays, a BESS and associated infrastructure (Figure 3-2). Preliminary SEF components include:

- PV modules (monofacial or bifacial) mounted on single-axis tracking structures;
- On-site IPP substation and BESS (combined footprint of ~6.5 ha);
- Associated stormwater management infrastructure;
- Site and internal access roads (up to 8 m wide);
- Temporary construction camp and laydown area (~6.5 ha) during the construction phase;
- Infrastructure including offices, operational control centre, operation and maintenance area, ablution facilities etc.;
- Grid connection infrastructure including medium-voltage cabling between the project components and the facility substation (underground cabling will be used where practical [up to 33 kV]); and
- Perimeter fencing.

The IPP substation will step up power from 33 kV to 132 kV and will then be evacuated to the national grid, via a 132 kV overhead powerline connecting the Eskom Switching Station (also known as the Eskom portion of the on-site substation) to the Main Transmission Substation (MTS). The MTS will be connected to the existing 400 kV overhead powerline through a loop-in loop-out (LILO) connection. The infrastructure to evacuate the power to the national grid will be subject to a separate EIA process, however, has been considered in the cumulative impact assessment (Section 7.4).

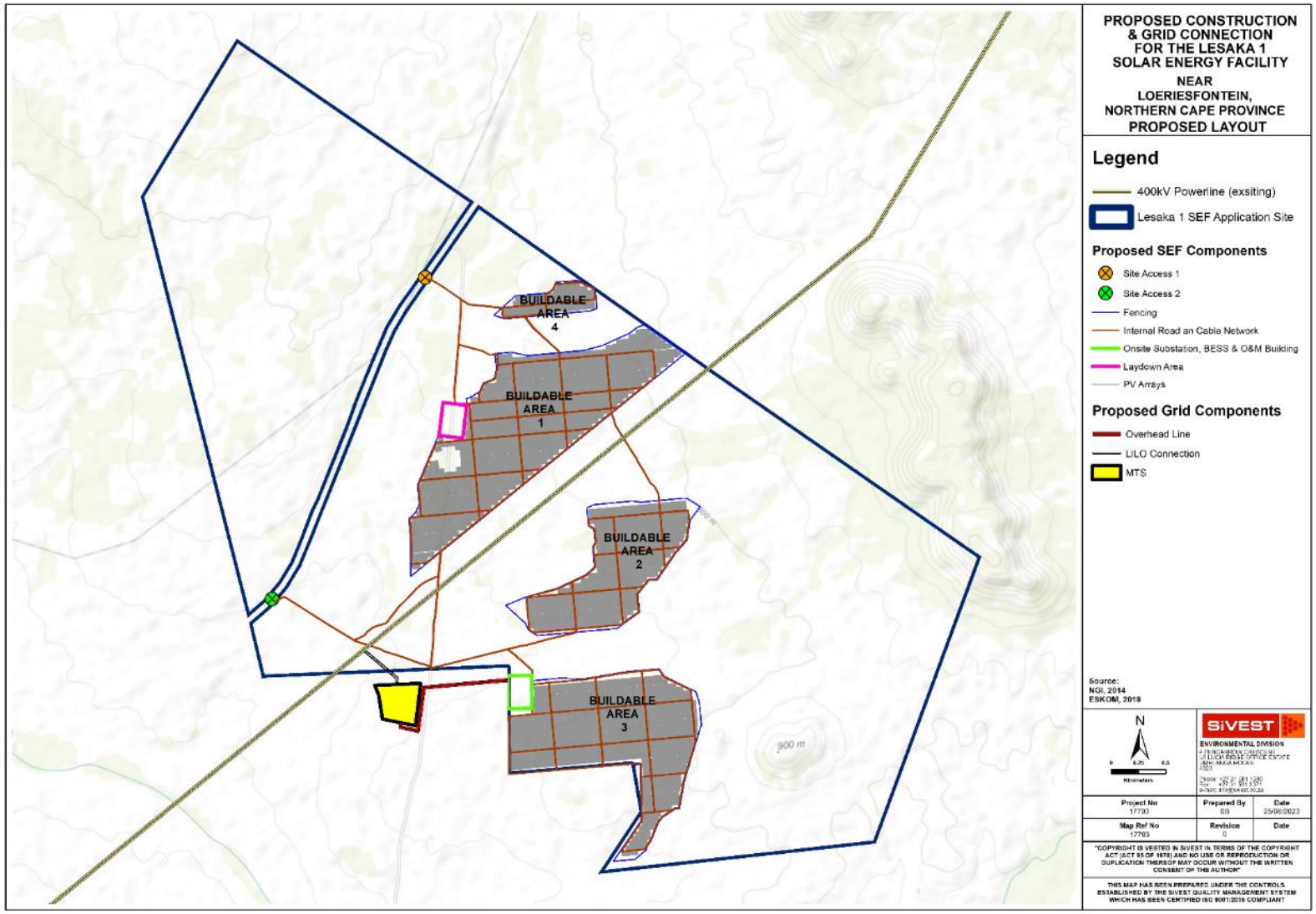


Figure 3-2: Site layout map

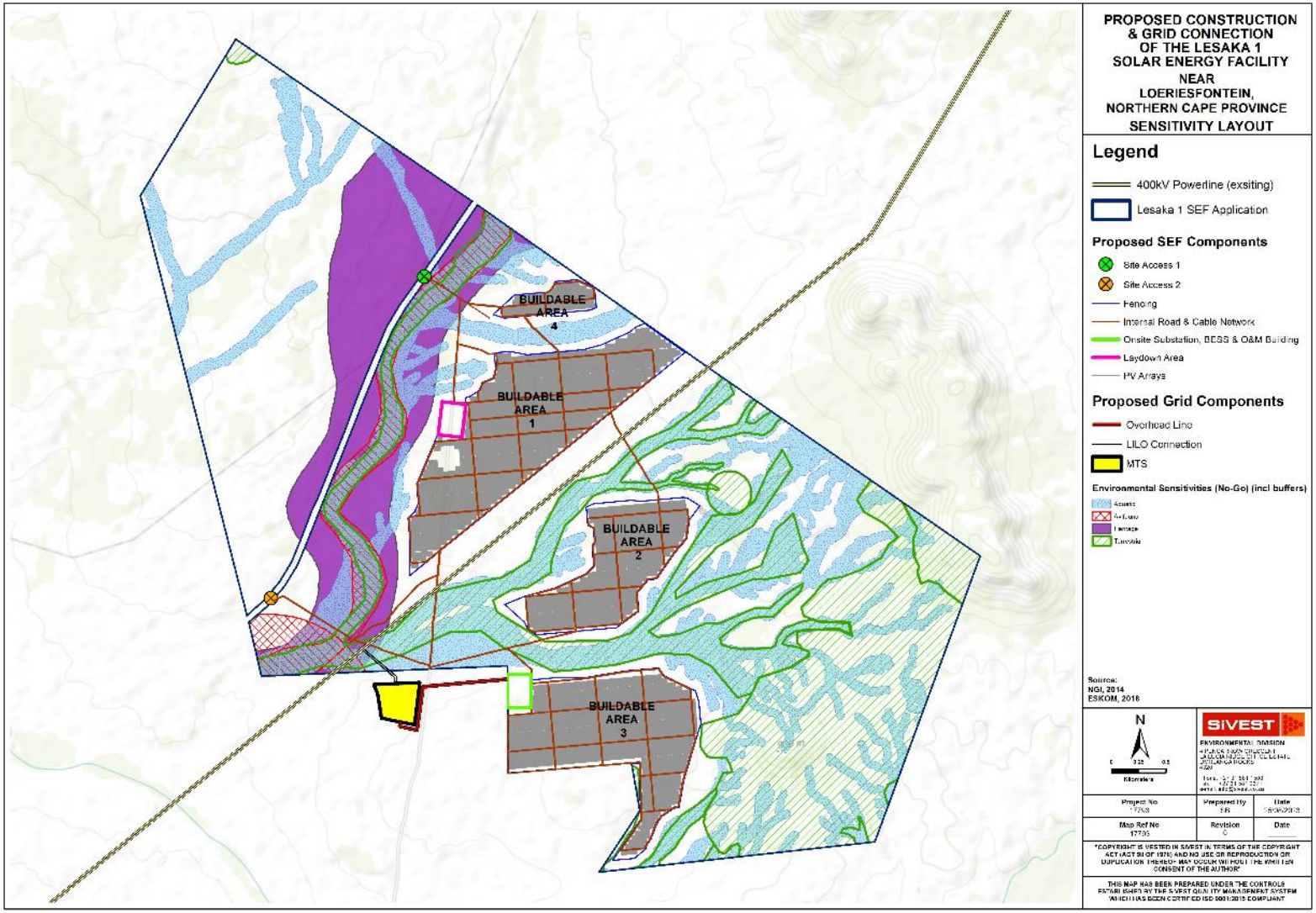


Figure 3-3: Sensitivity layout

3.2.1 Layout Alternatives

3.2.1.1 SEF

Specialist no-go areas were avoided when refining the proposed development footprint of the SEF and, as a consequence, four clusters (buildable areas) of PV arrays are proposed and have been assessed (Figure 3-2 and Figure 3-3). The design and layout alternatives will be considered and assessed as part of the EIA.

3.2.1.2 Temporary Laydown Area

Two location alternatives for a ~2.2 ha temporary laydown area were considered during the Scoping Phase of the project. However, based on an evaluation of the alternatives, only one ~6.5 ha temporary laydown area, located in PV array Buildable Area 1 is considered in the EIA report and this VIA (Figure 3-2).

3.2.2 No Go Alternative

The 'no-go' alternative is the option of not undertaking the development of the proposed SEF project. Hence, if the 'no-go' option is implemented, there would be no development. This alternative would result in no environmental impacts from the proposed project on the site or the surrounding local area. It provides the baseline against which other alternatives are compared and will be considered throughout the report.

4. LEGAL REQUIREMENTS AND GUIDELINES

Relevant guidelines that provide direction for visual assessment include the Department of Environmental Affairs and Development Planning's (DEA&DP) "Guideline for Involving Visual and Aesthetic Specialists in EIA Processes" (DEA&DP, 2005), the Landscape Institute's "Guidelines for Landscape and Visual Impact Assessments" (2013), and Germany's Federal Ministry of the Environment's Light Guidelines (Licht-Leitlinie) (2014), which have been considered in this VIA.

DEA&DP's Guideline (2005) identifies typical components of a visual study:

- Identification of issues and values relating to visual, aesthetic and scenic resources through involvement of stakeholders;
- Identification of landscape types, landscape character and sense of place, generally based on geology, landforms, vegetation cover and land use patterns;
- Identification of viewsheds, view catchment area and the zone of visual influence, generally based on topography;
- Identification of important viewpoints and view corridors within the affected environment, including sensitive receptors;
- Indication of distance radii from the proposed project to the various viewpoints and receptors;
- Determination of the VAC of the landscape, usually based on topography, vegetation cover or urban fabric in the area;
- Determination of the relative visibility, or visual intrusion, of the proposed project;

- Determination of the relative compatibility or conflict of the project with the surroundings; and
- A comparison of the existing situation with the probable effect of the proposed project.

Projects that warrant a visual specialist study include those:

- Located in a receiving environment with:
    - Protection status, such as national parks or nature reserves;
    - Proclaimed heritage sites or scenic routes;
    - Intact wilderness qualities, or pristine ecosystems;
    - Intact or outstanding rural or townscape qualities;
    - A recognized special character or sense of place;
    - Outside a defined urban edge line;
    - Sites of cultural or religious significance;
    - Important tourism or recreation value;
    - Important vistas or scenic corridors;
    - Visually prominent ridgelines or skylines; and/or
- Where the project is:
    - High intensity, including large-scale infrastructure;
    - A change in land use from the prevailing use;
    - In conflict with an adopted plan or vision;
    - A significant change to the fabric and character of the area;
    - A significant change to the townscape or streetscape;
    - A possible visual intrusion in the landscape; or
    - Obstructing views of others in the area.

In terms of the guideline the proposed SEF and associated infrastructure can be classified as a Category 5 development, which includes large-scale infrastructure. As the project is situated in a medium scenic, cultural, and historical significance. Based on the site visit it became evident that the high visual impact expected in terms of the guideline (see Table 3) can be reduced to a moderate visual impact, which introduces:

- A potential effect on protected landscapes or scenic resources;
- Some change in the visual character of the area; and
- Introduction of new development or adds to existing development in the area.

Table 3: Expected visual impact significance

Type of environment	**Type of development**				
	Cat 1	**Cat 2**	**Cat 3**	**Cat 4**	**Cat 5**
Protected / wild areas	Moderate	High	High	Very high	Very high
High scenic, cultural, historical value	Minimal	Moderate	High	High	Very high

Type of environment	Type of development				
	Cat 1	Cat 2	Cat 3	Cat 4	Cat 5
Medium scenic, cultural, historical value	Little or none	Minimal	**Moderate**	High	High
Low scenic, cultural, historical value / disturbed	Little or none Possible benefits	Little or none	Minimal	Moderate	High
Disturbed or degraded sites	Little or none Possible benefits	Little or none Possible benefits	Little or none	Minimal	Moderate

Such a project typically warrants a Level 3 assessment (see Table 4), which includes the following generic steps:

- Identification of issues and site visit;
- Description of receiving environment and proposed project;
- Establishment of view catchment area, view corridors, viewpoints and receptors;
- Indication of potential visual impacts using established criteria;
- Inclusion of potential lighting impacts at night; and
- Description of alternatives, mitigation measures and monitoring programmes.

Table 4: Recommended approach for visual assessment

Approach	Type of issue expected				
	Little or no visual impact	Minimal visual impact	Moderate visual impact	High visual impact	Very high visual impact
Level of visual impact recommended	Level 1 visual input	Level 2 visual input	**Level 3 visual assessment**	Level 4 visual assessment	

4.1 Glint and Glare Guidelines

Glint and glare (also referred to as solar reflection) analyses are required for projects anticipated to cause visual discomfort to surrounding receptors (particularly aviation activity, motorists and residents). PV panels vary in their reflectivity with none absorbing 100% of the incoming light, thus leading to solar reflection which may be experienced by receptors (and/or affect sense of place). Glint and/or glare can only be experienced by receptors with a direct line of sight to the PV array. Whether a receptor experiences glint or glare depends on the receptor's location and movement in relation to the PV panels.

Several countries, including South Africa, require Glint and Glare Impact Assessments for certain projects, *inter alia,* PV projects located in close proximity to aircraft approach and take-off centrelines, an aerodrome or helistop[2]. However, few authorities have released content requirements or associated guidelines relating to thresholds of glare that are considered acceptable. The German Federal Ministry of the Environment has defined acceptable levels of glare as being less than 30 minutes per day or 30 hours per year (Federal Ministry of the Environment, 2014). The German guidelines have been used as a guideline for the Glint and Glare analysis in this VIA.

[2] South African Civil Aviation Authority Obstacle Notice 3/2020: Additional Requirements for Solar Project Applications.

5. DESCRIPTION OF THE RECEIVING ENVIRONMENT – VISUAL CONTEXT

The following description of the affected environment focuses on the Visual Character of the area surrounding and including the project (the study area) and discusses the Visual Quality and Sense of Place[3]. This baseline information provides the context for the visual analysis.

5.1 Landscape Character

Landscape character is the description of the pattern of the landscape, resulting from particular combinations of natural (physical and biological) and cultural (land use) characteristics. It focuses on the inherent nature of the land rather than the response of a viewer (Young, 2000).

5.1.1 Geology and Topography

The geology and topography of the area, together with the arid climate, provide the framework for the basic landscape features and visual elements of the study area.

The property lies at an elevation of ~750 m amsl and is mostly flat. Elevation increases towards the northern and southern boundaries of the property to ~900 m and ~815 m respectively. A fairly prominent ridge, rising to ~ 1 000 m amsl is located on the eastern boundary of the property (Figure 5-2). This relief in the north-western, eastern and south-eastern areas of the property has resulted in a network of ephemeral rivers across the property, many of which drain into the Krom River to the west and the rest draining into Klein-Rooiberg and Rooiberg Rivers bisecting the northern and southern portions of the property respectively.

Figure 5-1: Generally flat site, flanked by a ridge on the north-eastern boundary (centre) and small hill on the south-eastern boundary (left of centre)

Regionally, elevation to the north continues to rise gradually to ~1 000 m amsl at ~35 km north of the SEF property. To the south the land rises gradually to ~950 m amsl at a distance of ~35 km. The study area essentially forms an extension of the Krom River valley and is at the foot of higher-lying ground to the south-east. Isolated koppies, ridgelines and escarpments, characteristic of the Karoo, are present throughout the region.

The Krom River valley lies to the west of the SEF property where elevation decreases to ~300 m amsl. The valley is flanked by range of ridgelines that rise up to ~1 300m amsl south-east of the SEF property. A network

[3] These terms are explained in the relevant sections below.

of ephemeral watercourses drains the region, particularly to the south of the SEF property, where the topography varies more significantly than to the north and east of the SEF property. Flash floods can be experienced in this area.

The project is underlain by the sandstones of the Prince Albert and Whitehill Formation, of the Ecca Group. Dolerite sills often result in the presentation of koppies, flat topped hills and ridgelines across the landscape.

5.1.2 Vegetation

The project is located within the original extent of two vegetation types; Hantam Karoo and Bushmanland Basin Shrubland, with the Hantam Karoo vegetation type dominating the property and the region.

The region experiences hot, dry summers and cold, dry winters.

Hantam Karoo vegetation type includes succulent elements and low Karoo shrubs. Bushmanland Basin Shrubland also includes succulent shrubs, as well as white grasses. The Hantam Karoo is characterized by a rich display of spring annuals, which attract many tourists each spring. There are very few (taller) shrubs and/or trees though some are present in the riparian zone of watercourses.

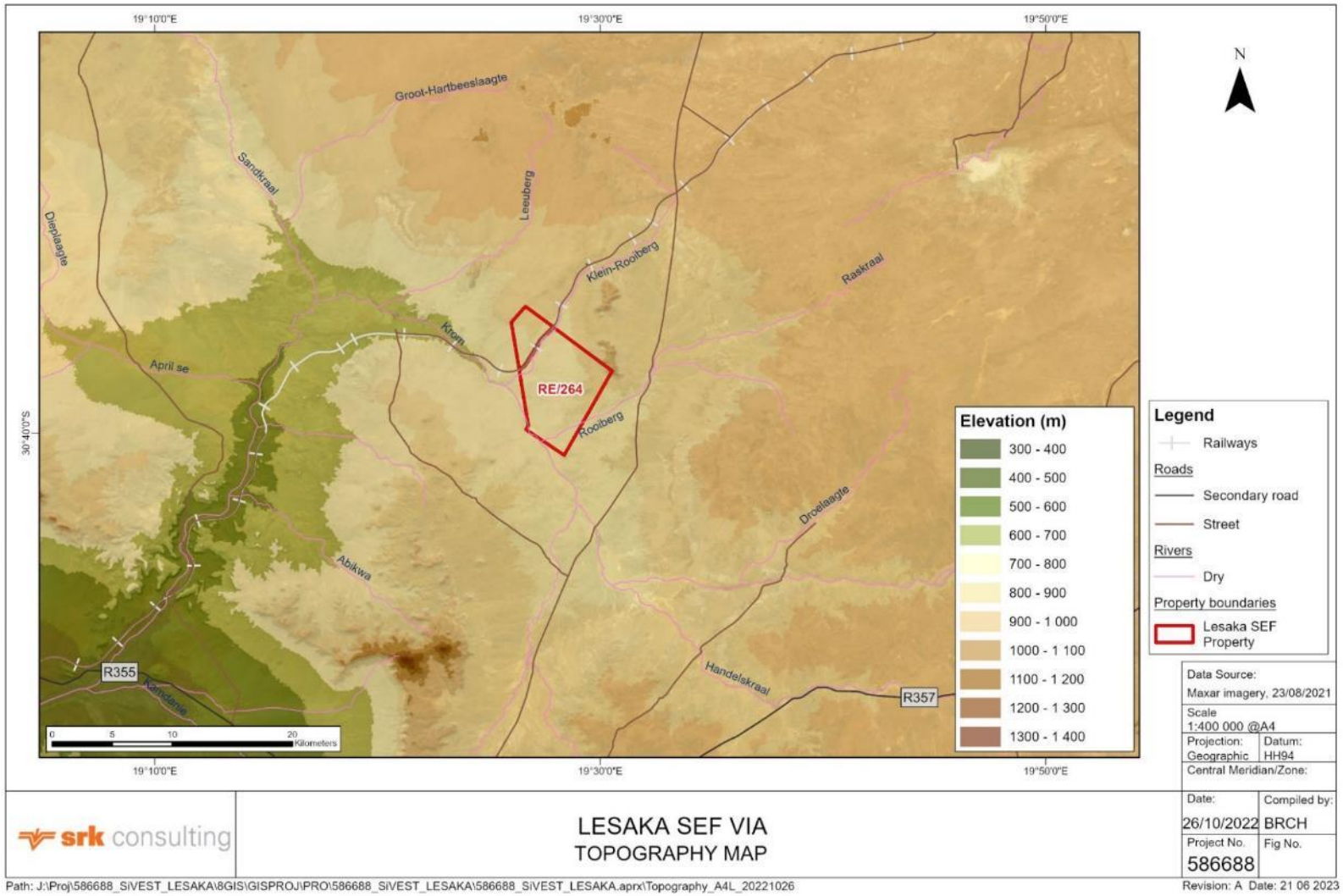


Figure 5-2: Topography map

5.1.3 Land Use

The main economic sectors in the Hantam Local Municipality are agriculture, tourism, mining and renewable energy. Agriculture is largely confined to livestock (sheep and goat) farming, with some rooibos cultivation in the south-west of the local municipality.

The area surrounding the SEF property is predominantly characterised by grazing lands (natural vegetation) with support infrastructure (roads, powerlines and a railway line). Livestock farming is the predominant land use surrounding the site with farmsteads interspersed throughout the area. A road (AP 2972) extends northwards from Loeriesfontein and to the east of the SEF property. The Sishen-Saldanha railway line is routed adjacent to the Klein-Rooiberg River bisecting the northern portion of the SEF property.

Existing large-scale powerlines are also present in the area surrounding the SEF property increasing in concentration nearer the existing Helios MTS (Figure 5-3).

Figure 5-3: Existing network of powerlines converging at the Helios MTS. Photograph is taken looking north.

The farm that constitutes the project site is largely undeveloped (i.e. not cultivated) and appear to be used for used for agricultural grazing.

As described in Section 3.1, there are a number (~ 12) of large approved renewable energy projects to the north of the SEF property (Figure 3-1). From examination of aerial imagery and desktop research, only two WEFs (Khobab and Loeriesfontein 2 WEFs) of the 12 facilities appear to be operational (Figure 5-4), with one SEF other under construction.

Figure 5-4: Khobab WEF

5.2 Visual Character

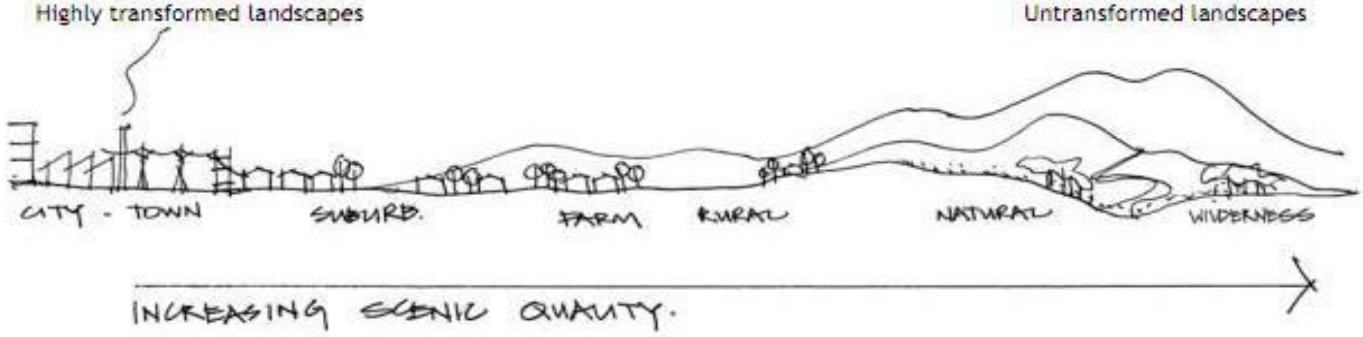
Visual character is descriptive and non-evaluative, which implies that it is based on defined attributes that are neither positive nor negative. It refers to the overall experience and impression of the landscape, such as natural or transformed.

A change in visual character cannot be described as having positive or negative attributes until the viewer's response to that change has been taken into consideration. The probable change caused by the project is assessed against the existing degree of change caused by previous development.

The basis for the visual character is provided by the topography, vegetation and land use of the area, which is a rural environment characterised by the sparsely vegetated prominences and ridgelines separated by often, wide flat expanses interspersed with farmsteads and some infrastructure (i.e. the road routed to the east of the site and the Sishen-Saldanha railway line bisecting the northern portion of the SEF property). The expanse of vegetated landscape surrounding the property evokes a rural, undeveloped and fairly inhospitable environment, representative of the Karoo (Figure 5-5). The project area can therefore be defined as a natural transition landscape as it is mostly rural with few isolated farmsteads and some powerlines, roads and a railway line visible in the landscape (Figure 5-6).

Figure 5-5: Landscape of the area surrounding the project site

Highly Transformed Landscape – Urban/Industrial	Transition Landscape	Modified Rural Landscape	Natural Transition Landscape	Untransformed Landscape – Natural
Substantially developed landscape. High levels of visual impact associated with buildings, factories, roads and other related infrastructure (e.g. powerlines).	Transitional landscape associated with the interface between, rural, agricultural area and more developed suburban or urban zones.	Typical character is rural landscape, defined by field patterns, forestry plantations and agricultural areas and associated small-scale roads and buildings.	A changing landscape character associated with the interface between natural areas and modified rural / pastoral or agricultural zones.	No / minimal impact associated with the actions of man. National parks, coastlines, pristine forest areas.



Source: (CNDV, 2006)

(Shan Ding Lu, 2009)

(Night Jar Travel South Africa, 2012)

(Boschkloof, 2012)

Figure 5-6: Typical visual character attributes

5.3 Visual Quality

Aesthetic value is an emotional response derived from our experience and perceptions. As such, it is subjective and difficult to quantify in absolute terms. Studies in perceptual psychology have shown that humans prefer landscapes with higher complexity (Crawford, 1994). Landscape quality can be said to increase when:

- Topographic ruggedness and relative relief increases;
- Water forms are present;
- Diverse patterns of grasslands, shrubs and trees occur;
- Natural landscape increases and man-made landscape decreases; and
- Where land use compatibility increases.

The visual quality of the area can be experienced through long closed views across plains of low, vegetation and prominences, escarpments and ridgelines defining the horizon (Figure 5-7). The arid, sparsely populated and vegetated region which can be experienced visually as a somewhat sterile environment. Though there are limited anthropogenic features (road, fences, powerlines and railway line), they impact significantly on the visual quality of the area as they interrupt views and are discordant with the natural landscape. Though not always visible, the very long, noisy trains using the railway line bisecting the property, detract significantly from visual quality. The ephemeral rivers and the rugged topography comprising open plains interrupted by koppies, ridges or mountains add to visual quality.

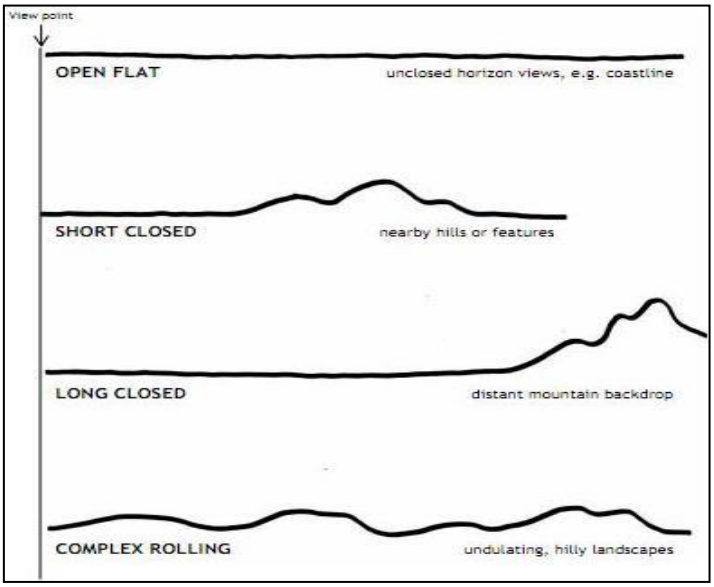


Figure 5-7: Typical views in the landscape

Sources: (CNDV, 2006)

5.4 Visual Receptors

Visual receptors have been identified based on surrounding land uses, including the isolated farmsteads and motorists. The visual receptors are briefly described below:

- **Farmstead Residents:** Isolated farmsteads are interspersed throughout the area surrounding the SEF;
- **Railway personnel:** The Sishen-Saldanha railway is routed to the north-west of the property; and
- **Motorists and tourists:** A gravel road, AP 2972, is routed to the east of the property.

5.5 Sense of Place

Our sense of a place depends not only on spatial form and quality, but also on culture, temperament, status, experience and the current purpose of the observer (Lynch, 1992). Central to the idea of 'sense of place' or Genius Loci is identity. An area will have a stronger sense of place if it can easily be identified, that is to say if it is unique and distinct from other places. Lynch defines 'sense of place' as "the extent to which a person can recognise or recall a place as being distinct from other places – as having a vivid or unique, or at least a particular, character of its own" (Lynch, 1992).

It is often the case that sense of place is linked directly to visual quality and that areas / spaces with high visual quality have a strong sense of place. However, this is not an inviolate relationship, and it is plausible that areas of low visual quality may have a strong sense of place or – more commonly – that areas of high visual quality have a weak sense of place. The defining feature of sense of place is uniqueness, generally real or biophysical (e.g. trees in an otherwise treeless expanse), but sometimes perceived (e.g. visible but unspectacular sacred sites and places which evoke defined responses in receptors). In this context Cross (2001) identified six categories of relationships with place: biographical, spiritual, ideological, narrative, cognitive and dependent (Table 5).

The region has scenic value in terms of the rugged natural landscape and large portions of agricultural land.

Table 5: Relationship to place

Type of Relationship	Process
Biographical (historical and familial)	Being born in and living in a place. Develops over time
Spiritual (emotional, intangible)	Feeling a sense of belonging
Ideological (moral and ethical)	Living according to moral guidelines for human responsibility to place Guidelines may be religious or secular
Narrative (mythical)	Learning about a place through stories, family histories, political accounts and fictional accounts
Cognitive (based on choice and desirability)	Choosing a place based on a list of desirable traits and lifestyle preferences
Dependent (material)	Constrained by lack of choice, dependency on another person or economic opportunity

Sources: Adapted from Cross (2001)

The sense of place of the surrounding area is strongly influenced by the surrounding land use, which can generally be described as a natural agricultural area, on natural grazing land, i.e. not managed (irrigated) pastures. The sense of place is not particularly distinct from the rest of the wider region and is not overly memorable.

The relationship of receptors in the study area (Section 5.4) to place may be predominantly biographical, cognitive, dependent and in some instances, spiritual. A family, for example, whose has farmed in this area

for a few generations will have a biographical, dependent and spiritual (sense of belonging) and in some cases cognitive attachment to the area. A farm worker living on a farm in the area will likely have a dependent relationship with the area.

6. ANALYSIS OF THE MAGNITUDE OF THE VISUAL IMPACT

The following section outlines the analysis that was undertaken to determine the **magnitude or intensity** of the overall visual impact resulting from the project. Various factors were considered in the assessment, including:

- Visual exposure;
- Visual absorption capacity;
- Sensitivity of visual receptors;
- Visibility and viewing distance; and
- Integrity with existing landscape / townscape.

The analysis of the magnitude or intensity of the visual impact, as described in this section, is summarized and integrated in Table 13 and forms the basis for the assessment and rating of the impact as documented in Section 6.

6.1 Visual Exposure

Visual exposure is determined by the zone of visual influence or viewshed. The viewshed is the topographically defined area that includes all the major observation sites from which the project *could* be visible; it is a function of topography and the dimensions of the project *only*, but not the location of visual receptors. The viewshed analysis assumes maximum visibility of the project in an environment stripped bare of vegetation and structures. The viewshed indicates the visibility of the project, accounting for the decrease in visibility as distance from the project increases (Figure 6-1).

The viewshed indicates that beyond the SEF property the SEF cluster is moderately visible in the background to the north and south-west. The SEF cluster will also be visible to railway personnel (on trains)[4] to the north, and from the southern bank of the Krom River, although there are no / few receptors located to the west (Figure 6-1). The SEF is highly visible from within the property, within 2 km of the SEFs. Beyond 5 km, the SEF will not be visible to receptors.

The visual exposure of proposed infrastructure is thus deemed ***moderate.***

[4] The Sishen – Saldanha Railway Line transports ore and is not a passenger route.

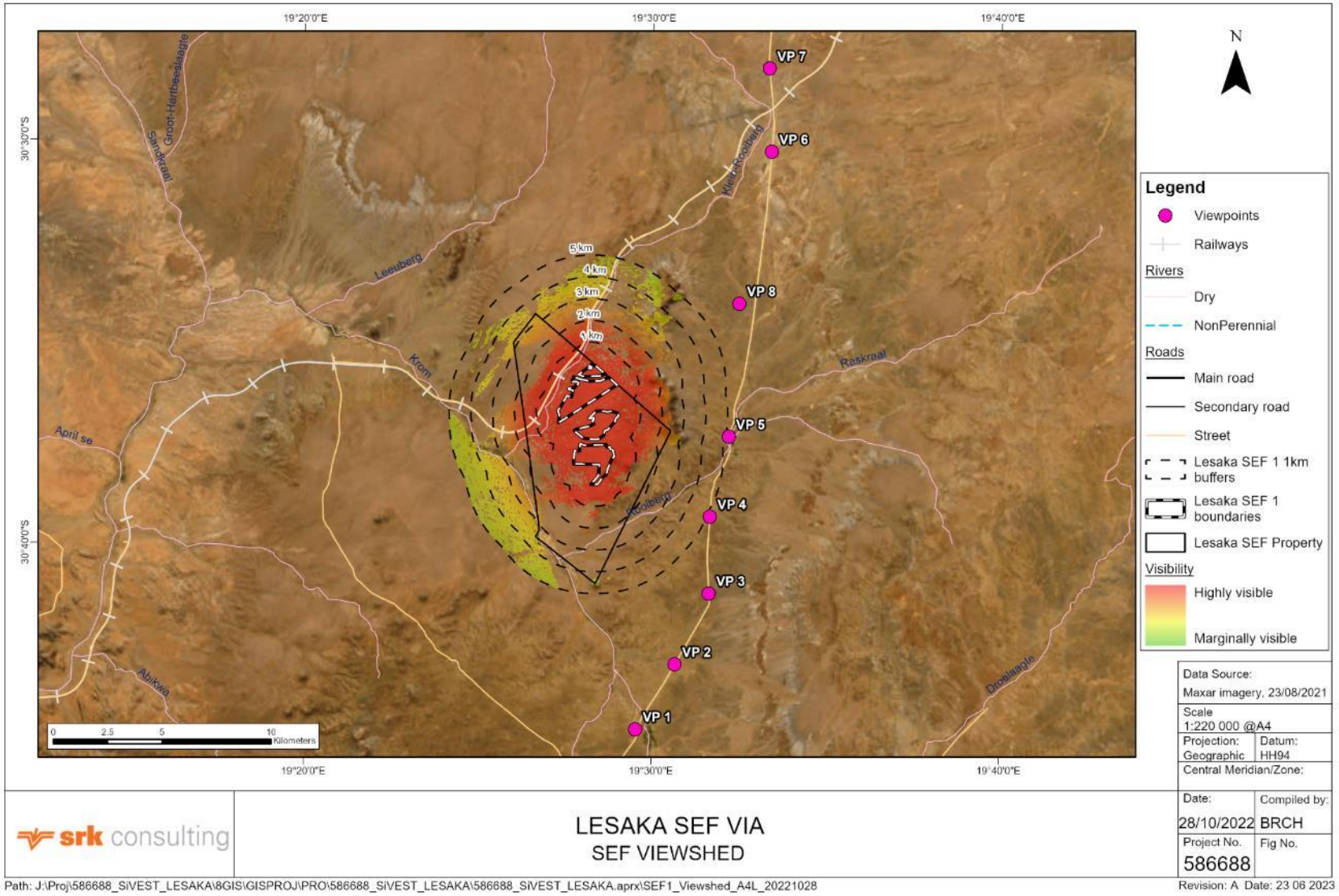


Figure 6-1: Viewshed of the SEF

6.2 Visual Absorption Capacity

The VAC is the potential for an area to conceal and assimilate the proposed project. Criteria used to determine the VAC of the affected area are defined in Table 6. The VAC of an area is increased by:

1. Topography and vegetation that is able to provide screening and increase the VAC of a landscape;
2. The degree of urbanisation compared to open space. A highly urbanised landscape is better able to absorb the visual impacts of similar developments, whereas an undeveloped rural landscape will have a lower VAC; and
3. The scale and density of surrounding development.

These factors frequently apply at different scales, by influencing the VAC in the foreground (e.g. dense bush, existing roads and bridges, small structures), middleground and background (e.g. tall forests, hills, cityscapes).

Rural areas generally have a low VAC. The low VAC of the surrounding area is reduced by the wide flat, undeveloped, expanse between isolated ridges for both the powerline and SEF. The vertical profile of the pylons further reduces the VAC of the surrounding area. The vegetation of the surrounding area is not expected to screen the SEF, powerline and pylons from receptors.

The study area has a ***low*** VAC for the proposed project.

Table 6: Visual absorption capacity criteria

High	Moderate	Low
The area is able to absorb the visual impact as it has: ▪ Undulating topography and relief ▪ Good screening vegetation (high and dense) ▪ Is highly urbanised in character (existing development is of a scale and density to absorb the visual impact).	The area is moderately able to absorb the visual impact, as it has: ▪ Moderately undulating topography and relief ▪ Some or partial screening vegetation ▪ A relatively urbanised character (existing development is of a scale and density to absorb the visual impact to some extent.	The area is not able to absorb the visual impact as it has: ▪ Flat topography ▪ Low growing or sparse vegetation ▪ Is not urbanised (existing development is not of a scale and density to absorb the visual impact to some extent.)
 http://www.franschhoek.co.za	 http://wikipedia.org	 http://www.butbn.cas.cz
 http://commons.wikimedia.org	 http://blogs.agu.org	 http://fortheinterim.com

6.3 Sensitivity of Visual Receptors

Receptors are important insofar as they inform visual sensitivity. The sensitivity of viewers is determined by the number and nature of viewers.

Viewers can be deemed to have:

1. High sensitivity if they view the project from e.g. residential areas, nature reserves and scenic routes or trails;
2. Moderate sensitivity if they view the project from e.g. sporting or recreational areas or places of work; and
3. Low sensitivity if they view the project from or within e.g. industrial, mining or degraded areas, or motorists with fleeting views.

The sensitivity of potential viewers identified in Section 5.4 is described below:

- **Farmstead receptors:** There is a limited number of isolated farmsteads surrounding the site, none of them located within 1 km of the proposed SEF. Therefore, the residents of these farmstead are not considered highly sensitive receptors, since they are some distance from the project, therefore with limited visibility.
- **Railway personnel:** The Sishen-Saldanha Railway Line bisects the SEF property. This railway line transports ore and is not a passenger route. Individuals travelling on the train will not be tourists or visitors to the area. They are considered to have a low sensitivity due to their temporary exposure to the site.
- **Motorists and tourists:** The AP 2972 road is routed to the east of the SEF property. This road is largely used by farmers and construction and maintenance staff employed on other renewable energy projects and to maintain the railway line. Motorists are considered to have relatively low sensitivity as they are transient receptors with fleeting views of the project. Furthermore, it is anticipated that these motorists, particularly the construction and maintenance staff, are inured to renewable energy projects and associated infrastructure in the landscape as an existing network of powerlines is a characteristic of the area around the Helios MTS.

The limited number of highly sensitive visual receptors is further moderated by the large number of motorists with fleeting views, as well as receptors' familiarity with and acceptance of views of renewable energy projects in the surrounding landscape. The sensitivity of the viewers or visual receptors potentially affected by the visual impact of the project is considered to be ***low.***

6.4 Viewing Distance and Visibility

The distance of a viewer from an object is an important determinant of the magnitude of the visual impact. This is because the visual impact of an object diminishes / attenuates as the distance between the viewer and the object increases. Thus, the visual impact at 1 000 m would, nominally, be 25% of the impact as viewed from 500 m (Figure 6-2). At 2 000 m it would be 10% of the impact at 500 m (Hull and Bishop, 1988 in (Young, 2000)).

Three basic distance categories can be defined for a project of this scale (as discussed and represented in Table 6-2): foreground, middleground and background.

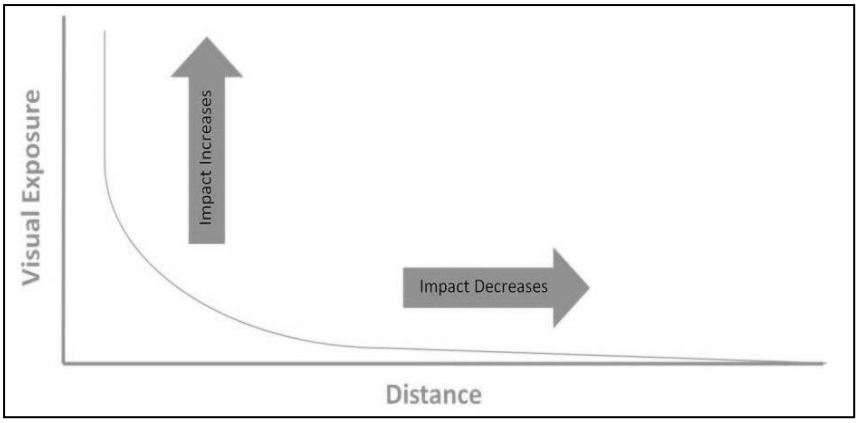


Figure 6-2: Visual exposure vis-à-vis distance

Table 7: Distance categories

FOREGROUND (0 – 1 km)	The zone where the proposed project will dominate the frame of view. The project will be *highly visible* unless obscured.
MIDDLEGROUND (1 - 2 km)	The zone where colour and line are still readily discernible. The project will be *moderately visible* but will still be easily recognisable.
BACKGROUND (2 - 5 km)	This zone stretches from 2 km to 5 km. Objects in this zone can be classified as *marginally visible* to *not visible*.

A number of viewpoints were selected to indicate locations from where receptors may (or may not) view the project. The viewpoints are listed in Table 9. Current views from these points are shown in Appendix B.

The predicted visibility of (any element of the project) from each viewpoint is described in Table 9, based on the visibility categories in Table 7. Note that unlike visual exposure (Section 6.1) which describes areas from which the project may be visible without taking local screening into account (i.e. the viewshed), visibility describes predicted, actual visibility. The visibility of the project can be summarised as follows:

- Receptors will have limited visibility of the Lesaka SEF in general, with no viewpoints to the north of the site (VP 5, 6, 7 and 8) having a view of the proposed SEF; and
- Motorists travelling on the AP 2972 may have a limited view of the SEF in the background along sections of the road (VP 3).

Overall, the proposed SEF is marginally visible in the background to receptors and is considered to be ***low***.

Table 8: Visibility criteria

NOT VISIBLE	Project cannot be seen	
MARGINALLY VISIBLE	Project is only just visible / partially visible (usually in the background zone)	
VISIBLE	Project is visible although parts may be partially obscured (usually in middleground zone)	
HIGHLY VISIBLE	Project is clearly visible (usually in foreground or middleground zone)	

Table 9: Visibility from viewpoints

Viewpoint #	Location	Co-ordinates	Direction of view	Potential Receptors	Visibility
VP 1	Krom River and Farmstead	30° 44' 35.87" S 19° 29' 32.89" E	Looking north	Residents of farmstead and motorists travelling on AP 2972.	**Lesaka 1 SEF: Not visible** The SEF is not visible due to distance and screening by intervening topography.
VP 2	AP 2972 Road 1	30° 42' 59.06" S 19° 30' 40.57" E	Looking north-west	Motorists travelling on AP 2972.	**Lesaka 1 SEF: Not Visible** The SEF is not visible due to distance and screening by intervening topography.
VP 3	AP 2972 Road 2	30° 41' 13.24" S 19° 31' 38.75" E	Looking west	Motorists travelling on AP 2972.	**Lesaka 1 SEF: Marginally Visible** The SEF will be marginally visible due to distance and screening by intervening topography.
VP 4	AP 2972 Road 3	30° 39' 19.18" S 19° 31' 40.20" E	Looking west	Motorists travelling on AP 2972.	**Lesaka 1 SEF: Marginally Visible** The SEF will be marginally visible due to distance and screening by intervening topography.
VP 5	Farmsteads	30° 37' 20.06" S 19° 32' 11.83" E	Looking west	Residents of farmstead and motorist travelling on the AP 2972.	**Lesaka 1 SEF: Not Visible** The SEF will not be visible due to screening by intervening topography.
VP 6	Helios MTS	30° 30' 15.66" S 19° 33' 24.01" E	Looking south	Motorists travelling on the AP 2972.	**Lesaka 1 SEF: Not Visible** The SEF will not be visible due to distance and screening by intervening topography.
VP 7	Khobab WEF	30° 28' 11.84" S 19° 33' 19.87" E	Looking south.	Motorists travelling on the AP 2972.	**Lesaka 1 SEF: Not Visible** The SEF will not be visible due to distance and screening by intervening topography.
VP 8	Klein Rooiberg River Road	30° 34' 2.01" S 19° 32' 29.55" E	Looking south	Motorists travelling on the Klein Rooiberg River Road.	**Lesaka 1 SEF: Not Visible** The SEF will not be visible due to distance and screening by intervening topography.

6.5 Compatibility with Landscape Integrity

Landscape (or townscape) integrity refers to the compatibility of the development / visual intrusion with the existing landscape. The landscape integrity of the project is rated based on the relevant criteria listed in Table 10.

Table 10: Landscape integrity criteria

Criterion	Landscape integrity		
	High	**Moderate**	**Low**
	The project is:		
Consistency with existing land use of the area	Consistent	Moderately consistent	Not consistent / very different
Sensitivity to natural environment	Highly sensitive	Moderately sensitive	Not sensitive
Consistency with urban texture and layout	Consistent	Moderately consistent	Not consistent / very different
Congruence of buildings / structures with / sensitivity to existing architecture / buildings	Congruent / sensitive	Moderately congruent / sensitive	Not congruent / sensitive
Scale and size relative to nearby existing development	Similar	Moderately similar	Different

The proposed project is located within a rural area comprising large, undeveloped farms with natural vegetation predominantly used for grazing. The vast, undeveloped expanse of arid landscape can be experienced by receptors as desolate. Existing powerlines converge on the Helios MTS to the north of the proposed SEF. The existing WEFs (Khobab and Loeriesfontein 2) are visible in the background, to the north of the proposed SEF. Another SEF located between the proposed Lesaka 1 SEF site and the Helios MTS is under construction.

The PV array will introduce a large, uniform anthropogenic artefact into the landscape discordant with scale, texture and use of the current land use around the SEF (Figure 6-3). The discordant nature of the SEF will result in the SEF being experienced as a visual intrusion in the landscape. Where the SEF is visible in the foreground, the rows of panels and the vertical height may be discernible. When visible in the middle- or background from various elevated viewpoints in the surrounding area the array will appear as a dark, uniform two-dimensional geometric unit.

Figure 6-3: Example of a SEF in an arid environment

Given the number of approved renewable energy projects in the area, it is likely that these will burgeon around the proposed project property.

The project is deemed to have a ***low*** integrity with the surrounding landscape.

6.6 Solar Reflection

The suite of visual receptors that may (in theory) be impacted by glint and glare caused by any new development may include:

- Residents;
- Motorists;
- Train drivers; and
- Pilots and air traffic controllers.

Visual receptors potentially exposed to solar reflection by this project are residents, motorists and train drivers (see Section 6.4).

6.6.1 Glare Thresholds

The ocular (or visual) impact of glare has been categorised into the following three categories (Ho, Ghanbari, & Diver, 2011):

- Green: low potential to cause after-image;
- Yellow: potential to cause temporary after-image; and
- Red: potential to cause retinal burn (permanent eye damage)[5].

The Glare Hazard Plot (Figure 6-4) illustrates the ocular impact of solar glare as a function of the intensity of the glare source on the retina (retinal irradiance) and the portion of a viewer's field of vision that the glare occupies (subtended source angle).

[5] Retinal burn is typically not possible from SPV glare as the SPV panels do not focus the reflected sunlight.

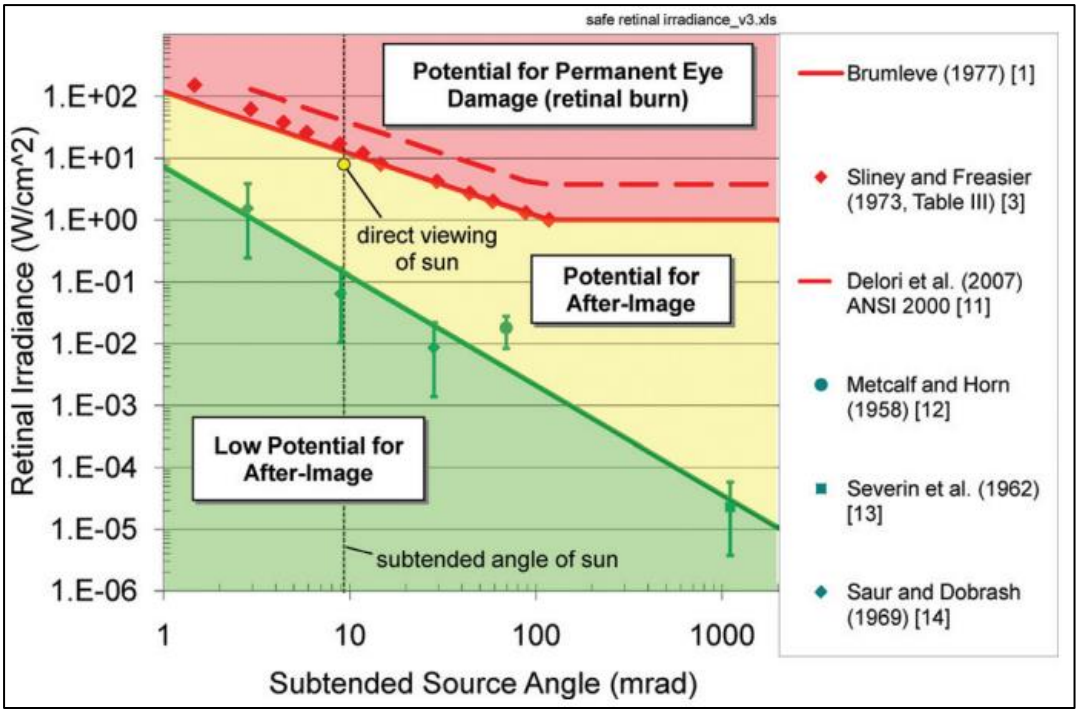


Figure 6-4: Potential impacts of retinal irradiance as a function of subtended source angle

As discussed in Section 4.1, no content requirements or guidelines relating to glint and glare thresholds or reporting have been released by South African authorities. German guidelines on acceptable glare thresholds have been defined as less than 30 minutes per day or 30 hours per year (Federal Ministry of the Environment, 2014). When glare exceeds this threshold, glare is considered significant, and mitigation is required.

SRK's framework for assessing the magnitude of glare is based on the two categories of glare applicable to PV facilities (Green glare and Yellow glare) in the Glare Hazard Plot (Ho, Ghanbari, & Diver, 2011) and the German guidelines (Federal Ministry of the Environment, 2014). The framework is presented in Table 11 below.

Table 11: Magnitude of glare impacts for PV facilities

Impact	Category of Glare[6]	Duration of Glare
High[7]	Yellow	> 30 minutes per day and >30 hours per year
Moderate	Yellow	> 30 minutes per day or > 30 hours per year
Low	Yellow or Green	< 30 minutes per day and < 30 hours per year

6.6.2 Modelling Glare

Glare modelling was conducted for the proposed layout of the PV array using ForgeSolar's GlareGauge. The parameter inputs used to model glare for the proposed project are included in Table 12 and the GlareGauge report included in Appendix C.

[6] Category of glare in terms of the Glare Hazard Plot; Red Glare, Yellow Glare and Green Glare (Ho, Ghanbari, & Diver, 2011).

[7] Exceeds the German glare guideline

Table 12: Solar reflection model parameters

Parameter	Input
Panel height (centroid)	2.5 m
Axis tracking	Single (horizontal)
Tracking axis orientation	0° (North-South)
Tracking axis tilt	0°
Tracking axis panel offset	0°
Maximum tracking angle[8]	60°
Resting angle	0
Panel material	Smooth glass[9]
Receptor height – Residents	1.5 m
Receptor height - Railway	2 m
Receptor height - Motorists	1 m

Eighteen observation points representative of the residential dwellings located around the site were modelled to ascertain whether glare would be experienced by receptors at these points (Figure 6-5). Two routes were modelled in both directions:

1. Gravel farm road, representative of the motorists; and
2. Sishen-Saldanha Railway Line, representative of the railway

While the viewshed demonstrates that the SEF will be highly visible within ~ 1.5 km of the site, there very few receptors in this area.

Based on the input parameters (Table 12) the glare analysis demonstrated that no glare (i.e. zero minutes of glare) from the project will be experienced by visual receptors (residents, motorists and rail personnel) despite their close proximity to the array.

Glint is not modelled. However, if the PV panels are visible to moving receptors, then glint and a degree of after-image may be experienced.

The exposure to glare is considered to be ***low***.

[8] Maximum rotation (tracking) angle of PV modules in either direction (East and West) relative to the mid-position on the torque tube.

[9] Conservative assumption that the PV modules will not have anti-glare coating.

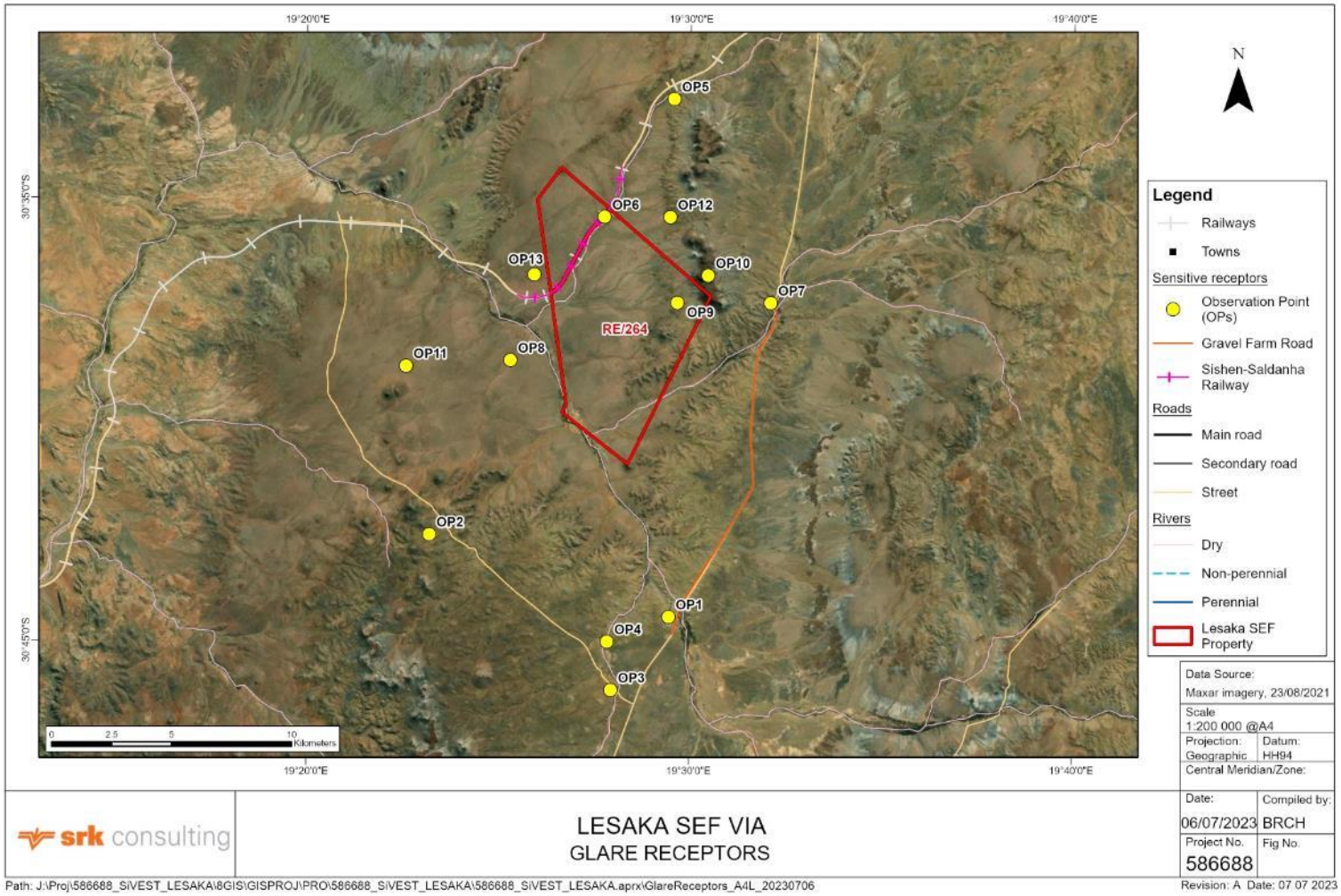


Figure 6-5: Glare receptors

6.7 Magnitude of Overall Visual Impact

Based on the above criteria, the magnitude or intensity of the overall visual impact that is expected to result from the project has been rated. Table 13 provides a summary of the criteria, a descriptor summarising the status of the criteria and projected impact magnitude ratings.

The overall magnitude of the visual impact that is expected to result from the project is rated as ***moderate***. The moderate visual exposure and landscape integrity and low VAC are moderated by the low viewer sensitivity, visibility and exposure to solar reflection.

Table 13: Magnitude of overall visual impact

Criteria	Rating	Comments
Visual Exposure (Viewshed)	Moderate	The viewshed indicates that beyond the SEF property the SEF cluster is moderately visible in the background to the north and south-west. The SEF cluster will also be visible to railway personnel to the north, and from the southern bank of the Krom River, although there are no / few receptors located to the west.
Visual Absorption Capacity	Low	The low VAC of the surrounding area is reduced by the wide flat, undeveloped, expanse between isolated ridges for the SEF. The vegetation of the surrounding area is not expected to screen the SEF from receptors.
Viewer Sensitivity (Receptors)	Low	The limited number of highly sensitive visual receptors is further moderated by the large number of transient motorists and railway personnel, as well as receptors' familiarity with and acceptance of views of renewable energy in the surrounding landscape.
Viewing Distance and Visibility	Low	The proposed SEF is marginally visible in the background to receptors.
Landscape Integrity	Low	Although a number of renewable energy facilities are proposed around the SEF property, they do not currently exist within the landscape. The proposed project is incongruent with the size, scale and form of the currently landscape.
Solar Reflection	Low	The glare analysis indicates that glare caused by the project will not be experienced by receptors. Glint is not modelled; but may be experienced by moving receptors that have line of sight of the PV panels.

7. IDENTIFICATION AND ASSESSMENT OF IMPACTS

The following section describes the visual impacts anticipated during the construction, operational and decommissioning phases, and assesses the significance of these impacts utilizing the impact rating methodology presented in Appendix D.

Possible measures to avoid, mitigate or compensate visual impacts will be considered and recommended, depending on the severity of the impacts and the feasibility of measures. The mitigation hierarchy and sample measures are provided below below (DEA&DP, 2005):

- Avoid, e.g. by re-examining the need for the proposed project, relocating the project or re-designing the project;

- Mitigate (reduce), e.g. through adjustments to the siting and design of the project, careful selection of finishes and colours, use of earthworks (such as berms) and planting to provide visual screening and dust control where required;
- Rehabilitate and restore, e.g. through on-site and off-site landscape rehabilitation of areas affected by the project, which may include re-instating landforms and natural vegetation, provision of landscaped open space etc.;
- Compensate and offset, where avoidance or mitigation cannot achieve the desired effect; and
- Enhance, where the proposed project is located in run-down areas or degraded landscapes.

The project relates to the greenfield development of a SEF and associated infrastructure (i.e. on-site substation and BESS) and the range of potential visual impacts is thus larger than it would be for a brownfield project (e.g. rooftop or urban SEF).

Direct visual and aesthetic impacts are likely to result from the following project interventions and/or activities:

- Earthworks and construction activities (including clearing of vegetation and associated generation of dust);
- Altered sense of place;
- Visual intrusion compromising vistas across the project area; and
- Increased light pollution.

The visual and aesthetic impacts generated by the project are likely to be associated with visual intrusion and visual quality.

7.1 Construction Phase – SEF Components

7.1.1 Altered Sense of Place and Visual Intrusion caused by Construction Activities associated with the SEF Components

Visual impacts will be generated by construction activities such as earthworks, which can generate dust, and from construction infrastructure, plant and materials on site (e.g. site camp, plant and machinery, and stockpiles of excavated material). Dust generated during construction will be visually unappealing and may detract from the visual quality (and sense of place) of the area. These impacts are typically limited to the immediate area surrounding the construction site and development footprint, during the construction period.

Construction activities will have a greater impact within the foreground (< 200 m) as sensitive receptors in close proximity to these activities will be particularly exposed to these visual impacts. However, very few farmsteads are evident from aerial imagery and the site visit, and none were identified to be within the foreground.

Laydown location alternatives do not affect the significance rating.

The impact is assessed to be of ***medium*** significance and with the implementation of mitigation is reduced to ***low*** (Table 15).

7.2 Operational Phase – SEF Components

7.2.1 Altered Sense of Place and Visual Intrusion caused by the PV Array

The total combined development footprint of the SEF is ~ 591 ha. The development of this PV array may be perceived as conflicting with the current undeveloped, inhospitable agricultural landscape. Although a number of renewable energy projects are proposed in the area directly adjacent to the site, many of them do not currently exist. Therefore, within the current landscape the proposed project is considered incongruent in scale, size and form.

Furthermore, although modelling shows that no glare is experienced by receptors (see Section 6.6), glint/glare will emanate from the PV arrays, possibly being seen and experienced as an unobtrusive twinkle in the distance (>5 km away) across the landscape. The glare, though not affecting permanent receptors in a significant manner, will be generated and therefore contributes to the altered sense of place.

Across the landscape there is evidence of anthropogenic influence such as the Sishen-Saldanha railway line, fence lines, AP 2972, operational WEFs and construction of a SEF. Nevertheless, the proposed PV array is expected to degrade views, and negatively impact the sense of place and present as a visual intrusion across the landscape.

Receptors, identified through examination of aerial imagery and during the site visit, are located to the east and south of the proposed SEF, but due to their distance from the property the receptors are not expected to experience the PV array as a significant transformation in the landscape.

Motorists on the AP 2972 may also be exposed to the project, however due to their fleeting views and transient exposure to the area, motorists are not considered sensitive receptors. An exception is the seasonal tourists (to renowned springtime Namaqualand floral displays/landscapes) who may be affected.

The impact is assessed to be of ***medium*** significance with and without the implementation of mitigation (Table 15).

7.2.2 Altered Sense of Place and Visual Intrusion caused by the BESS, IPP substation and Internal Grid Infrastructure

The SEF will include a BESS, IPP substation and internal grid connections (up to 33 kV powerlines). Where possible, the powerlines will be installed underground. This associated infrastructure, particularly the BESS, is not congruent with the current landscape integrity, and will contribute to visual clutter: however, few receptors are expected to be exposed.

Stationary receptors (in farmsteads) are located to the east and south of the proposed SEF, but due to their distance from the property are not expected to experience the BESS, internal grid infrastructure and IPP substation as a significant transformation in the landscape.

The impact is assessed to be of ***low*** significance with and without the implementation of mitigation (Table 15).

7.2.3 Impaired Visibility and/or Visual Discomfort caused by Glint and Glare from the PV Array

Due to the proximity of the SEF to dwellings, roads and railway, the potential glare impact was modelled.

The glare analysis indicated that no glare will be experienced at the OPs modelled or along the routes modelled, *viz*. Gravel Road and the railway line (see Section 6.6.2). In theory, it is possible that moving receptors, notably motorists or rail personnel, may experience glint from the PV panels, however considering these routes are not expected to experience glare it is deemed unlikely. As no glare is expected, the impact associated with visual discomfort or impaired visibility is considered unlikely.

The impact is assessed to be of ***low*** significance with and without the implementation of mitigation (Table 15).

7.2.4 Altered Visual Quality caused by Light Pollution at Night

It is anticipated that lighting will be installed along the perimeter of the PV array and / or around the BESS and IPP substation to improve security.

The installation of lighting on the site perimeter and / or around the BESS will generate nightglow that currently does not emanate from the natural, undeveloped property or surrounds. As such, the introduction of lighting on the site alters the sense of place and visual quality to surrounding receptors.

Lighting is not easily screened by vegetation or topography, and the proposed lighting will contribute any existing nightglow from the surrounding areas and significantly alter visual quality of the surrounding area.

The impact is assessed to be of ***medium*** significance and with the implementation of mitigation is reduced to ***low*** (Table 15).

7.3 Decommissioning Phase – SEF Components

7.3.1 Altered Sense of Place caused by the Decommissioning Activities for the SEF

While the proposed PV array and associated infrastructure are anticipated to operate in the long-term, when decommissioning is required visual impacts will be generated.

Decommissioning will include earthworks, the presence and movement of plant and equipment on site, and stockpiles of excavated material. Dust generated during decommissioning will be visually unappealing and may detract from the visual quality (and sense of place) of the area. These impacts are typically limited to the immediate area surrounding the site, during the decommissioning period.

Decommissioning activities will have a greater impact within the foreground (< 200 m) as sensitive receptors in close proximity to these activities will be particularly exposed to these visual impacts. However, very few farmsteads are evident from aerial imagery, and none were identified to be within the foreground.

The impact is assessed to be of ***medium*** significance and with the implementation of mitigation is reduced to ***low*** (Table 15).

7.4 Cumulative Impacts

7.4.1 Introduction

For the purposes of this report, cumulative impacts are defined as ‘direct and indirect impacts that act together with existing or future potential impacts of other activities or proposed activities in the area / region that affect the same resources and / or receptors’.

For the most part, cumulative effects or aspects thereof are too uncertain to be quantifiable, due mainly to a lack of data availability and accuracy. This is particularly true of cumulative effects arising from potential or future projects, the design or details of which may not be finalised or available and the direct and indirect impacts of which have not yet been assessed.

For practical reasons, the identification and management of cumulative impacts are limited to those effects generally recognised as important on the basis of scientific concerns and/or concerns of affected communities, in this case effects of other renewable energy facilities and large-scale infrastructure projects.

7.4.2 Cumulative Impacts Analysis

In addition to the project, other past, present and future activities have taken place or are proposed within a 35 km radius of the project site that might have caused or may cause impacts and may interact with impacts caused by the project. These are briefly discussed in this section.

Three approved SEFs and nine proposed WEFs within a 35 km radius of the proposed project site are listed on the DFFE South African Renewable Energy EIA Application Database (DFFE, 2023). These projects are listed in Table 14 and their location shown in Figure 3-1.

Table 14: Renewable projects within a 35 km radius of the project site

	Facility Name / Description	**Status**	**MW**
1	Dwarsrug WEF	Approved	140 MW
2	Hantam SEF	Approved and in construction phase	100 MW
3	Orlight SA SEF	Approved	22 MW
4	Loeriesfontein 3 SEF	Approved	100 MW
5	Kokerboom 1 WEF	Approved	256 MW
6	Kokerboom 2 WEF	Approved	240 MW
7	Kokerboom 3 WEF	Approved	240 MW
8	Kokerboom 5 WEF	Approved	256 MW
9	Graskoppies WEF	Approved	235 MW
10	!XHA Boom WEF	Approved	235 MW
11	Khobab WEF	Approved and in operational phase	140 MW
12	iThemba WEF	Approved	235 MW
			2 199 MW

WEFs are generally more visually intrusive structures within the landscape due to their height and form. SEFs have a lower visual impact to the surrounding region due to their low vertical profile and therefore, lower visibility across vistas in the landscape, when compared to projects such as WEFs or power stations. Nevertheless, both WEFs and SEFs result in change to the visual character of a large footprint / area, and therefore can alter the sense of place to visual receptors near the site. Only two WEFs of the 12 facilities appear to be operational, while another SEF is under construction. As more of these facilities are constructed and enter their operational phase, the visual landscape is expected to be significantly transformed detracting from the visual quality of the region. As SEFs and WEFs proliferate, impacts will accumulate towards an unknowable threshold.

The power generated by the project will be evacuated to the national grid via a 132 kV overhead powerline connecting the Eskom Switching Station to the MTS and a LILO connecting the MTS to the existing 400 kV

overhead powerline traversing the site. This infrastructure will be subject to a separate application but has been considered in the cumulative impact assessment. Powerlines, BESS's and substations are typical components of renewable energy facilities. Despite the rural location of the project and surrounding area the region has a high concentration of approved renewable energy projects located around the Helios MTS. The associated powerline infrastructure (subject to a separate application) will marginally contribute to the powerlines traversing the landscape due to their short length.

SiVEST's Impact Assessment methodology has been used to evaluate the cumulative visual impacts of the project on the sense of place within a 35 km radius. The cumulative impact of the SEF and associated infrastructure is assessed to be of ***medium*** significance and with the implementation of mitigation is reduced to ***low*** (Table 15).

7.5 Overall Impact Rating

The impact assessment and ratings for the SEF is summarised in Table 15 below.

Table 15: Rating of impacts – SEF components

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ /-)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ / -)	S
Construction Phase																				
Altered Sense of Place and Visual Intrusion caused by Construction Activities	Dust generated during construction will be visually unappealing and may detract from the visual quality (and sense of place) of the area. These impacts are typically limited to the immediate area surrounding the construction site, during the construction period.	2	4	1	2	1	3	30	-	Medium	• Limit vegetation clearance and the footprint of construction to what is absolutely essential. • Consolidate the footprint of the construction camp to a functional minimum. • Avoid excavation, handling and transport of materials which may generate dust under very windy conditions. • Keep stockpiled aggregate and sand covered to minimise dust generation. • Keep construction site tidy.	2	3	1	2	1	2	18	-	Low
Operational Phase																				
Altered Sense of Place and Visual Intrusion caused by the PV Array	The development of this PV array may be perceived as conflicting with the current undeveloped, inhospitable agricultural landscape. The proposed SEF is anticipated to interrupt and/or degrade views, affecting the sense of place and presenting as a visual intrusion across the landscape.	2	4	2	3	3	3	26	-	Medium	• Fence the perimeter of the site with green or black fencing.	2	4	2	3	3	3	26	-	Medium

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ /-)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ / -)	S
Altered Sense of Place and Visual Intrusion caused by the BESS, Substation and Internal Grid Infrastructure	Associated infrastructure, particularly the BESS, is not congruent with the current landscape integrity, and will contribute to visual clutter: however, few receptors are expected to be exposed.	2	4	1	1	3	2	22	-	Low	• Install powerlines underground, where possible. • Fence the perimeter of the site with green or black fencing. • Ensure that the roof colour of the proposed buildings blends into the landscape.	2	3	1	1	3	2	20	-	Low
Visual Discomfort and Impaired Visibility caused by Glint and Glare	The glare analysis indicated that no glare will be experienced at the OPs modelled or along the routes modelled, *viz*. Gravel Road and the railway line. As no glare is expected, the impact associated with visual discomfort or impaired visibility is considered unlikely.	2	1	1	1	3	1	8	-	Low	• None	2	1	1	1	3	1	8	-	Low
Altered Visual Quality caused by Light Pollution at Night	The installation of lighting on the site perimeter and / or around the BESS is anticipated to generate nightglow which currently does not emanate from the natural, undeveloped site. The introduction of lighting on the site will alter the sense of place and visual quality to surrounding receptors.	2	4	1	1	3	3	33	-	Medium	• Reduce the height of lighting masts to a workable minimum. • Direct lighting inwards and downwards to limit light pollution.	2	3	1	1	3	2	20	-	Low

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ /-)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ / -)	S
Decommissioning Phase																				
Altered Sense of Place caused by the decommissioning activities	Dust generated during decommissioning activities will be visually unappealing and may detract from the visual quality (and sense of place) of the area. These impacts are typically limited to the immediate area surrounding the site, during the decommissioning period.	2	4	1	2	1	3	30	-	Medium	• Limit vegetation clearance and the footprint of decommissioning to what is absolutely essential. • Avoid excavation, handling and transport of materials which may generate dust under very windy conditions. • Keep stockpiled aggregate and sand covered to minimise dust generation. • Keep site tidy.	2	3	1	2	1	2	18	-	Low
Cumulative Impact																				
Altered sense of place caused by the SEF and associated infrastructure	The site and surrounds are rural in character, there is a high concentration of approved renewable energy projects and associated grid infrastructure located around the Helios MTS. Only two WEFs of the 12 facilities appear to be operational, while another SEF is under construction. As more of these facilities and infrastructure are constructed, the visual landscape is expected to be significantly transformed detracting from the visual quality of the region. As SEFs and WEFs proliferate, impacts will accumulate towards an unknowable threshold.	2	4	1	3	3	2	26	-	Medium	• Encourage other project owners to implement measures to mitigate the impact of these projects on visual intrusion and altered sense of place, such as screening (vegetation and/or berms) and limit the light pollution generated by these facilities.	2	3	1	2	3	2	22	-	Low

7.6 Input into the EMPr

Table 16 provides a description of the key monitoring recommendations for each mitigation measure identified for each phase of the project for inclusion in the EMPr or Environmental Authorisation (EA).

Table 16: EMPr measures

Impact / Aspect	Mitigation / Management Actions	Responsibility	Methodology	Mitigation / Management Objectives and Outcomes	Frequency
Construction Phase					
Visual Quality	• Limit vegetation clearance and the footprint of construction to what is absolutely essential.	Contractor	• Plan which areas require the clearance of vegetation. • Only clear vegetation when works in the area will be undertaken.	• Limited dust generation.	Throughout construction
	• Consolidate the footprint of the construction camp to a functional minimum.		• Ensure that the construction camp is consolidated (in size) during the design phase	• Small construction camp footprint.	
	• Avoid excavation, handling and transport of materials which may generate dust under very windy conditions.		• During very windy conditions cease excavation, handling and transportation of materials which may generate dust.	• No dust generated by activities undertaken during very windy conditions.	
	• Keep stockpiled aggregates and sand covered to minimise dust generation.		• Stockpile all aggregate and sand. • Keep stockpiles covered when not in use.	• No airborne dust entrained from stockpiles.	
	• Keep construction site tidy.		• Implement measures to keep the site tidy.	• No wind-blown litter originating from the site.	

Impact / Aspect	Mitigation / Management Actions	Responsibility	Methodology	Mitigation / Management Objectives and Outcomes	Frequency
Operational Phase					
Altered Sense of Place and Visual Intrusion	• Install the powerlines underground, where possible.	Developer	• Incorporate underground powerlines in the design.	• Reduced visual clutter interrupting views.	On completion of construction activities. Throughout operation.
	• Fence the perimeter of the site with green or black fencing.	Developer	• Install a perimeter fence.	• The site is screened by the fence.	
	• Ensure that the roof colour of the proposed buildings blends into the landscape.	Developer	• Incorporate colour requirements in the design.	• The roof visibly blends into the landscape.	
Altered Visual Quality	• Reduce the height of lighting masts to a workable minimum.	Developer and Contractor	• Incorporate lighting requirements in the design.	• Limited light pollution caused by the SEF.	Once construction activities have concluded. Throughout operation
	• Direct lighting inwards and downwards to limit light pollution.				
Decommissioning Phase					
Visual Quality	• Limit vegetation clearance and the footprint of decommissioning to what is absolutely essential.	Contractor	• Plan which areas require the clearance of vegetation. • Only clear the vegetation when works in the area will be undertaken.	• Limited clearance of exposed ground.	Throughout decommissioning
	• Consolidate the footprint of the decommissioning camp to a functional minimum.		• Ensure that the decommissioning camp footprint is consolidated where possible.	• Reduced project footprint.	

Impact / Aspect	Mitigation / Management Actions	Responsibility	Methodology	Mitigation / Management Objectives and Outcomes	Frequency
	• Avoid excavation, handling and transport of materials which may generate dust under very windy conditions.		• During very windy conditions cease excavation, handling and transportation of materials which may generate dust.	• No dust generated by activities during very windy conditions.	
	• Keep stockpiled aggregates and sand covered to minimise dust generation.		• Stockpile all aggregates and sand. • Keep stockpiles covered when not in use.	• No airborne dust entrained from stockpiles.	
	• Keep site tidy.		• Implement measures to keep the site tidy.	• No wind-blown litter originating from the site.	

7.7 No-Go Alternative

The No Go alternative entails no change to the status quo, in other words, no SEF (see Section 3.2.2).

Should the application for the Lesaka 1 SEF be refused the visual impacts will not be realised.

8. CONCLUSION

The VIA describes and interprets the visual context or affected environment in which the project is located: this provides a visual baseline or template and aims to ascertain the aesthetic uniqueness of the project area.

The following findings are pertinent:

- Lesaka 1 SEF (Pty) Ltd proposes to develop the 240 MW Lesaka 1 SEF on Farm Kluitjes Kraal No. 264 approximately 35 km north of Loeriesfontein, in the Hantam Local Municipality, in the Northern Cape Province. The project comprises PV arrays, a BESS, an IPP substation and internal grid infrastructure on a 591 ha footprint;
- The basis for the visual character of the region is provided by the topography, vegetation and land use of the area, which is predominantly a rural environment characterised by vegetated prominences and ridgelines undulating interspersed with farmsteads and limited infrastructure (i.e. the regional road routed to the east of the site and the Sishen-Saldanha railway line) bisecting the northern portion of the SEF property. The project is defined as a natural transition landscape;
- The visual quality of the area can be experienced through long closed views across plains of low vegetation and prominences, escarpments and ridgelines defining the horizon and is experienced visually as a somewhat sterile environment;
- The region has scenic value in terms of its rugged natural landscape and large portions of natural grazing land;
- Visual receptors have been identified and include; residents of isolated farmsteads, railway personnel and motorists and tourists on the nearby AP 2972 gravel road;
- The SEF cluster will also be visible to railway personnel to the north, and from the southern bank of the Krom River, although there are no / few receptors located to the west. The SEF is highly visible from within the property, within 2 km of the SEFs. The visual exposure of the proposed infrastructure is deemed moderate;
- The low VAC of the surrounding area is reduced by the wide flat, undeveloped, expanse between isolated ridges for both the powerline and SEF. The vertical profile of the pylons further reduces the VAC of the surrounding area. The vegetation of the surrounding area is not expected to screen the SEF from receptors. The study area has a low VAC;
- The limited number of highly sensitive visual receptors is further moderate by the large number of transient motorists with fleeting views, as well as receptors' familiarity with and acceptance of views of renewable energy projects and powerlines in the surrounding landscape. The sensitivity of the visual receptors is considered to be low;
- The proposed SEF is marginally visible in the background to receptors, and therefore the visibility of the project is low;

- Given the number of approved renewable energy projects in the area, it is likely that these will burgeon around the proposed project property. Grid infrastructure such as substations and powerlines are and will become increasingly more common in the area around the proposed project, with existing small and large powerlines traversing the landscape throughout the project area. Therefore, currently the proposed infrastructure will be consistent with the size, type and scale of the approved development. The project is deemed to have a low integrity with the (current) surrounding landscape;
- The glare analysis for the project demonstrated that no glare (i.e. zero minutes of glare) from the project, will be experienced by visual receptors (residents, motorists and rail passengers) despite their close proximity to the array. The exposure to glare is considered to be low;
- Construction activities associated with the SEF will generate visual impacts related to earthworks and construction infrastructure, plant and materials on site. These activities are visually intrusive and will have a greater impact within the foreground (<200 m); however, very few farmsteads were identified around the site, and none were identified in the foreground. The impact is assessed to be of ***medium*** significance and with the implementation of mitigation is reduced to ***low*** for both laydown location alternatives;
- The PV array may be perceived as conflicting with the current undeveloped, natural agricultural (grazing land) landscape. The PV array may also degrade views, and therefore negatively impact the sense of place and present as a visual intrusion across the landscape. The impact is assessed to be of ***medium*** significance with and without the implementation of mitigation;
- The associated infrastructure, particularly the BESS, is not congruent with the current landscape integrity. This infrastructure will contribute to visual clutter; however, few receptors are expected to be exposed. The impact is assessed to be of ***low*** significance with and without the implementation of mitigation;
- As no glare is expected to be experienced, the impact associated with glint and glare is considered unlikely. The impact is assessed to be of ***low*** significance with and without the implementation of mitigation;
- Installation of lighting along the perimeter of the PV array and / or the BESS and IPP substation to improve security will expose sensitive receptors (e.g. residents) to light pollution, i.e. nightglow, that currently does not emanate from the natural, undeveloped property. The impact is assessed to be of ***medium*** significance and with the implementation of mitigation is reduced to ***low***;
- Decommissioning activities associated with the SEF and associated infrastructure will generate visual impacts related to earthworks and construction infrastructure, plant and materials on site. These activities are visually intrusive and would mostly impact receptors in the foreground (<200 m), of which there are none. The impact is assessed to be of ***medium*** significance and with the implementation of mitigation reduced to ***low***; and
- In addition to this proposed project, there are 12 approved renewable energy provides (three SEFs and nine WEFs) listed on DFFE's list of renewable energy projects and the associated grid (powerline) infrastructure required to connect the new facilities to the national grid within a 35 km radius of the project. If constructed, this facilities and infrastructure would significantly alter the visual character, and therefore, alter the sense of place within the surrounding area. The cumulative impact of the SEF and the associated grid infrastructure is assessed to be of ***medium*** significance and with the implementation of mitigation is reduced to ***low***.

8.1 Impact Statement

The proposed project comprises the development of a SEF, further altering the visual landscape of the project area. The SEF layout avoids no-go areas identified. This project is moderately congruent with and marginally affects the integrity of the landscape, as there are a number of approved renewable energy facilities around or near the proposed site, with two operational WEFs and a SEF under construction. A highly concentrated network of powerlines exists within the project area and the wider region due to the nearby Helios MTS and approved renewable projects. Due to the open, flat and intact topography, the VAC of the project area is considered low.

This project will alter visual quality during the construction and decommissioning phases, as well as alter sense of place, visual quality and result in visual intrusion during the operational phase and have been assessed to be of ***low*** to ***medium*** significance. The impact of visual discomfort and impaired visibility is assessed to be ***low*** significance. The cumulative impact, assessing the proposed project as well as the proposed associated infrastructure (including powerlines and MTS) is assessed to be of ***low*** significance after mitigation. These impacts are deemed to be acceptable on the assumption that the mitigation measures listed in Section 7.6 are implemented.

Based on the assessment and the assumption that the mitigation measures will be implemented, the specialist is of the opinion that the visual impacts of the project are acceptable and there is no reason not to authorise the project.

9. REFERENCES

Boschkloof. (2012). *Cederberg Farm Experience*. Retrieved October 2012, from http://www.boschkloof.com/cederberg-guest-farm-citrusdal.htm

CNDV. (2006). *Strategic Initiative to Introduce Commercial Land Based Wind Energy Development to the Western Cape: Towards a Regional Methodology for Wind Energsanbiy Site Selection. Reports 1 – 6.*

Crawford, D. (1994). Using remotely sensed data in landscape visual quality assessment. *Landscape and Urban Planning 30*, 17-81.

Cross, J. E. (2001). What is Sense of Place? *Prepared for the 12th Headwaters Conference, November 2-4, 2001.* Retrieved July 2020, from https://www.researchgate.net/publication/282980896_What_is_Sense_of_Place/link/56256fbf08aeabddac91cd62/download

DEA&DP. (2005). *Guideline for Involving Visual and Aesthetic Specialists in EIA Processes.* Retrieved June 2020, from http://asapa.co.za/wp-content/uploads/2016/06/5_deadp_visual_guideline_june05.pdf

DFFE. (2023). *Department of Forestry, Fisheries and the Environment: egis* . Retrieved from https://egis.environment.gov.za/gis_data_downloads

Federal Ministry of the Environment. (2014). *Gesundheit und Verbraucherschutz zur Messung und Beurteilung von Lichtimmissionen (Licht-Leitlinie) (Light Guidelines).* Retrieved from https://bravors.brandenburg.de/sixcms/media.php/66/Amtsblatt%2021_14%20%28S.%20691-704%29.pdf#:~:text=Diese%20Leitlinie%20ist%20von%20den,Beurteilung%20von%20Lichtimmissionen%20zu%20beachten.

Ho, C. K., Ghanbari, C. M., & Diver, R. B. (2011). Methodology to Assess Potential Glint and Glare Hazards from Concentrating Solar Power Plans: Analytical Models and Experimental Validation. *Journal of Solar Energy Engineering*, 031021-1 - 031021-9.

Landscape Institute. (2013). *Guideline for Landscape and Visual Impact Assessment.* Routledge.

Lynch, K. (1992). *Good City Form.* London: The MIT Press.

Night Jar Travel South Africa. (2012). Retrieved August 2012, from http://www.nightjartravel.com

Pager Power. (2018). *Solar Photovoltaic Development - Glint and Glare Guidance.*

Shan Ding Lu. (2009). Retrieved August 2012, from http://www.shandinglu.org

Young, G. (2000). *First Draft Gamsberg Zinc Project: Specialist Study Report: Visual Environment. Newtown Landscape Architects, 10 March 2000.*

Appendix A: Specialist CV

Appendix B: Views from viewpoints

Viewpoint 1: Krom River and Farmsteads: Looking north towards the site.

Viewpoint 2: AP 2972 Road 1: Looking north-west towards the site.

Viewpoint 3: AP 2972 Road 2: Looking north-west towards the site.

Viewpoint 4: AP 2972 Road 3: Looking west towards the site.

Viewpoint 5: Farmsteads: Looking west towards the site and the northern aspect of the ridge on the SEF property.

Viewpoint 6: Helios MTS: Looking south towards the site

Viewpoint 7: Khobab and Loeriesfontein 2 WEF: Looking south towards the site.

Viewpoint 8: Klein Rooiberg River Road: Looking south towards the site and the northern aspect of the ridge on the SEF property.

Appendix C: GlareGauge Report

Appendix D: Impact Rating Methodology

1. Environmental Impact Assessment Methodology

The Environmental Impact Assessment (EIA) Methodology assists in evaluating the overall effect of a proposed activity on the environment. Determining of the significance of an environmental impact on an environmental parameter is determined through a systematic analysis.

1.1. Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale (i.e. site, local, national or global), whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 1.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

1.2. Impact Rating System

The impact assessment must take account of the nature, scale and duration of effects on the environment and whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the various project stages, as follows:

- Planning;
- Construction;
- Operation; and
- Decommissioning.

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

1.2.1. Rating System Used to Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the possible mitigation of the impact. Impacts have been consolidated into one (1) rating. In assessing the significance of each issue the criteria (including an allocated point system) below is used.

Table 1: Impact assessment rating methodology

ENVIRONMENTAL PARAMETER		
A brief description of the environmental aspect likely to be affected by the proposed activity (e.g. Surface Water).		
ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity (e.g. oil spill in surface water).		
EXTENT (E)		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
PROBABILITY (P)		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY (R)		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES (L)		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION (D)		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity.		

1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
INTENSITY / MAGNITUDE (I / M)		
Describes the severity of an impact (i.e. whether the impact has the ability to alter the functionality or quality of a system permanently or temporarily).		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.

SIGNIFICANCE (S)		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula: **Significance = (Extent + probability + reversibility + irreplaceability + duration) x magnitude/intensity.** The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	**Impact Significance Rating**	**Description**
5 to 23	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
5 to 23	Positive Low impact	The anticipated impact will have minor positive effects.
24 to 42	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
24 to 42	Positive Medium impact	The anticipated impact will have moderate positive effects.
43 to 61	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
43 to 61	Positive High impact	The anticipated impact will have significant positive effects.
62 to 80	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
62 to 80	Positive Very high impact	The anticipated impact will have highly significant positive effects.