LESAKA 1 SOLAR ENERGY FACILITY (PTY) LTD

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR THE PROPOSED LESAKA 1 SOLAR ENERGY FACILITY, NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE

Terrestrial Biodiversity including Sensitive Plant Species

DEA Reference: *(or applicable)*
Report Prepared by: Enviro-Insight CC
Issue Date: 28 August 2023
Version No.: 04

Lesaka 1 Solar Energy Facility (Pty) Ltd

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR THE PROPOSED LESAKA 1 SOLAR ENERGY FACILITY, NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE

Terrestrial Biodiversity including Sensitive Plant Species

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

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR THE PROPOSED LESAKA SOLAR RENEWABLE ENERGY FACILITIES, NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE

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I. SPECIALIST INFORMATION

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B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition	100
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II. DECLARATION BY THE SPECIALIST

I, **Corné Niemandt**, 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

Enviro-Insight CC

Name of Company:

Date:

III. UNDERTAKING UNDER OATH/ AFFIRMATION

I, **Corné Niemandt**, 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

Enviro-Insight CC

Name of Company

Date

Signature of the Commissioner of Oaths

Date

Lesaka 1 Solar Energy Facility (Pty) Ltd

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR THE PROPOSED LESAKA 1 SOLAR ENERGY FACILITY, NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE

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Glossary of Terms

Critical Biodiversity Area (CBA): an area that must be maintained in a good ecological condition (natural or semi-natural state) in order to meet biodiversity targets. CBAs collectively meet biodiversity targets for all ecosystem types, as well as for species and ecological processes that depend on natural or semi-natural habitat that have not already been met in the protected area network. CBAs are identified through a systematic biodiversity planning process in a configuration that is complementary, efficient and avoids conflict with other land uses where possible.

Cumulative impact: in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

Endemic: a species that is naturally restricted to a particular, well-defined region. This is not the same as the medical definition, which is 'occurring naturally in a region.

Extent of occurrence (EOO): the area contained within the shortest continuous imaginary boundary that can be drawn to encompass all the known, inferred or projected sites of present occurrence of a taxon, excluding cases of vagrancy; and in short is the species' contemporary distribution range.

IUCN Red List Categories and Criteria: the threatened species categories used in Red Data Books and Red Lists have been in place for almost 30 years. The IUCN Red List Categories and Criteria provide an easily and widely understood system for classifying species at high risks of global extinction, so as to focus attention on conservation measures designed to protect them.

IUCN Red List status: the conservation status of species, based on the IUCN Red List categories and criteria.

Mitigation: means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.

Species of conservation concern (SCC): includes all species that are assessed according to the IUCN Red List Criteria as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Data Deficient (DD) or Near Threatened (NT), as well as range-restricted species which are not declining and are nationally listed as Rare or Extremely Rare [also referred to in some Red Lists as Critically Rare].

Threatened species: species that are facing a high risk of extinction. Any species classified in the IUCN categories Critically Endangered, Endangered or Vulnerable is a threatened species. In terms of section 56(1) of NEMBA, 'threatened species' means indigenous species listed under the Act as critically endangered, endangered or vulnerable species.

List of Abbreviations

BESS	Battery Energy Storage System
CBA	Critical Biodiversity Area
CEPF	Critical Ecosystem Partnership Fund
CR	Critically Endangered
DD	Data Deficient
DFFE	Department of Forestry, Fisheries and the Environment
EN	Endangered
EIA	Environmental Impact Assessment
ESA	Ecological Support Area
NCNCA	Northern Cape Nature Conservation Act, Act 9 of 2009
NEMA	National Environmental Management Act, Act 107 of 1998
NEMBA	National Environmental Management Biodiversity Act, Act 10 of 2004
NSBA	National Spatial Biodiversity Assessment
NT	Near Threatened
SANBI	South African National Biodiversity Institute
SACAD	South Africa Conservation Areas Database
SAPAD	South Africa Protected Areas Database
SCC	Species of conservation concern
SEF	Solar Energy Facilities
SKEP	Succulent Karoo Ecosystem Project
SSV	Site Sensitivity Verification
VU	Vulnerable

Lesaka 1 Solar Energy Facility (Pty) Ltd

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR THE PROPOSED LESAKA 1 SOLAR ENERGY FACILITY, NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE

1. INTRODUCTION

Enviro-Insight CC was commissioned by Enertrag South Africa (Pty) Ltd on behalf of Lesaka 1 Solar Energy Facility (Pty) Ltd and Lesaka 2 Solar Energy Facility (Pty) Ltd to perform a Terrestrial Biodiversity Assessment for the proposed construction of the Lesaka 1 and 2 Solar Energy Facilities (SEF) located near Loeriesfontein in the Northern Cape Province, South Africa.

The distinct Environmental Authorisations that are required for each of the respective Projects Infrastructure are as follows:

- Lesaka SEF 1 (up to 240MW)
- Lesaka SEF 2 (up to 240MW)

This report is only for Lesaka SEF 1.

The proposed SEF is subject to full Environmental Impact Assessment (EIA) processes in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA) as amended and EIA Regulations, 2014 (as amended). Accordingly, the EIA processes as contemplated in terms of the EIA Regulations (2014, as amended) are being undertaken in respect of the proposed SEF projects. The competent authority for this EIA is the national Department of Forestry, Fisheries and the Environment (DFFE).

1.1 Scope and Objectives

The overall objective of the development is to generate electricity by means of renewable energy technology capturing energy to feed into the National Grid

1.2 Terms of Reference

The following ToR is based on the relevant protocols and guidelines for Terrestrial Biodiversity:

- Undertake a site inspection to identify the site-specific terrestrial ecological sensitivities including terrestrial animal and plant species and verify them in terms of the National Web-Based Screening Tool (https://screening.environment.gov.za/). The outcome of the site sensitivity verification must be recorded in the form of a report, which confirms or disputes the current use of the land and environmental sensitivity as identified by the National Web-Based Screening Tool;

- Determination, description and mapping of the baseline environmental conditions and sensitivity of the study areas in question. Specify development setbacks / buffers and provide reasons for these recommendations. The initial screening process is required to further refine the focus areas and identify developable areas.
- Provide specialist input to the Scoping Reports, based on templates provided by SiVEST in compliance with the 2014 NEMA EIA Regulations (as amended). Following the Public Participation Process, the specialists are required to address relevant comments received and the report must be updated. Once these review comments are addressed, and the report is finalised, will they be included in the Final Scoping Reports that will be submitted to the Competent Authority for decision-making.
- Conduct field surveys and compile specialist studies in adherence to:
    - the gazetted Environmental Assessment Protocols of the 2014 NEMA EIA Regulations (as amended) - i.e. Protocol for the Specialist Assessment and Minimum Report Content Requirements of Environmental Impacts on **Terrestrial Biodiversity** (GG 43110 / GNR 320, 20 March 2020);
    - the gazetted Environmental Assessment Protocols of the 2014 NEMA EIA Regulations (as amended) – i.e. Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on **Terrestrial Plant Species** (GG 43855 / GNR 1150, 30 October 2020);
    - the gazetted Environmental Assessment Protocols of the 2014 NEMA EIA Regulations (as amended) – i.e. Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on **Terrestrial Animal Species** (GG 43855 / GNR 1150, 30 October 2020); and
    - any additional relevant legislation and guidelines that may be deemed necessary.
    - The gazetted protocols above (of March 2020 and October 2020) for **Terrestrial Biodiversity**, **Terrestrial Plant Species and Terrestrial Animal Species** can be combined into one report.
- Pending the outcome of the site sensitivity verification (SSV), compliance statements will be required under the following circumstances:
    - a terrestrial biodiversity compliance statement must be prepared for a site with a '**low**' Terrestrial Biodiversity sensitivity rating in accordance with the requirements of the Terrestrial Biodiversity Protocol (GG 43110 / GNR 320, 20 March 2020);
    - a Terrestrial Animal Species Compliance Statement and a Terrestrial Plant Species Compliance Statement must be prepared for a site with a "**low**" sensitivity in accordance with the requirements of the Terrestrial Animal and Plant Species Protocol (GG 43855 / GNR 1150, 30 October 2020);
    - a Terrestrial Animal Species Compliance Statement and a Terrestrial Plant Species Compliance Statement must be prepared for a site with a "**medium**" sensitivity for terrestrial animal and terrestrial plant species, depending on the outcome of a site inspection undertaken in accordance with paragraph 41 of the Terrestrial Animal and Plant Species Protocol (GG 43855 / GNR 1150, 30 October 2020).
- Pending the outcome of the site sensitivity verification, "full assessments" will be required under the following circumstances:
    - Where the sensitivity rating is '**very high'** for terrestrial biodiversity, a full Terrestrial Biodiversity Impact Assessment must be undertaken in accordance with the requirements of the Terrestrial Biodiversity Protocol (GG 43110 / GNR 320, 20 March 2020);
    - Where the sensitivity rating is "**very high"** or **"high**" sensitivity for terrestrial animal species and

terrestrial plant species, a Terrestrial Animal Species Specialist Assessment Report and a Terrestrial Plant Species Specialist Assessment Report must be prepared in line with the Terrestrial Animal and Plant Species Protocol (GG 43855 / GNR 1150, 30 October 2020);

- Where the sensitivity rating is "medium" sensitivity for terrestrial animal and terrestrial plant species, a Terrestrial Animal Species Specialist Assessment Report and a Terrestrial Plant Species Specialist Assessment Report must be prepared in line with the Terrestrial Animal and Plant Species Protocol (GG 43855 / GNR 1150, 30 October 2020), depending on the outcome of a site inspection undertaken in accordance with paragraph 4[1] of the Terrestrial Animal and Plant Species Protocol (GG 43855 / GNR 1150, 30 October 2020).

- Please note that the Terrestrial Biodiversity, Plant Species and Animal Species Protocols above replace the requirements for specialist studies contained in Appendix 6 of the 2014 NEMA EIA Regulations (as amended). Please refer to the important points below from the Species Protocol and refer to the definitions provided therein:
  - The Terrestrial Animal Species Specialist Assessment / Compliance Statement, and Terrestrial Plant Species Specialist Assessment / Compliance Statement must be undertaken within the study area.
  - Where the nature of the activity is not expected to have an impact on species of conservation concern (SCC) beyond the boundary of the preferred site, the study area means the proposed development footprint within the preferred site.
  - Where the nature of the activity is expected to have an impact on SCC beyond the boundary of the preferred site, the project areas of influence (PAOI) must be determined by the specialist in accordance with Species Environmental Assessment Guideline, and the study area must include the PAOI, as determined.
- The specialist can devise the best approach towards fulfilling all the requirements of the Terrestrial Biodiversity Protocol of GN320 and Terrestrial Plant and Animal Species Protocols of GN1150.
- Provide review input on the preferred infrastructure locations i.e. solar panels, construction camps, onsite substation, etc. following the sensitivity analysis;
- Provide sensitive features spatial data in a useable GIS format (kmz / shp);
- Assess the impacts including cumulative impacts associated with the proposed PV developments;
- Address relevant concerns / comments raised by Interested and Affected Parties and Stakeholders, including the Competent Authority, during Public Participation Processes on the respective Draft Scoping and EIA Reports;
- Identify relevant permits that may be required;
- Recommend mitigation measures, best practice management actions, monitoring requirements, and rehabilitation guidelines for all identified impacts to be included in the respective Environmental Management Programmes (EMPrs); and
- Address any queries from the Competent Authority during the decision-making phase (as and when they arise).

[1] If the site is "medium sensitivity" for terrestrial animal species, either a Terrestrial Animal Species Specialist Assessment Report or a Terrestrial Animal Species Compliance Statement will be required, depending on the outcome of a site inspection undertaken in accordance with paragraph 4 of the Species Protocol of October 2020. The same applies to terrestrial plants.

1.3 Specialist Credentials

Corné Niemandt *Pr. Sci. Nat*. – Ecologist and Botanist

Corné Niemandt is an ecologist who mainly operates as a botanist since 2012. He has accumulated degrees in both zoology and botany (B.Sc. (Hons) Zoology; M.Sc. Plant Science) from the University of Pretoria. Corné specialises in terrestrial biodiversity assessments in South Africa as well as IFC Performance Standard 6 Critical Biodiversity assessments throughout Africa. In general, Corné has vast experience in a range of international projects, including biodiversity assessments, running ESIA processes for various industries including power lines, renewable energy projects, prospecting and mining right applications, township establishments, road networks and pipelines. His experience is extremely broad and includes environmental authorisations, preparation of environmental management programmes, rehabilitation plans, project management, biodiversity assessments as well as linear biodiversity assessments based on national and international standards.

Corné has worked on renewable energy projects since 2018. Projects include the Bloemsmond Solar Facilities (Keimoes), Botterblom WEF (Loeriesfontein), Red Sands WEF, Red Sands PVSEF, De Rust WEF and De Rust PVSEF. Since 2017 Corné has been working for Enviro-Insight, where he holds the position of Senior Consultant and Specialist. Corné is currently:

- registered as a professional scientist (*Pr. Sci. Nat*.) in the field ecological science with the South African Council for Natural Scientific Professions (SACNASP) – refer to Appendix A.
- is a member of International Association for Impact Assessment South Africa (IAIAsa).
- is a member of South African Association of Botanists (SAAB).
- serving on the IAIAsa National Executive Committee for the period 2022-2024.
- served on the Gauteng Department of Agriculture and Rural Development (GDARD) Environmental Assessment Practitioners forum committee for the period 2020-2022; and
- served on the IAIAsa Gauteng Branch committee for the period 2021-2022.

1.4 Assessment Methodology

1.4.1 National web based environmental screening tool

The assessment and minimum reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the national web based environmental screening tool (screening tool). The requirements for terrestrial biodiversity are for landscapes or sites which support various levels of biodiversity. A screening report was generated on 11 April 2022.

Based on the screening report generated, the Terrestrial Biodiversity Combined Sensitivity Theme is indicated as Very High sensitivity (Figure 1-1). The sensitive features which trigger the Very High sensitivity include:

- FEPA subcatchments;
- Critical Biodiversity Area (CBA) 1;
- Critical Biodiversity Area 2; and
- Ecological Support Area (ESA).

Accordingly, a Terrestrial Biodiversity Specialist Assessment must be conducted based on the Protocols (published on 20 March 2020), and the site sensitivity verification (see below).

The plant species theme indicated Medium sensitive due to the potential presence of sensitive species 144, sensitive species 951[2] and *Dregeochloa calviniensis* (Figure 1-2). During the site verification, sensitive species 144 was recorded and accordingly, a full assessment was incorporated for this theme to account for all possible sensitive species likely to occur on site.

The Animal species theme is indicated as High sensitive due to the presence of sensitive avifauna species, while the remaining taxa groups are considered to be low (Figure 1-3). The avifauna component is addressed in a separate report based on the specific protocol and guidelines. Accordingly, only a compliance statement is required.

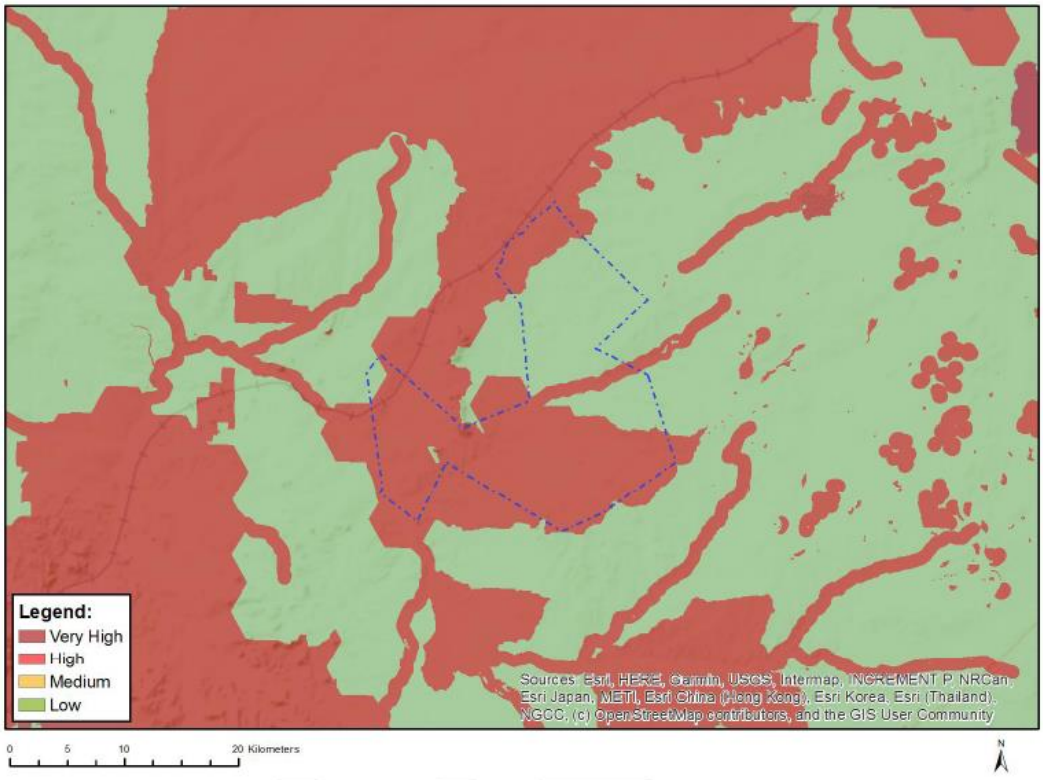

Figure 1-1: Map of relative terrestrial biodiversity theme sensitivity.

[2] As per the best practise guideline that accompanies the protocol and screening tool, the name of the sensitive species may not appear in the final EIA report nor any of the specialist reports released into the public domain. The name has been withheld as the species may be prone to illegal harvesting and must be protected.

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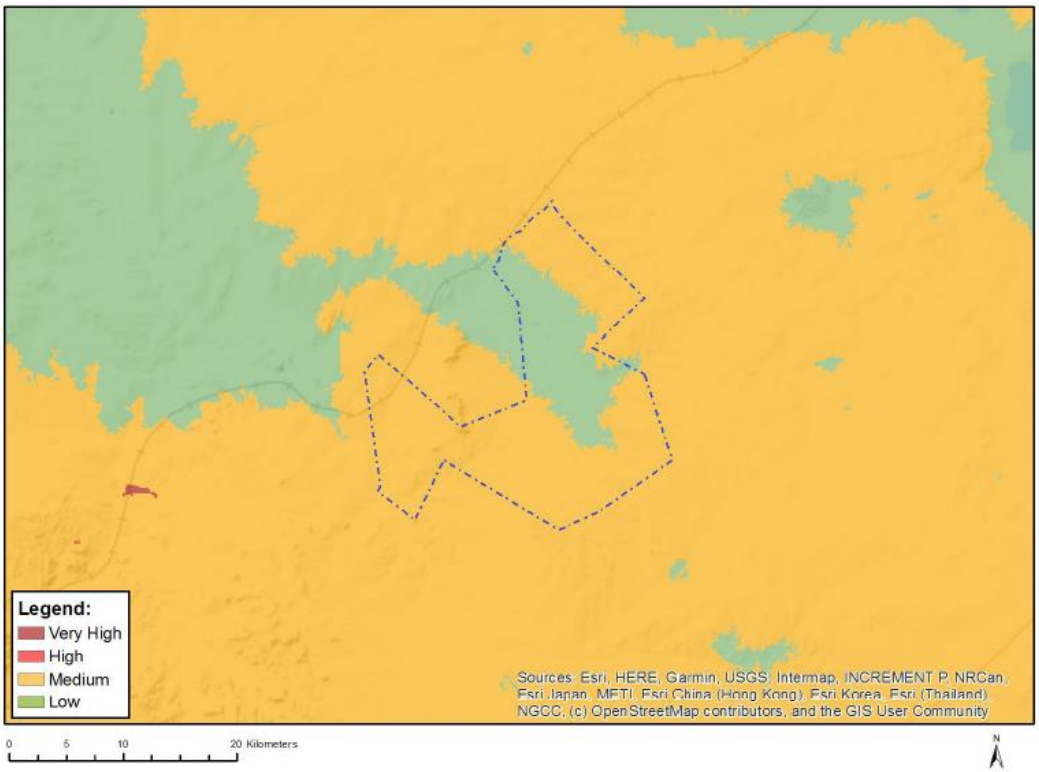

Figure 1-2: Map of relative plant species theme sensitivity.

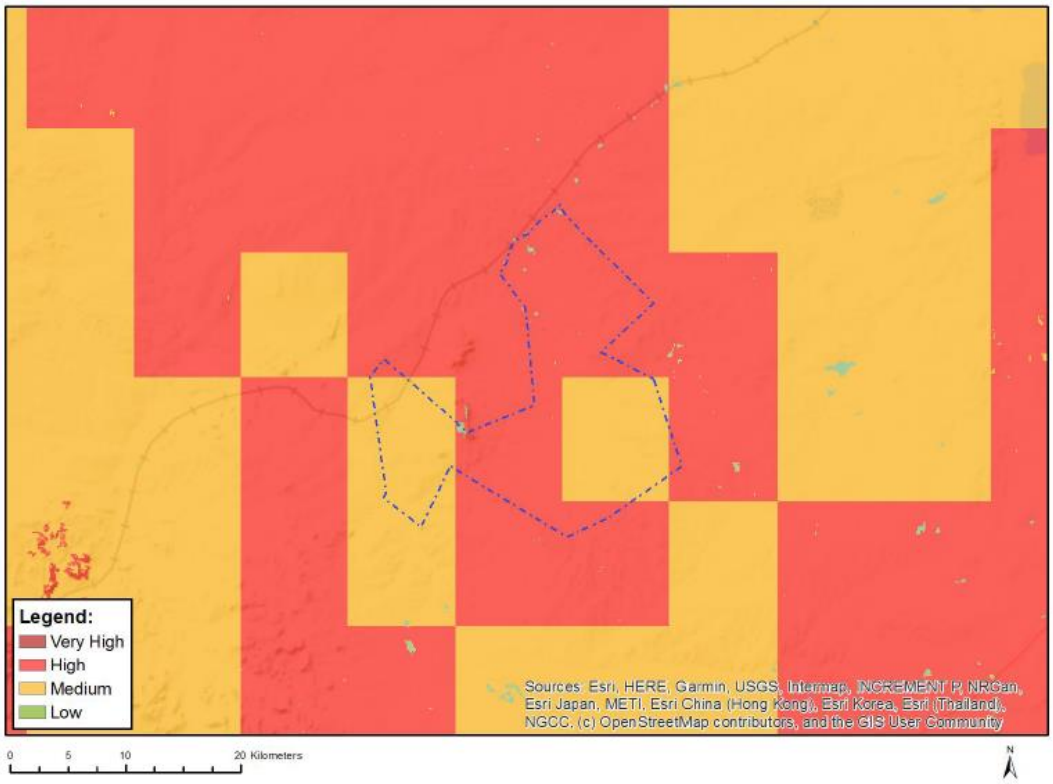

Figure 1-3: Map of relative animal species theme sensitivity.

1.4.2 Site sensitivity verification

Prior to commencing with a specialist assessment, the current use of the land and the potential environmental sensitivity of the site under consideration as identified by the screening tool must be confirmed by undertaking a site sensitivity verification.

Site verification was undertaken on 2 July 2022 by a SACNASP registered ecologist. The purpose of this preliminary on-site inspection was to confirm the current use of the land and environmental sensitivities as identified by the screening tool. The findings of the site verification, which included a desktop assessment, confirmed the Very High environmental sensitivity of the Terrestrial Biodiversity theme and Low sensitivity for all other animal taxa groups, except for avifauna. The plant species theme confirmed the presence of sensitive species 144 on site, accordingly a full assessment must be done, and the theme is regarded as high sensitivity. The initial desktop review focused mainly on the BRAHMS Online BODATSA database, which proved to be of little relevance as less than 20 species were recorder for this area. The species lists generated from existing botanical reports for other renewable energy projects in the surrounding area were also scrutinised and included in the expected species list.

1.4.3 Desktop survey

1.4.3.1 GIS

Existing data layers were incorporated into a GIS to establish how the proposed study areas and associated activities interact with important terrestrial entities. Emphasis was placed on the following spatial datasets:

- Vegetation Map of South Africa, Lesotho and Swaziland (SANBI, 2018);
- Northern Cape Critical Biodiversity Areas (Northern Cape Department of Environment and Nature Conservation, 2016);
- Protected and Conservation areas of South Africa (South Africa Protected Areas Database-SAPAD; South Africa Conservation Areas Database-SACAD)[3];
- Red List of Ecosystems (RLE) for terrestrial realm for South Africa - remnants (SANBI, 2022[a]); and
- Red List of Ecosystems (RLE) for terrestrial realm for South Africa - Original extent (SANBI, 2022[b]).

All mapping was performed using open-source GIS software (QGIS)[4].

1.4.3.2 Habitat mapping

Habitats were manually mapped within the PAOI and surrounding areas as structural units that would be utilised differently by herpetofauna / mammals or represent distinct habitats to flora (geology, watercourses, vegetation density) as determined from satellite imagery and on the ground verification. This mapping exercise was achieved through a combination of:

- the habitat characterisation performed on the ground during fieldwork;
- vegetation communities identified by botany fieldwork;
- the digital elevation model (obtained from Shuttle Radar Topography Mission[5]); and
- the most recent satellite imagery (courtesy of Google Corporation).

[3] http://dea.maps.arcgis.com/apps/MapTools/index.html?appid=2367540dd75148e8b6eaeab178a19d3a
[4] http://qgis.osgeo.org/en/site/
[5] https://earthexplorer.usgs.gov/

1.4.3.3 Flora Assessment

A literature review was conducted as part of the desktop study to identify the potential habitats and flora species of conservation concern (SCC) present within the study area. The South African National Biodiversity Institute (SANBI) provides an electronic database system, namely the Botanical Database of Southern Africa (BODATSA[6]) (SANBI, 2016[7]), to access distribution records on southern African plants. The POSA database provided distribution data of flora at the quarter degree grid cell (QDGC) resolution; however, the BODATSA database provides distribution data as point coordinates. The literature assessment, therefore, focused on querying the database to generate species lists for the immediate study area and surroundings. A list of only 41 species were generated for the larger area.

The Red List of South African Plants website (SANBI, 2021)[8] was utilized to provide the most current account of the national status of flora. Relevant field guides and texts consulted for identification purposes in the field during the surveys included the following:

- Guide to grasses of southern Africa (Van Oudtshoorn, 2014);
- Field guide to succulents of southern Africa (Smith et al. 2017);
- Field guide to wild flowers of South Africa (Manning, 2019);
- Problem plants and alien weeds of South Africa (Bromilow, 2019);
- Namaqualand Wildflower Guide (Le Roux & Schelpe 1988) and
- Field guide to trees of southern Africa (Van Wyk & Van Wyk, 2013).

Additional information regarding ecosystems, vegetation types, and SCC included the following sources:

- The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006 as amended); and
- Red List of South African Plants (Raimondo et al., 2009; SANBI, 2021).

1.4.4 Field Surveys

Site visits were undertaken in July and September 2022 (wet seasons) by an ecologist where the floral and the faunal aspects of the survey area were evaluated. The timing of the surveys represented wet season conditions in order to cover biophysical seasonal aspects. Many of the shrubs and other plant species were in flower during the survey. It must be noted that sensitive species 951 flowers in autumn.

[6] Data are obtained from the National Herbarium in Pretoria (PRE), the Compton Herbarium in Cape Town (NBG & SAM) and the KwaZulu-Natal Herbarium in Durban (NH)
[7] http://newposa.sanbi.org/
[8] http://redlist.sanbi.org/

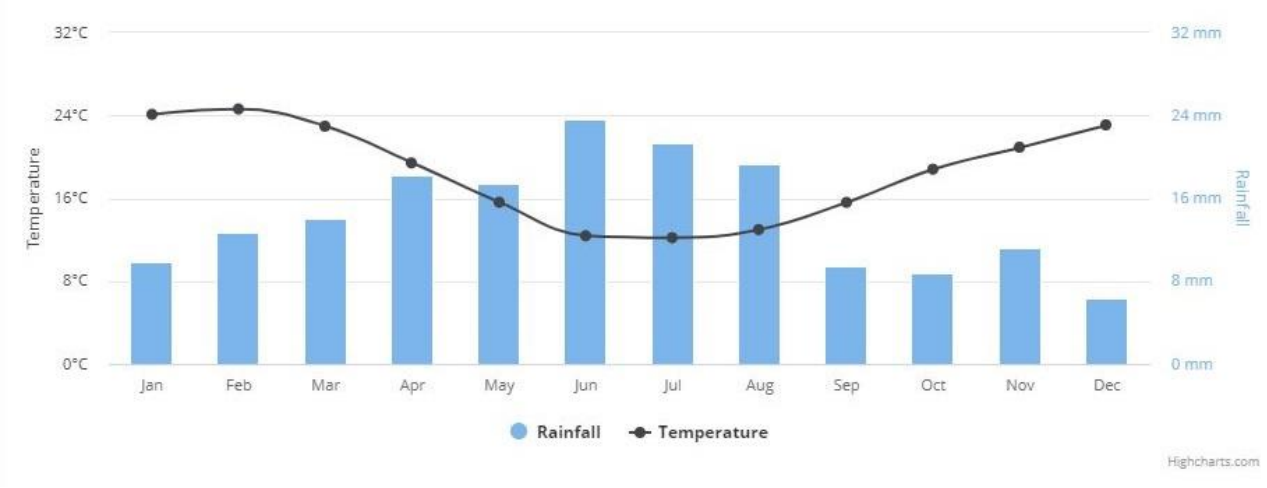

Figure 1-4: Average monthly temperature and rainfall for the watershed in which the study area is located for the period of 1991-2016[9].

1.4.5 Species of conservation concern

The Red List of threatened species generated by the IUCN (http://www.iucnredlist.org/) provided the global conservation status of terrestrial fauna and flora. However, regional conservation status assessments performed following the IUCN criteria were the most relevant and sourced for each group as follows:

- Plants: Red List of South African plants version 2021 and Raimondo et al. (2009);
- Reptiles: Bates et al. (2014);
- Amphibians: Du Preez & Carruthers (2017);
- Mammals: Child et al. (2016).

The conservation status categories defined by the IUCN, which are considered here to represent SCC, are the "threatened" categories defined as follows:

- Critically Endangered (CR) - Critically Endangered refers to species facing immediate threat of extinction in the wild.
- Endangered (EN) - Endangered species are those facing a very high risk of extinction in the wild within the foreseeable future.
- Vulnerable (VU) - Vulnerable species are those facing a high risk of extinction in the wild in the medium-term.

Other measures of conservation status include species listed under the following:

- Trade in Protected Species (TOPS; National)
- Convention on International Trade in Endangered Species (CITES; International).

[9] The chart above shows mean historical monthly temperature and rainfall for Watershed #427 during the time period 1991-2016. The dataset was produced by the Climatic Research Unit (CRU) of University of East Anglia (UEA).

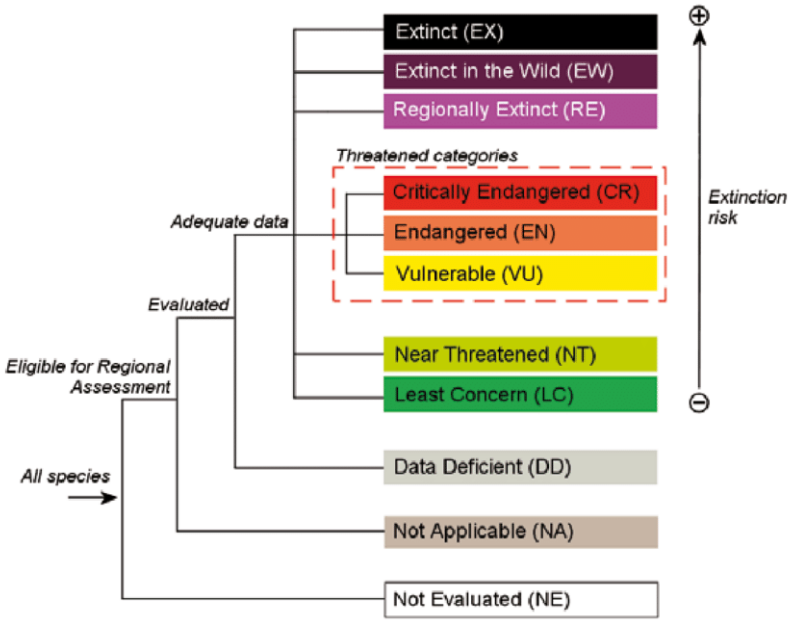

Figure 1-5: Schematic representation of the structure of the IUCN Red List Categories (IUCN 2012).

2. ASSUMPTIONS AND LIMITATIONS

- It is assumed that all third-party information acquired is correct (e.g. GIS data and scope of work).
- Avifauna assessment is not part of this assessment and is dealt with under the relevant theme which requires a 6-month pre-construction monitoring assessment.
- No layout design has been provided to date. Once this has been done, can the impacts of the proposed solar development be assessed.
- Not all plants have the same growth and/or flowering period, and thus it is likely that the surveys could have occurred outside of the growth and/or flowering period of a specific species.
- Species of conservation concern (SCC) are generally uncommon and/or localised. Thus, locating such species can be challenging when attempted to locate such species outside its flowering season.
- Due to the nature of most biophysical studies, it is not always possible to cover every square metre of a given study area. Due to the large study area, it is possible that small individual plant SCC may have been overlooked even though care has been taken to search for specific SCC.
- The literature review for plant species identified several limitations in the use of online data platforms, and for this specific area was not considered to be very reliable. Furthermore, as this is an extremely remote part of the country where limited surveys have been conducted, data is underrepresented for this area.

3. TECHNICAL DESCRIPTION

3.1 Project Location

The Lesaka Cluster is located approximately 35km north of the Loeriesfontein town within the Hantam Local Municipality, in the Namakwa District Municipality, in the Northern Cape Province. The total extent for Lesaka SEF 1 is approximately 795 ha and located on Portion 0 of the Farm Kluitjes Kraal No. 264.

There are two site access roads to the Project site. The first access road is via the R355, which is approximately 34 km south from the proposed development area; and the second access road is on the north of the proposed development area, namely, the Grannaatboskolk road.

3.2 Project Description

The project aims to supply suitable private off-taker initiatives (direct supply or wheeling agreements, as applicable), or be bid into the government coordinated Renewable Energy Independent Power Producer Procurement Programme ("REIPPPP") or similar procurement program under the Integrated Resource Plan ("IRP"). The Lesaka SEF Cluster Projects will be administered under the respective Project Companies, and the Projects will be required to be composed of the following:

Lesaka Solar Energy Facility 1 (Pty) Ltd

- Lesaka SEF 1 (up to 240MW)
- Battery Energy Storage System ("BESS")
- On-site Independent Power Producer ("IPP") Substation (up to 33/132kV)
- All associated grid infrastructure

3.2.1 Layout Alternatives

Location Alternatives

No other activity alternatives are being considered. Renewable Energy development in South Africa is highly desirable from a social, environmental and development.

Technology Alternatives

No other activity alternatives are being considered. Renewable Energy development in South Africa is highly desirable from a social, environmental and development point of view.

SEF Layout Alternatives

Design and layout alternatives are considered and assessed as part of the EIA. These include alternatives for the Substation locations and also for the construction / laydown area.

No-Go Alternative

The 'no-go' alternative is the option of not undertaking the proposed SEF infrastructure projects. 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 are considered throughout the report.

4. LEGAL REQUIREMENT AND GUIDELINES

The following legislation and guidelines are applicable to the proposed development:

- Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the NEMA (1998), published on 20 March 2020, in Government Gazette 43110, GN No. 320, with regards to Terrestrial Biodiversity.
- Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the NEMA (1998), published on 30 October 2020, in Government Gazette 43855, GN 1150 with regards to Terrestrial Animal and Plant Species.
- South African National Biodiversity Institute (SANBI). 2020. Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. Version 3.1.2022.
- Alien and Invasive Species lists in terms of sections 66(1), 67(1), 70(1)(a), 71(3) and 71A of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).
- Northern Cape Nature Conservation Act (No.9 of 2009)

The requirements for Specialist Studies being undertaken in support of applications for Environmental Authorisation are specified in the Assessment Protocols that were published on 20th of March 2020, in Government Gazette 43110, GN 320 and the Assessment Protocols that were published on the 30th of October 2020, In Government Gazette 43855, GN 1150. These protocols stipulate the Procedures for the Assessment and Minimum Criteria for reporting on identified environmental themes in terms of Sections 24(5)(A) and (H) and 44 of the NEMA, when applying for EA.

The Assessment Protocols relates to the Site Sensitivity Verification (SSV) and Reporting requirements where a Specialist Assessment is required and a specific Assessment Protocol has been prescribed. The following Assessment Protocols are relevant to this report for the proposed project:

- Terrestrial Biodiversity
- Terrestrial Plant Species
- Terrestrial Animal Species

5. DESCRIPTION OF THE RECEIVING ENVIRONMENT

The results are presented according to the requirements for undertaking site sensitivity verification and for protocols for the assessment and minimum report content requirements of environmental impacts for environmental themes for activities requiring environmental authorisation dated 20 March 2020 (Government Gazette No. 43110, GN 320). In order to simply this, each required aspect is indicated in Table 5-1 below, and where triggered or relevant, it is discussed in more detail in the sections to follow.

Table 5-1: Terrestrial Biodiversity theme aspects required to be assessed.

Environmental Theme Aspect	Triggered for proposed activities	Section in report
Regional Vegetation according to Mucina and Rutherford (2006, as amended)	Yes – located in the Hantam Karoo vegetation type	Section 5.1
Threatened Ecosystems	No – not located within any listed threatened ecosystem	-
Protected Areas and Important Bird Areas	No – not located in any protected area or important bird area, and none are located within a 20km radius from the study area	-
Provincial CBA	Yes – located in CBA and ESA	Section 5.2
Ecology of the system	Main landscape features, habitats, dominant species recorded	Section 5.3

5.1 Vegetation type

5.1.1 Succulent Karoo Biodiversity Hotspot

The Critical Ecosystem Partnership Fund (CEPF) is designed to safeguard the world's threatened biodiversity hotspots in developing countries. It is a joint initiative of Conservation International (CI), the Global Environment Facility (GEF), the Government of Japan, the MacArthur Foundation and the World Bank. CEPF supports projects in hotspots, areas with more than 60 percent of the Earth's terrestrial species in just 1.4 percent of its land surface. A fundamental purpose of CEPF is to ensure that civil society is engaged in efforts to conserve biodiversity in the hotspots. An additional purpose is to ensure that those efforts complement existing strategies and frameworks established by local, regional and national governments.

There are currently 36 recognized biodiversity hotspots in the world[10], including the Succulent Karoo Hotspot. These are Earth's most biologically rich—yet threatened—terrestrial regions. To qualify as a biodiversity hotspot, an area must meet two strict criteria:

- Contain at least 1,500 species of vascular plants found nowhere else on Earth (known as "endemic" species).
- Have lost at least 70 percent of its primary native vegetation.

The ecosystem profile for the Succulent Karoo hotspot is based on the results of the Succulent Karoo Ecosystem Planning (SKEP) process (Driver *et al*., 2003).

[10] Critical Ecosystem Partnership Fund (CEPF)/.

Figure 5-1: Subregions in the SKEP Planning Domain. The planning domain is larger than the Succulent Karoo hotspot. Additional information on how the domain was defined can be found in the SKEP documents.

The rich biodiversity of the Succulent Karoo is due to an extensive and complex array of habitat types derived from topographical and climatic diversity in the regions' rugged mountains, semi-arid shrublands, and coastal dunes. The hallmark of the Succulent Karoo is its exceptionally diverse and endemic-rich flora, especially succulents and bulbs. The 116 000 km^2 biome is home to 6 356 plant species, 40% of which are endemic and 936 (17%) of which are Red Listed (Driver *et al*., 2003). However, only 3.5% of the hotspot is formally conserved.

This biodiversity is due to massive speciation of an arid-adapted biota in response to unique climatic conditions and high environmental heterogeneity. The high regional plant richness is the result of high compositional change of species-rich communities along these environmental and geographical gradients. Many species are extreme habitat specialists, mainly related to soil-type, of limited range size. Local endemism (i.e. the restriction of species to extremely small ranges of less than 50 km^2) is most pronounced among succulents, especially Mesembryanthemaceae, and bulbs.

Based on the SKEP, nine geographic priority areas were identified that highlights areas essential for achieving conservation targets as well as areas that require additional research for refining and defining finer-scale outcomes for the SKEP Program. These nine geographic priority areas were identified as the most efficient

locations for achieving the conservation targets of SKEP and refined on the basis of their ability to contribute to the maintenance of Red Data List species and maintaining important ecological processes, particularly in the face of climate change. The study area however is not located within one of these nine geographic priority areas. The closest is the Bokkeveld-Hantam-Roggeveld towards the south. The Hantam Karoo vegetation type is located within the Succulent Karoo Biome.

5.1.2 Hantam Karoo SKt 2

The entire study area is located in the Hantam Karoo vegetation type (part of the Succulent Karoo Biome) as described by Mucina and Rutherford (2006, as amended) depicted in Table 5-2 and Figure 5-2 below.

The distribution is mainly within the Northern Cape Province and to a smaller extent also Western Cape. It forms the greater part of the Onder-Bokkeveld and Hantam region between Nieuwoudtville and Calvinia. The unit also encompasses the lower slopes of the Hantamsberg (but not the mountain itself). A small patch of the unit is found north of the Langberg (west of Loeriesfontein) where, in places, it also moves into the Western Cape Province. In the western part of the unit the altitude is about 400 m up to 1 280 m in the east and southeast.

It comprises of dwarf Karoo shrubland with nearly equal proportions of succulents (*Aloe, Antimima, Euphorbia, Ruschia*) and low karroid shrubs, particularly of the daisy family Asteraceae (*Eriocephalus, Pentzia, Pteronia*). The area has rich displays of spring annuals and geophytes. Hantam Karoo is an arid area with a mean annual rainfall of 190 mm (compared with 350 mm around Nieuwoudtville), with a clear peak from June to July and hardly any rain in December and January, characters typical of a winter-rainfall regime. The mean annual temperature is around 16-17ºC and frost incidence is high.

Least threatened. Target 18%. Only a small patch is statutorily conserved in Akkerendam Nature Reserve near Calvinia. Transformation rate is low and invasions of alien plants have not been identified as a problem yet. Erosion is moderate (73%) and high (18%).

Table 5-2: Attributes of the Hantam Karoo vegetation type.

Name of vegetation type	**Hantam Karoo**
Code as used in the Book - contains space	**SKt2**
Conservation Target (percent of area) from NSBA	**18%**
Protected (percent of area) from NSBA	**0.1%**
Remaining (percent of area) from NSBA	**98.6%**
Description of conservation status from NSBA	**Least threatened**
Description of the Protection Status from NSBA	**Hardly protected**
Area (sqkm) of the full extent of the Vegetation Type	**7463.56**
Name of the Biome	**Succulent Karoo Biome**
Name of Group	**Trans-Escarpment Succulent Karoo Bioregion**
Name of Bioregion	**Trans-Escarpment Succulent Karoo Bioregion**

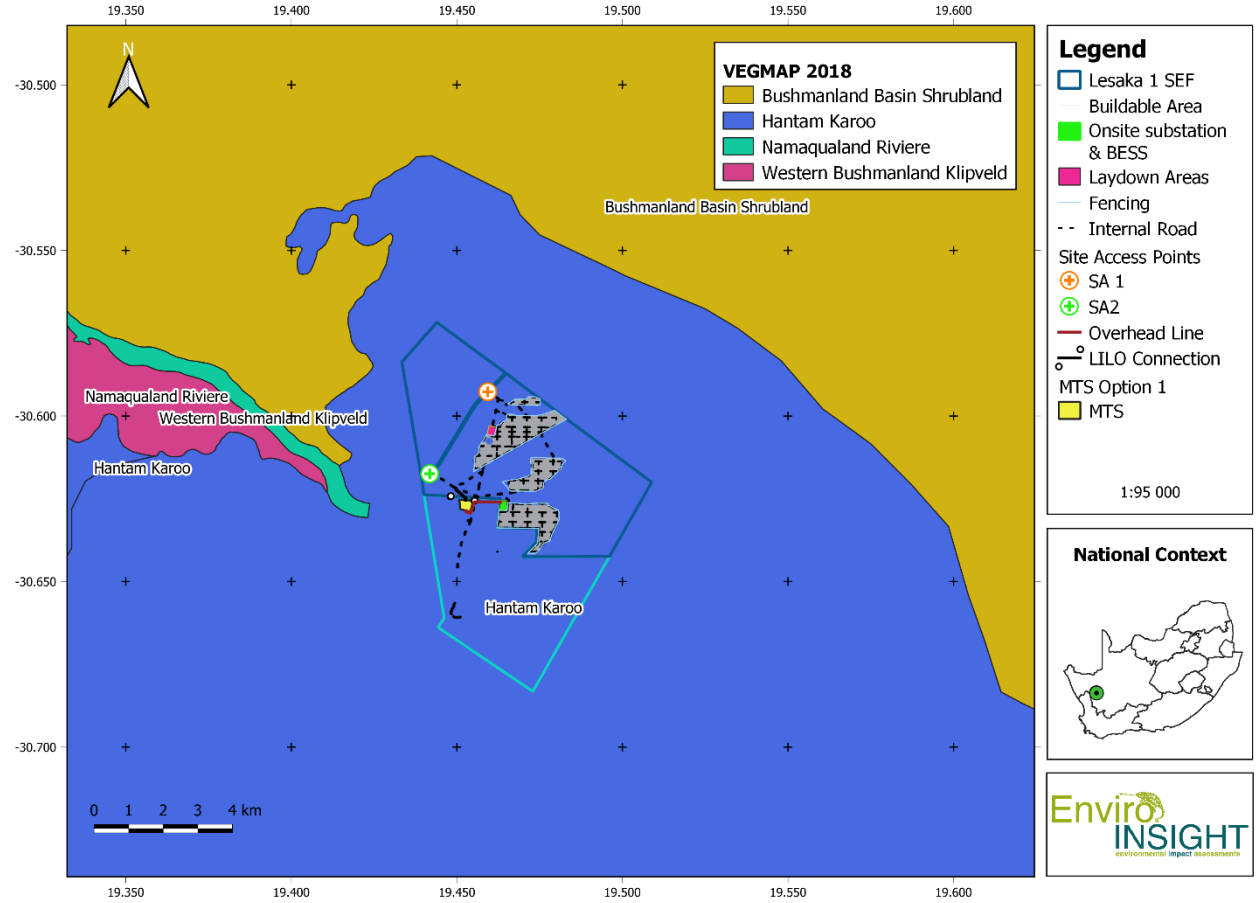

Figure 5-2: Regional vegetation types in relation to Lesaka PV1 (SANBI, 2018).

5.2 Northern Cape Critical Biodiversity Areas

The Northern Cape CBA Map (2016) identifies biodiversity priority areas, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), which, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of e landscape as a whole (Holness & Oosthuysen, 2016). Priorities from existing plans such as the Namakwa District Biodiversity Plan, the Succulent Karoo Ecosystem Plan, National Estuary Priorities, and the National Freshwater Ecosystem Priority Areas were incorporated. Targets for terrestrial ecosystems were based on established national targets, while targets used for other features were aligned with those used in other provincial planning processes.

CBAs are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services. The primary purpose of CBA's is to inform land-use planning in order to promote sustainable development and protection of important natural habitat and landscapes. Biodiversity priority areas are described as follows:

- *Critical biodiversity areas (CBA's)* are areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity conservation targets cannot be met. Maintaining an

area in a natural state can include a variety of biodiversity-compatible land uses and resource uses. For CBA's the impact on biodiversity of a change in land-use that results in a change from the desired ecological state is most significant locally at the point of impact through the direct loss of a biodiversity feature (e.g., loss of a populations or habitat). All FEPA prioritized wetlands and rivers have a minimum category of CBA1, while all FEPA prioritised wetland clusters have a minimum category of CBA2.

- *Ecological support areas (ESA's)* are areas that are not essential for meeting biodiversity representation targets/thresholds but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The degree of restriction on land use and resource use in these areas may be lower than that recommended for critical biodiversity areas. For ESA's a change from the desired ecological state is most significant elsewhere in the landscape through the indirect loss of biodiversity due to a breakdown, interruption or loss of an ecological process pathway (e.g., removing a corridor results in a population going extinct elsewhere or a new plantation locally results in a reduction in stream flow at the exit to the catchment which affects downstream biodiversity). All natural non-FEPA wetlands and larger rivers have a minimum category of ESA.

According to the Northern Cape CBA Map (2016), the study area is mainly located in CBA2, with sections of CBA1, ESA and "Other Natural Areas" (Figure 5-3). CBA2 are mainly due to the FEPA catchment, FEPA rivers and 500m buffer and the vegetation type (not listed as threatened). The CBA1 are the NFEPA Rivers, Klein-Rooiberg and Rooiberg, both considered largely natural. The ESA towards the western section is the Krom River and associated wetlands, while the smaller scattered ESAs towards the eastern boundary are koppies which are large high value climate resilience areas. Based on this, most features are aquatic of nature (which is not addressed in this report) and the other terrestrial features such as the Klein-Rooiberg and Rooiberg and smaller koppies are excluded from development. The vegetation type is not listed as threatened, and >98% is still in a natural state.

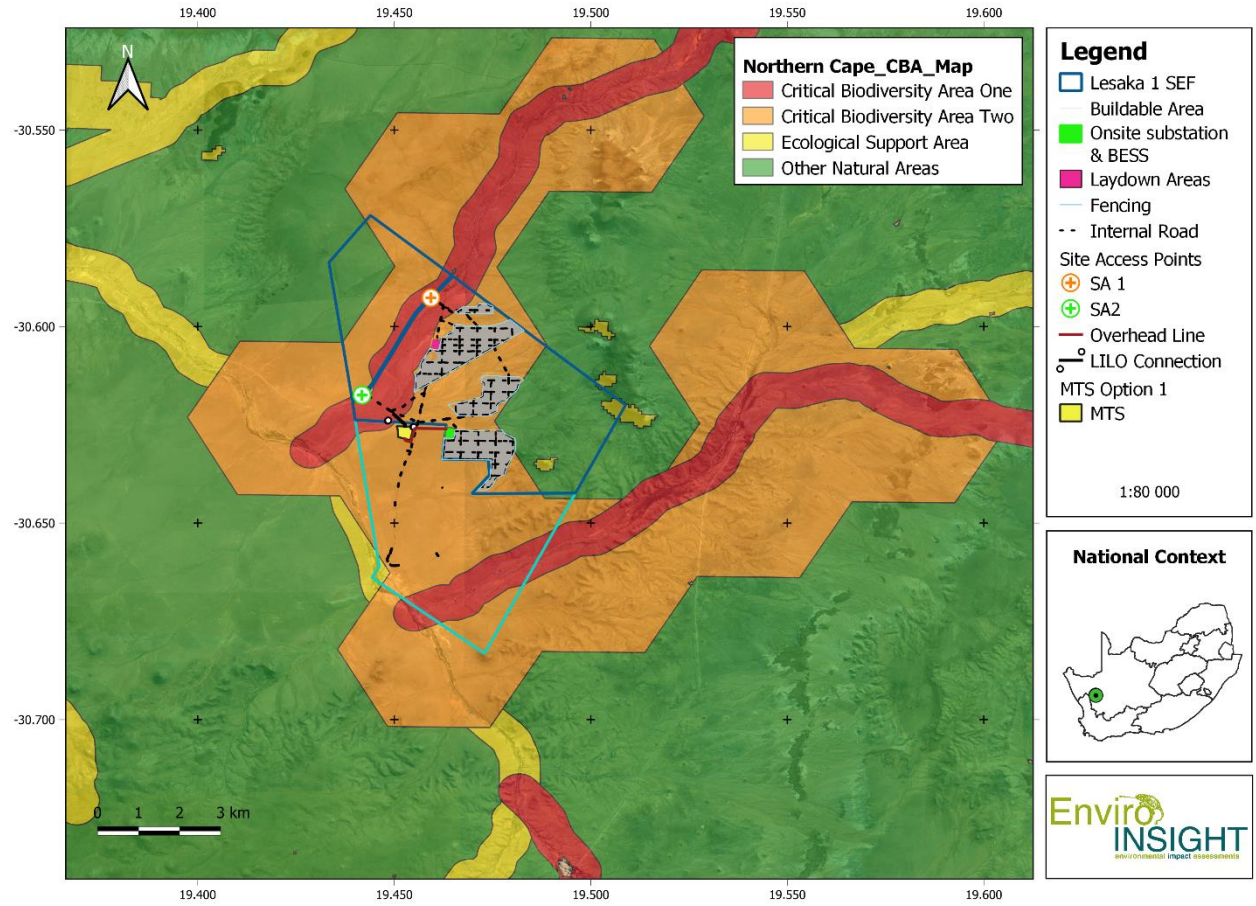

Figure 5-3: Lesaka PV1 in relation to the Northern Cape Critical Biodiversity Areas (2016).

5.3 Ecology of the system

5.3.1 Ecological drivers and significant terrestrial landscape features

Several important endorheic pans, wetlands clusters and rivers exist within this region which attracts several important bird species such as flamingos. Transformation in the Hantam Karoo is low, where changes in vegetation structure and composition are mainly driven by overgrazing and the introduction of alien invasive species such as *Prosopis* sp.

The site consists of flat to gently undulating open plains dominated by low shrubs and arid grasses. It is typical of Hantam Karoo and does contain some remarkable landscape features such as rivers and ridges. Other landscape features include koppies, a low gravel hill and some poorly developed drainage lines. The vegetation of the site is very homogenous and is dominated by shrub vegetation on gravelly soils.

5.3.1.1 National Freshwater Ecosystem Priority Areas (NFEPA), 2011

The National Freshwater Ecosystem Priority Areas (NFEPA) project provides strategic spatial priorities for conserving South Africa's freshwater ecosystems and supports sustainable use of water resources. These priority areas are called Freshwater Ecosystem Priority Areas, or 'FEPAs'.
FEPAs were identified based on:

- Representation of ecosystem types and flagship free-flowing rivers
- Maintenance of water supply areas in areas with high water yield
- Identification of connected ecosystems
- Representation of threatened and near-threatened fish species and associated migration corridors
- Preferential identification of FEPAs that overlapped with:
    - Any free-flowing river
    - Priority estuaries identified in the National Biodiversity Assessment 2011
    - Existing protected areas and focus areas for protected area expansion identified in the National Protected Area Expansion Strategy.

The largest section of the study area is located in a FEPA, with the Klein-Rooiberg and Rooiberg FEPA rivers running through the study area.

5.3.2 Ecological functioning and processes

The watercourses in the region represent the most important ecological processes, and if not protected it could lead to reduced ecosystem services and increased negative impacts could result in a cascading effect. The vegetation unit is not considered threatened and there are limited sensitive features or important landscape features that, if disturbed or transformed, will result in a catastrophic collapse of the system.
The proposed Lesaka SEF does not represent a significant impact on the ecosystem processes and services, except for the main river courses and wetland pans as well as Koppies located on the study area which needs to be excluded from construction activities.

5.3.3 Ecological corridors and connectivity

An ecological corridor is a clearly defined geographical space that is governed and managed over the long-term to maintain or restore effective ecological connectivity. The main watercourses / rivers as well as ridges act as corridors for the movement of fauna across the landscape. The proposed layout must not impact on connectivity within the landscape by locating the PV arrays and associated infrastructure outside main watercourses and by not destroying the ridges. Where roads and powerlines cross watercourses and ridges, the necessary mitigation measures need to be implemented to reduce fauna mortality, and not restrict movement of fauna.

6. SPECIALIST FINDINGS / IDENTIFICATION AND ASSESSMENT OF IMPACTS

6.1.1 Species, distribution, and important habitats

Plant diversity is generally moderate with diversity increasing on hilly plains and the ridges. Four main habitats were identified based on species composition and structure for the Lesaka Cluster, but for the development footprint only one habitat is impacted on directly, namely the Hantam karoo shrubland (Figure 6-1). The main driver of vegetation pattern in the area is substrate.

Georeferenced photographs were taken to assist in both the site characterisation as well as the sensitivity analysis and provide lasting evidence for future queries. The specialist coverage is considered optimal as every habitat was surveyed, taking into consideration the large study area. Furthermore, all areas of the study

area were clearly visible, but not completely accessible due to the extent of the study area and road access limitations.

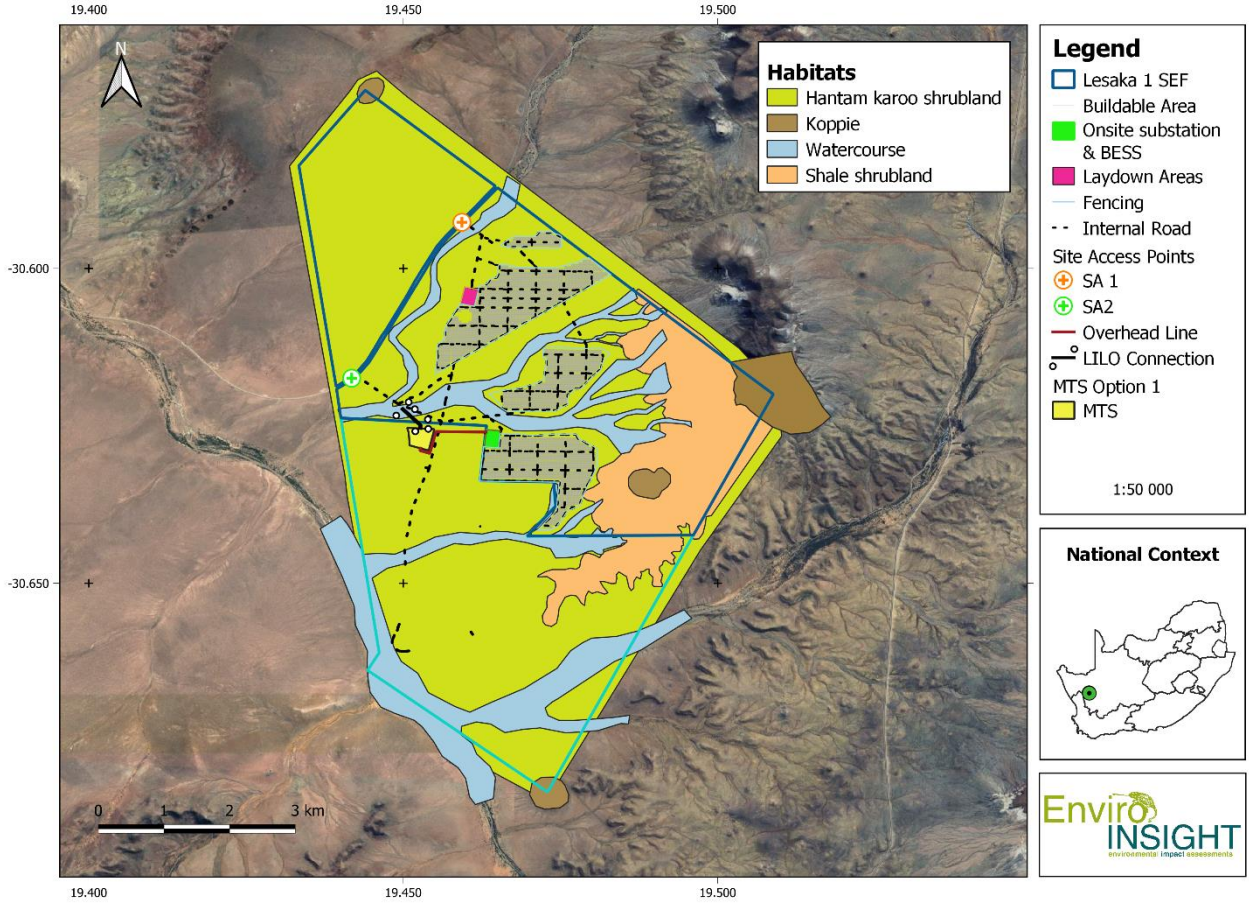

Figure 6-1: Habitats identified for the study area.

6.1.1.1 Karoo shrubland

This represents the Hantam Karoo vegetation type. There are rich displays of geophytes and spring annuals, with dominant dwarf shrubs and microphyllous karroid shrubs. The following species were recorded:

- Shrubs: *Lycium cinereum, Salsola aphylla, Pentzia incana, Pteronia incana, Aptosimum spinescens, Felicia macrorrhiza, Monsonia salmoniflora, Blepharis sp., Galenia fruticose, Eriocephalus sp., Zygophyllum microphyllum*
- Succulent shrubs*: Drosanthemum sp., Ruschia cf. grisea, Augea capensis, Euphorbia sp., Mesembryanthemum brevicarpum*
- Grasses: *Ehrharta calycina*, *Stipagrostis obtusa, S. ciliata, Tribolium tenellum, Aristida sp.*
- Geophytic herbs: *Albuca secunda*, *Lachenalia sp., Daubenya sp., Oxalis sp., Lachenalia cf. aurioliae, Lachenalia xerophila, Ledebouria apertiflora, Haemanthus sp., Oxalis foveolata*
- Succulent herbs: *Aloe sp., Hoodia gordonii, Gonialoe variegata,*
- Herbs: *Amellus tridactylus, Gazania lichtensteinii, Senecio arenarius, Lotononis sp., Hermannia cf. multiflora, Psilocaulon junceum*

One individual of sensitive species 144 was recorded in this habitat. It should be protected in situ with a buffer of 200m.

Figure 6-2: Vegetation and landscape features of the Karoo shrubland.

6.1.1.2 Watercourses

There are three main watercourses on site, two flowing into one on the south-western boundary. Species composition is limited but the ecosystem services of water supply to the landscape remains vital.

Species recorded include *Stipagrostis namaquensis, Senecio niveus, Nenax namaquensis, Salvia disermas, Foveolina dichotoma, Trichodesma africanum, Prosopis sp., Sutherlandia frutescens.*

Figure 6-3: Vegetation and landscape features of Watercourse habitat.

6.1.1.3 Shale Shrubland

This was distinguished from the Karoo shrubland habitat mainly due to geological features and species composition. Although there might be some overlap, some of the species recorded only occur within this habitat. Species recorded include:

- Shrubs: *Felicia macrorrhiza, Salsola aphylla, Pentzia incana, Pteronia incana, Eriocephalus sp.*
- Succulent Shrubs: *Drosanthemum sp., Ruschia cf. grisea, Ruschia spinosa, Euphorbia cf. mauritanica., Euphorbia rhombifolia, Gonialoe variegata, Mesembryanthemum tetragonum*

- Succulent Herbs: *Aloe sp., Hoodia gordonii, Lampranthus otzenianus*, *Anacampseros namaquensis,*
- Herbs*: Hyobanche glabrata, Gazania lichtensteinii, Albuca longipes, Helichrysum herniarioides, Tritonia karooica*
- Geophytic herbs: *Albuca leucantha, Albuca longipes, Albuca spiralis, Bulbine sp., Gethyllis linearis, Oxalis purpurea., Lachenalia cf. aurioliae, Tritonia karooica, Moraea sp.*
- Woody climbers: *Microloma sagittatum, Asparagus fasciculatus*

Figure 6-4: Vegetation and landscape features of the Shale Shrubland habitat.

6.1.1.4 Ridge / Koppies

Several small koppies and Klein Rooiberg is located on the study area.

- Shrubs: *Asparagus capensis*, *Eriocephalus sp.*
- Geophytic herbs: *Oxalis pes-caprae, Oxalis sp., Lachenalia cf. aurioliae, Moraea cf. miniata.*
- Succulent herbs: *Aloe sp., Hoodia gordonii, Mesembryanthemum tetragonum, Lampranthus otzenianus, Phyllobolus sp.*
- Herb*: Amellus tridactylus, Sutherlandia frutescens, Psilocaulon junceum*

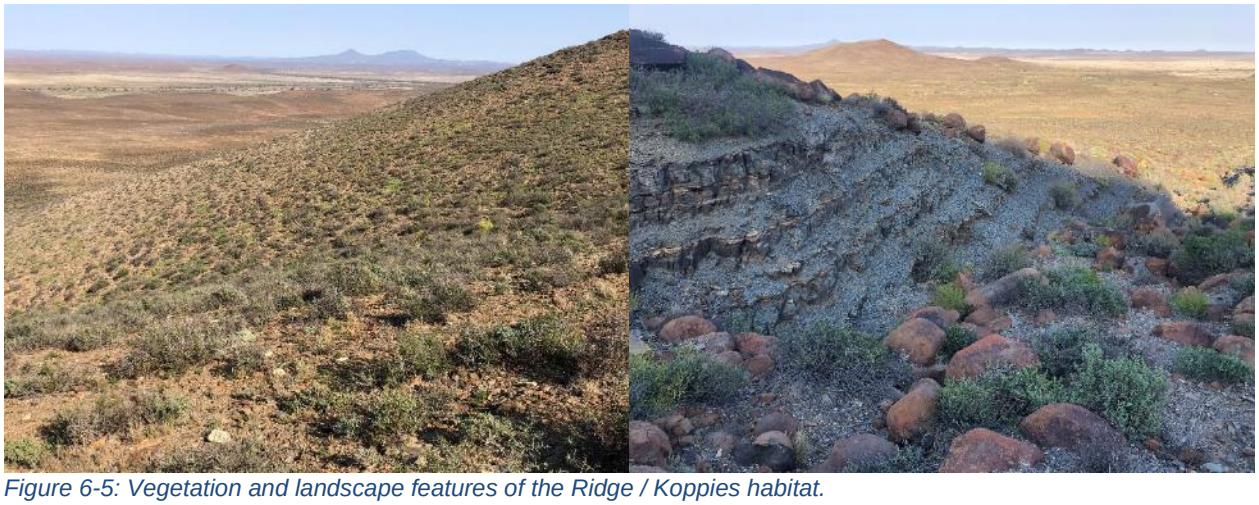

Figure 6-5: Vegetation and landscape features of the Ridge / Koppies habitat.

6.2 Plant Species Theme Results

6.2.1 National sensitive species

As per the screening report, three sensitive species are likely to occur in the study area. Based on existing literature and surveys conducting, two additional SCC were included in this assessment (Table 6-1).

Table 6-1: Expected and Observed list of Sensitive Plant Species for the Lesaka SEF. Species highlighted in bold were recorded during this survey.

Species	National Status	Provincially Protected	Endemic to (1) South Africa or (2) Northern Cape	Observed or likely to occur within the study area
Sensitive species 144	**Vulnerable A3ce**	**Yes**	**No**	**One individual observed within the study area, two individuals observed on neighbouring properties to the east.**
Sensitive species 951	Vulnerable D2	Yes	1 and 2	Moderate probability – was recorded approximately 30km from the study area
Dregeochloa calviniensis Conert	Rare	Yes	1 and 2	Moderate probability – was recorded approximately 52km SE of the study area
***Hoodia gordonii* (Masson) Sweet ex Decne.**	**Data Deficient - Insufficient Information**	**Yes**	**No**	**Observed within the study area and on neighbouring properties.**
Wahlenbergia divergens A.DC.	Data Deficient - Taxonomically Problematic		1 and 2	Moderate – currently there is not enough information available for this species. Based on historical records, this species was recorded approximately 12km south of the study area.

Sensitive species 144 – Vulnerable A3ce

This species occurs from Nieuwoudtville east to Olifantsfontein and northwards to the Brandberg in Namibia and is therefore not endemic to South Africa. It is known to occur on north-facing rocky slopes (particularly dolomite) in the south, and any slopes and sandy flats in the central and northern parts of its range. The main threats to this species include climate change, harvesting and trampling by livestock. Damage by baboons, scale insects and fungus has been observed, but none of these seem to cause mortality. Some social birds make large nest on the species, sometimes causing it to fall over due to the weight of the nests and its owners. Climate change models project a 36% decline in its range in 100 years, assuming dispersal into newly suitable areas. Patterns of modelled declines have been supported by field and repeat photo studies. Without dispersal, the models predict a 73% decline in 100 years, qualifying the species as EN.

Only one individual was recorded within the PAOI. The species need be protected *in situ* as per the Provincial gazette No 968 of 1 April 2005 in terms of the Nature and Environmental Conservation Ordinance, 1974 (Ordinance No. 19 of 1974) which prohibits the harvesting of this species.

Figure 6-6: Sensitive species 144 recorded within the PAOI.

Sensitive species 951 – Vulnerable D2

This South African and Northern Cape endemic species from the Hantam Karoo occurs in decomposed granite under shrubs and in open places among stones derived from gneiss. It is known to occur North-North-West of Loeriesfontein. It is a very peculiar species easily distinguished for its translucent greenish-olive top with lighter raised, scalloped islands around the edges. The flowers are yellow with a white throat which flower in early autumn. The species was not recorded on site, but the habitat is being excluded from development.

***Dregeochloa calviniensis* Conert – Rare**

This endemic species is known to occur in limestone outcrops in arid succulent karoo shrubland. The type collection is from Handelskraal, ENE of Loeriesfontein. It is a habitat specialist, occurring as localised subpopulations. It is a relatively unknown species from a poorly collected area where livestock grazing is abundant. There are no known threats to the species, although overgrazing could be considered. The species only flowers in October, thereby making identification out of season extremely difficult. The species was not recorded on site, but this could be due to seasonality and might not reflect a true absence.

***Hoodia gordonii* (Masson) Sweet ex Decne.**

The species occurs in a wide variety of arid habitats from coastal to mountainous, also on gentle to steep shale ridges, found from dry, rocky places to sandy spots in riverbeds. It is a widespread species (EOO 850,000 km²) but has undergone decline since 2001 as a result of indiscriminate harvesting for its appetite suppressant properties. International and national demand was particularly high between 2004 and 2006 and as a result of the high economic value of this species (price range between R500 and R1200 per kilogram at

this time); even remote areas of its distribution range are suspected to have been harvested. Unfortunately, data do not exist to quantify the degree of decline to the population and as this species is widespread and can be locally common it is not possible to estimate overall population decline. Research on population recovery post harvesting and degree of impact of the harvesting over the past 10 years is required before this species can be accurately assessed. As a result of a decrease in demand for Hoodia internationally and the strict enforcement of new legislation to protect this species wild harvesting has declined in South Africa (Raimondo et al., 2008).

Within the study area, the species is more abundant on the koppies / ridge. Where the proposed development requires the removal or destruction of the species, the necessary permit from the Provincial Department for its relocation is required.

Figure 6-7: Hoodia gordonii recorded within the PAOI.

6.2.2 Provincially protected species

In addition to the above species, there are several provincially protected species under the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) that occur on the study area which require permits for their removal from the Provincial Department. Prior to construction activities, all individuals of these species that will be directly impacted on by the proposed development, needs to be enumerated and marked with a GPS. A permit application for their relocation needs to be submitted to the Northern Cape Department Agriculture, Environmental Affairs, Rural Development and Land Reform and the necessary species needs to be removed or relocated prior to the commencement of construction activities.

Provincially protected species include:

Schedule 1 species:

- *Hoodia gordonii*
- *Sensitive species 144*
- *Sutherlandia spp.*
- *Pelargonium spp.*

Schedule 2 species:

- All species within the Aizoaceae family, which includes *Ruschia sp, Mesembryanthemum sp, Drosanthemum spp.,*
- All species within the Anacampserotaceae family, including *Anacampseros* spp., *Avonia* spp.
- All species within the Oxalidaceae family, including *Oxalis* spp.
- All species within the Apocynaceae family, including *Microloma sagittatum*
- All species within the Asphodelaceae family, including all *Aloe* spp. (except those listed in Schedule 1), *Gonialoe variegata*.

6.3 Sensitive features

A sensitivity map was generated for the study area, where low sensitivity is considered ideal for development and highly sensitive areas must be avoided (no-go areas) (Figure 6-8). The watercourse and koppies habitats are considered highly sensitive and must be excluded from the layout. For Lesaka SEF 1 and grid connection, these sensitive features have been avoided from the layout. It must be noted that the pylon positions won't be able to avoid watercourses due to the proximity, location and connectivity to the existing kv line grid connection. This is not considered a fatal flaw. Sensitive species 144 requires a 200m buffer area around it, where no development should take place as the species should ideally be protected *in situ*. The PV arrays can be designed around this individual.

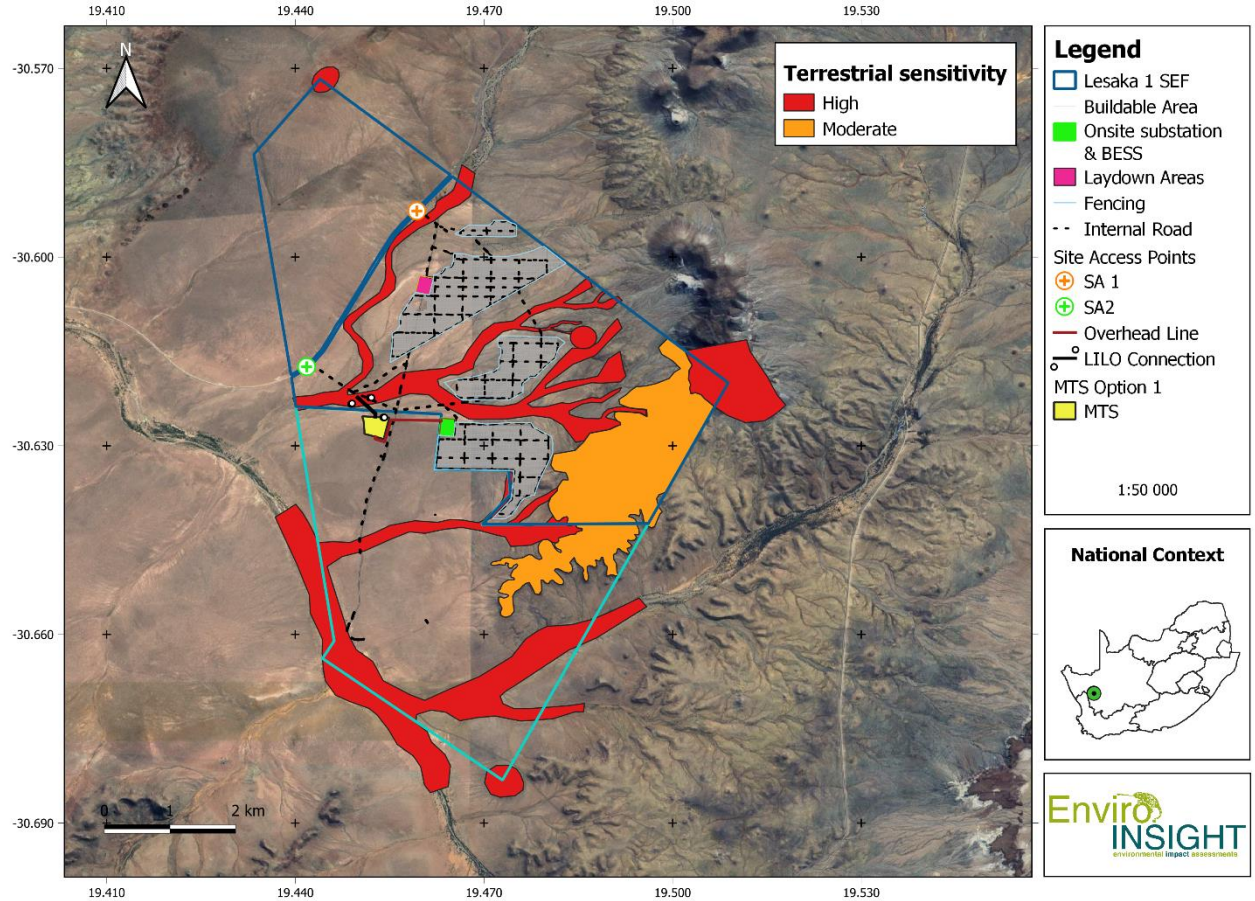

Figure 6-8: Habitat sensitivity of the study area.

6.4 Impact Assessment

The development of the Lesaka SEF is likely to result in a variety of impacts, associated largely with the disturbance and transformation of intact vegetation and faunal habitat to hard infrastructure for the PV array foundations and associated infrastructure such as service areas, access roads, operations and maintenance buildings, and laydown areas during the construction phase.

The overall impacts associated with the current layout of the proposed Lesaka SEF as well as the "no-go alternative" is assessed to evaluate the significance of the "as predicted" ecological impacts (prior to mitigation) and the "residual" ecological impacts (that remain after mitigation measures are considered). The following impacts are identified as the major impacts that are likely to be associated with the development and was assessed for the planning and design, construction, operational and decommissioning phases of the development.

6.4.1 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.

6.4.2 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.

6.4.3 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 following criteria (including an allocated point system) is used:

Table 6-2: Rating of impacts criteria.

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.		

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.

6.4.4 Potential Impacts

Potential impacts associated with the proposed development include:

- Habitat loss due to placement of infrastructure,
- Habitat fragmentation,
- Reduced connectivity within the landscape,
- Loss of sensitive and endemic flora,
- Increased alien invasive plant species due to soil disturbance and movement during the construction phase,
- Reduced ecosystem functioning due to construction within watercourse, pans and other sensitive features,
- Animal mortality due to construction phase activities, and
- Increased erosion due to removal of vegetation.

Currently, no anticipated fatal flaws exist as avoidance is possible and where not, appropriate mitigation measures can reduce impacts to low levels. Theses impacts are assessed and discussed in more detail below.

6.4.5 Planning and Design Phase

No direct, indirect or cumulative ecological impacts have been identified for the Planning and Design Phase of the proposed Lesaka SEF as no tangible alterations to the environment will occur within the proposed site during this phase. The proposed layout design must consider excluding infrastructure within Critical Biodiversity Areas and the sensitivity features indicated in Figure 6-8. The CBA classification is triggered by the presence of NFEPA watercourses, while other sensitive features to avoid include plant SCC as well as the koppie habitat. All buffers indicated must be included as no-go areas for development.

6.4.6 Construction Phase

Impact 1: Habitat Loss and Fragmentation

The habitats within the proposed study area and those of the surrounding areas form part of a functional ecosystem. An ecosystem can be defined as “a dynamic complex of animal, plant and micro-organism communities and their non-living environment interacting as a functional unit” (Ecosystem Environmental Assessment Guideline Draft, 5 July 2021). The functional component or ecological functioning can be defined as “the roles, or functions, that species (of plants, animals, and microbes) and the effects of their activities (e.g., feeding, growing, moving, excreting waste etc.) play in the community or ecosystem in which they occur. In this approach, physiological, anatomical, and life history characteristics of the species are emphasised. The term "function" is used to emphasize certain physiological processes rather than discrete properties, describe an organism's role in a trophic system, or illustrate the effects of natural selective processes on an organism” (Ecosystem Environmental Assessment Guideline Draft, 5 July 2021). Considering the interactions between living and the non-living component of the environment requires an understanding of the processes that drive these interactions. These processes are crucial for maintaining healthy ecosystems and supporting the long-term persistence of biodiversity. Ecological processes include, amongst others, population abundance, range shifts (e.g. season or long-term migration), community structure and species turnover, trophic interactions, pollination, invasive species, shrub expansion/loss, forest expansion/loss, fire (frequency, severity, timing, extent), pathogens, pest outbreaks, acidification, succession, nutrient cycling, herbivory, phenology, and primary productivity/biomass. Various anthropological, atmospheric, biogeochemical, geomorphic, hydrological, and oceanographic processes also exist, but these are not ecological in nature.

The proposed Lesaka SEF is not located in a threatened ecosystem. It is located in the Hantam Karoo vegetation type which has a status of least concern, but is within the endemic Succulent Karoo biome which is a biodiversity hotspot. There is a CBA1 located on the property which should be excluded from development, where possible. This will not be possible for all linear activities (roads and grid connections), but the PV arrays placement, laydown areas and other permanent structures must avoid these areas

The proposed development will require vegetation clearing of approximately 1300 ha for PV arrays, roads and other hard infrastructure, which will also impact on faunal habitat. This is usually accompanied by the loss of food sources and/or shelter but may also include the loss of sensitive features including wetlands, breeding habitat and rocky outcrops. The cumulative impacts for this vegetation unit is considered to be moderate as there are limited existing renewable energy projects within it.

Sensitive features must be avoided during the construction phase. In order to minimise the loss of vegetation and faunal habitat, several mitigation measures are proposed. Prior to mitigation the impact is considered High, which can be reduced to Moderate after the application of appropriate mitigation.

Proposed mitigation measures:

- Placement of infrastructure within High Sensitivity areas must be avoided.
- Ensure that lay-down and other temporary infrastructure is within low sensitivity areas, preferably previously transformed areas where possible.
- Minimise the development footprint as far as possible.
- Rehabilitate disturbed areas that are no longer required by the operational phase of the development. Inadequate rehabilitation could result in limited revegetation and/or an invasion of alien vegetation which will result in long term ecological degradation and damage.

- A Rehabilitation Management Plan must be developed and implemented during the construction phase as construction is complete at each site.
- The number of roads should be reduced to the minimum possible and routes should also be adjusted to avoid areas of high sensitivity as far as possible. Where possible, existing roads must be used to avoid additional habitat loss and fragmentation.
- Demarcate all areas to be cleared with construction tape or other appropriate and effective means. However, caution should be exercised to avoid using material that might entangle fauna.
- An Environmental Control Officer (ECO) must be employed to monitor the clearing of vegetation for the construction of roads and hardstands.

Impact 2: Loss of species of conservation concern (SCC), including national and provincial protected species and protected trees.

Apart from the direct loss of vegetation within the development footprint, plant SCC could be impacted on. The nationally protected sensitive species 144 was recorded on site, as well as several provincially protected species. The development must avoid sensitive species 144 and where infrastructure will impact on provincially protected species the necessary permits for their removal or relocation is required from the relevant provincial department prior to the commencement of construction activities.

Prior to mitigation the impact is considered High, which can be reduced to low-medium after the application of appropriate mitigation.

Proposed mitigation measures:

- A comprehensive Plant Search and Rescue must be undertaken by a suitably qualified botanical specialist prior to vegetation clearance during the construction phase.
- All relevant plant permits must be obtained from the provincial authority prior to the removal or relocation of SCC, including provincially protected species.
- Demarcate sensitive species with the appropriate buffers which must be excluded from development activities. A 200m buffer is applied to sensitive species 144.
- Plant SCC (excluding sensitive species 144 which must be protected *in situ*) found within the proposed site must either be housed in an onsite nursery for use during rehabilitation or be relocated to suitable areas where vegetation clearance will not occur.

Impact 3: Alien and invasive plant species

The disturbance associated with the construction phase of the project could see an increase of alien invasive plant species at disturbed areas. Some alien plant invasion is inevitable and regular alien plant clearing activities would be required to limit the extent of this problem. Once the natural vegetation has returned to the disturbed areas through rehabilitation efforts post-construction, the site will be less susceptible to alien plant invasion. Roadsides and service areas will remain focal points of alien plant invasion for the project's operational duration, and likely during the decommissioning phase. This impact would manifest towards the end of the construction phase, and accordingly the required measures to reduce this impact are required early on.

Prosopis sp. is the only dominant alien invasive plant in the study area which is located mainly in watercourses (a few individuals may occur in the larger study area). The removal of these individuals will have a positive outcome by improving the indigenous biodiversity as there will be less competition and more favourable habitat for indigenous fauna.

Proposed mitigation measures:

- A site-specific Alien Invasive Species (AIS) Management Plan must be implemented during the construction phase and continued monitoring and eradication needs to take place throughout the life of the project.
- Alien vegetation, within the development footprints, should be removed from the site and disposed of at a registered waste disposal site.
- The development footprints and immediate surroundings should be monitored for the growth/regrowth of alien vegetation throughout the construction and operation phases of the project.

Impact 4: Increased risk of erosion and flash floods

Disturbance created during construction would leave the site vulnerable to wind and water erosion. Soil disturbance associated with the development such as earth works, laying foundations, and expansion of roads, will render the impacted areas vulnerable to soil erosion, especially when crossing watercourses. Appropriate measures to limit erosion will need to be implemented. This impact is mainly limited to the construction phase and could persist into the operational phase.

Proposed mitigation measures:

- Soil Erosion and Rehabilitation Plan to be part of the EMPr.
- The clearance of vegetation, at any given time, must be kept to a minimum to reduce the possibility of soil erosion.
- Rehabilitation of eroded areas on a regular basis during the construction period.
- All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.
- Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance.

Impact 5: Disturbances or displacement impacts on fauna including traffic, noise and dust

The construction of the proposed Lesaka SEF and associated infrastructure will result in an increase in noise and dust within the proposed site and surrounds. Roads are known to alter the physical characteristics of the environment and it is possible that numerous species within the proposed site will be affected by the increase in noise and dust to some extent. Species which is most likely to be impacted by the increase in noise and dust levels are water associated. Increased dust levels alter wetlands and watercourses which could affect the feeding and breeding of species within these areas.

Fauna varies in the degree to which they can tolerate such disturbances and the increase in noise and dust could potentially have adverse impacts on various faunal groups. Increased noise and motor vibrations in wetland areas could also impact amphibian breeding choruses, but these impacts will be localised and many

amphibian species are surprisingly tolerant of vehicle noise. Noise pollution will occur during all phases of development (construction, operational, and de-commissioning/closure).

Proposed mitigation measures:

- Ground clearing and the digging of trenches should ideally take place at the end of the dry season, prior to the first rains in order to minimise the impacts of dust.
- Newly cleared and exposed areas must be managed for dust and landscaped with indigenous vegetation to avoid soil erosion. Where necessary, temporary stabilisation measures must be used until vegetation establishes.
- Speed restrictions (40 km per hour is recommended) should be in place to reduce the amount of dust caused by vehicle movement along the roads, and to reduce possible fauna fatalities with vehicle collisions.
- Driving around in the area as well as noise levels at night should be limited, as should the use of harsh lights which could cause light pollution for nocturnal species.
- Where appropriate, sound dampeners must be used.
- Avoid the presence of people and vehicles in highly sensitive areas as far as possible.
- Fences should be constructed in such a way so that burrowing animals can still gain access.
- Strict measures should be put into place to prevent workers from poaching and hunting naturally occurring fauna.

6.4.7 Operational Phase

Impact 1: Direct faunal impacts due to operational activities

Operational phase has a longer duration (approximately 15-20 years) in comparison to the construction phase (approximately 18-24 months). The most negative and significant impacts will likely be the displacement and/or disturbance of fauna communities. Fences around the proposed SEFs, if not fauna-friendly, may limit fauna movement and dispersal. Importantly, mitigation measures should be put in place to assure that ecological flow and genetic exchange is not interrupted or fragmented by the infrastructure.

Additionally, the presence of human and vehicle-movements through the area (associated with maintenance movements) has the potential to negatively affect the fauna community, especially during the night-time when most fauna species are active and can get killed by moving vehicles. However due to the short duration of these impacts and especially if mitigation measures are implemented, this is considered to be a low-significance impact.

Proposed mitigation measures:

- reduce the presence of human activity on the project area as far as possible by only focusing on the areas where operational tasks are required,
- avoid the presence of people and vehicles in highly sensitive areas as far as possible,
- no unauthorised persons should be allowed onto the site,
- any potentially dangerous fauna such snakes or fauna threatened by the maintenance and operational activities must be removed to a safe location. A specialist or trained animal handler (especially when working with dangerous animals) must be contacted,

- lower the levels of noise whenever possible and avoid the destruction or disturbance of identified important features,
- The illegal collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden by anyone except by individuals with the appropriate permits obtained from the relevant competent authorities,
- All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill,
- fences should be constructed in such a way so that burrowing animals can still gain access, which will allow other animals to also utilise the holes dug under fences to increase connectivity in the area.

Impact 2: Alien and invasive plant species

The clearance of vegetation associated with the proposed solar developments and associated infrastructure will create suitable conditions which are likely to be colonised by pioneer plant species. While this is partly a natural revegetation/regeneration process, which would ultimately lead to the re-establishment of secondary vegetation cover, it also favours the establishment of alien species. Care should be taken to limit the spread of alien invasive species.

Proposed mitigation measures:

- The site-specific AIS Management Plan must be implemented for the first year of the operational phase. Thereafter, alien vegetation must continue to be monitored and eradicated annually throughout the life of the project.
- Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented. Problem woody species such as Prosopis are already present in the area and are likely to increase rapidly if not controlled.
- Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.
- Alien vegetation, within the development footprints, should be removed from the site and disposed of at a registered waste disposal site.

6.4.8 Decommissioning Phase

When the solar farms reach the end of their lifespan, all machinery and related installations must be dismantled and removed, and the site should, as far as is reasonably possible, be restored to its original condition. It is only if the developer decides to extend the life of the solar farms and repowering the site, that the necessary parts need to be replaced. As decommissioning of large-scale solar farms in South Africa are new, the regulatory framework and impacts associated with this phase are based on assumptions. Perhaps the most important assumption is that decommissioning a solar farm is straight forward and simple, compared to the problems associated with decommissioning a nuclear power station, or a coal or gas fired plant. The major issue is not the physical removal but rather the disposal of the used parts. Where possible, all recyclable materials must be repurposed in an environmentally friendly way.

It is expected that the dismantling of the solar panels and associated infrastructure can lead to disturbance of the fauna community, in all ways similar to that resulting from the construction phase. The ecological impacts associated with the decommissioning phase will be similar to those listed in the construction phase and the associated mitigations measures must be updated and implemented to reduce potential adverse impacts.

The dismantling of the project will eventually contribute to the removal of all the implemented structures; accordingly, this may be considered a positive impact.

6.5 Cumulative Impacts

Where other renewable energy developments occur within the surrounding area of the proposed development, a cumulative impact assessment is required. This includes a general assessment of cumulative impact as well as an assessment of different potential cumulative impact sources and an indication of the size or extent of the identified cumulative impact.

There is a large amount of existing and planned WEFs and a couple of SEFs within the regional area, which raises the possibility of significant cumulative impacts (Figure 6-9). From this, a node of renewable energy development is developing around the Helios Substation. The large amount of renewable energy developments in the area would potentially generate significant cumulative impact in terms of habitat loss and potential disruption of landscape connectivity.

There are two existing WEFs towards the north of the study area, and a Solar Facility in construction towards the north-east. The total extent of habitat loss from these developments is approximately 1000ha. Another 8 WEFs and 2 solar PV projects have already obtained environmental authorisation and await the necessary approval as preferred bidders before construction can commence.

In addition to the renewable projects, there is an increase in grid connectivity to the Helios Substation, as well as expanding of the transmission and distribution lines to and from the substation. This increase in powerlines could see an increase in habitat loss, vegetation clearing beneath the powerlines and loss of plant SCC based on pylon placement, road construction and construction vehicle movement and ground clearing during the construction phase. These impacts are generally less significant compared to the placement of solar PV arrays, turbines, BESS and other associated infrastructure. Cumulatively it could have a moderate impact on vegetation clearing and loss of SCC, but considering the vegetation type is least threatened, the number of SCC and density is considered low in this area, and there are no other sensitive terrestrial features in the landscape, the cumulative impact after avoiding the known sensitivities and locations of plant SCC is considered to be low.

Some of the main cumulative impacts of renewable energy developments in the region will include:

- Vegetation and habitat loss,
- Increased habitat fragmentation,
- Loss of critical habitat as well as direct loss of flora and fauna SCC as well as endemic species,
- Loss of provincially protected species which require a permit for removal or relocation,
- Surface water impacts and associated ecological processes,
- Increased erosion due to flooding (not a yearly event but longer term),

- Increased alien flora and fauna species.

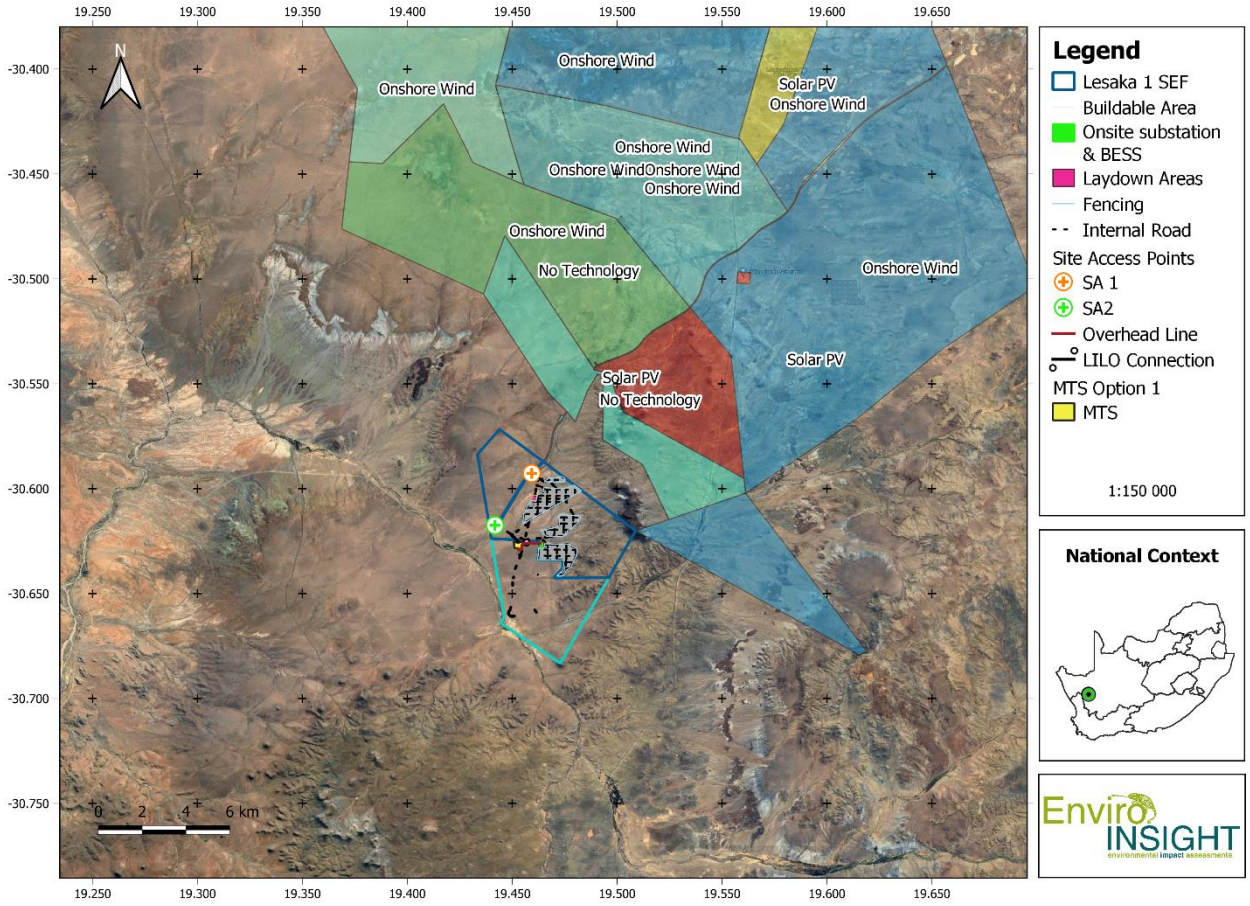

Figure 6-9: DEA Renewable Energy Development (RED) registered projects for the area as of 2022. The proposed Lesaka SEF 1 and SEF 2 are located south of existing or proposed renewable energy projects.

Table 6-3: Rating of environmental impacts for Lesaka SEF 1.

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 (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Construction Phase																				
Habitat Loss and Fragmentation	Vegetation clearing for access roads, solar arrays and their service areas and other infrastructure will impact on vegetation	2	4	3	3	3	4	60	-	High	Refer to section 6.4.6	1	3	2	3	3	3	36	-	Medium
Loss of species of conservation concern (SCC), including national and provincial protected species and protected trees	Vegetation clearing for access roads, solar arrays and their service areas and other infrastructure will impact on SCC	1	4	3	3	4	4	60	-	High	Refer to section 6.4.6	1	2	2	2	2	3	27	-	Medium
Alien and invasive plant species	Disturbance could see an increase of alien invasive plant species at disturbed areas	2	3	2	2	3	4	48	-	High	Refer to section 6.4.6	1	2	2	2	2	2	18	-	Low
Increased risk of erosion and flash floods	Disturbance would leave the site vulnerable to wind and water erosion.	2	3	2	3	3	3	39	-	Medium	Refer to section 6.4.6	2	2	2	2	2	2	20	-	Low
Disturbances or displacement impacts on fauna including traffic, noise and dust	Could result in an increase in noise and dust within the proposed site and surrounds which could have negative impacts	2	3	2	3	3	3	39	-	Medium	Refer to section 6.4.6	1	2	2	2	2	2	18	-	Low

	on faunal activity including breeding and feeding																			
Operational Phase																				
Direct faunal impacts	Displacement and/or disturbance of fauna communities	2	4	3	3	3	3	45	-	High	Refer to section 6.4.7	1	3	2	2	2	2	20	-	Low
Alien and invasive plant species	Re-establishment of secondary vegetation cover and establishment of alien species	2	4	3	3	3	3	45	-	High	Refer to section 6.4.7	1	2	2	2	2	2	18	-	Low
Decommissioning Phase																				
Vegetation loss and disturbance of fauna communities	Dismantling and removal of infrastructure	1	3	2	3	2	3	33	-	Medium	Refer to section 6.4.8	1	2	2	2	2	2	18	-	Low
Waste generated	Repurpose all recyclable materials	2	3	3	3	3	4	56	-	High	Refer to section 6.4.8	2	3	2	2	2	3	33	-	Medium
Cumulative Impacts																				
Cumulative Impact of various existing and proposed renewable energy projects on the natural environment	The cumulative assessment considers the various proposed renewable projects that occur within a 30km radius of this site.	2	4	3	3	3	3	45	-	High	• The premise of all the reviewed or assessed projects has been the avoidance of impacts on the Very High and High Sensitivity Environments including appropriate buffers, which have been achieved by the various proposed layouts. • Majority of projects are not located in CBA or ESA (mainly in ONA).	2	3	2	2	2	2	22	-	Low

											• Necessary relocation permits for provincially protected species are required prior to construction phase. • No threatened ecosystems or vegetation types intersect any of the developments.									
Cumulative Impact of numerous grid connection infrastructure in the surrounding area	Additional removal of vegetation and potential loss of SCC	2	3	2	3	3	3	39	-	Medium	• The premise of all the reviewed or assessed projects has been the avoidance of impacts on the Very High and High Sensitivity Environments including appropriate buffers, which have been achieved by the various proposed layouts. • For grid connections specifically, pylons must be placed strategically to avoid very high and high sensitivity areas as far as possible. • Necessary relocation permits for provincially protected species are required prior to construction phase. • No threatened ecosystems or vegetation types intersect any of the developments.	1	2	2	2	2	2	18	-	Low

6.6 No-Go Alternative

The “no-go” option assumes that the site remains in its current state, i.e. there is no construction of a Solar PV and associated infrastructure in the proposed project area and the status quo would proceed. This means that there will be no impacts on the natural environment from this development, and ecological processes will continue unimpeded. The main current impacts are due to existing alien invasive species, largely *Prosopis* spp. within the watercourses. There will also be no habitat loss or fragmentation, but the vegetation type is not listed as threatened. The impact on protected species will also not occur, and permit applications for provincially protected species will not be required.

7. INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

As per the TOR, a description of the key monitoring recommendations for each applicable mitigation measure identified for each phase of the project for inclusion in the Environmental Management Programme (EMPr) or Environmental Authorisation (EA). Table 7-1 lists specific mitigation measures that must be implemented and adhered to. These must be considered to be conditions of authorisation.

Table 7-1: Specific Mitigation Measures and Recommendations.

Impact/Aspect	Mitigation/Management Actions	Responsibility	Mitigation/Management Objectives and Outcomes	Frequency
Vegetation Loss	• Blanket clearing of vegetation must be limited to the site. No clearing outside of footprint to take place. • The boundaries of the development footprint areas are to be clearly demarcated and it must be ensured that all activities remain within the demarcated footprint area. • Topsoil must be striped and stockpiled separately during site preparation and replaced on completion where revegetation will take place. • Erosion prevention is key thus runoff must be controlled and managed by use of proper stormwater management measures. • Any site camps and laydown areas requiring clearing must be located within already disturbed areas away from sensitive areas.	Authorisation Holder / Project Manager	To minimise vegetation loss	Planning and Design phase prior to construction commencing
Loss of flora SCC	• A flora walkdown is required for permit applications prior to commencement of construction activities. • Respective permits to be obtained beforehand. • Provincially protected species can be replanted and re-established post construction.	Authorisation Holder / Project Manager	To minimise loss of flora SCC	Prior to construction commencing

Alien Invasive Species Invasion	• • Alien invasive species (AIS) and weeds must be removed from the site as per CARA/NEMBA requirements. • A suitable AIS and weed management strategy to be implemented during construction and operation phases. • After clearing and construction is completed, an appropriate cover may be required, should natural re-establishment of grasses not take place in a timely manner along road verges. This will also minimise dust.	Authorisation Holder / Project Manager / ECO	To minimise regeneration of AIS and weeds	Quarterly during the construction phase. Annually during the operational phase. Once-off during the decommissioning phase.
Rehabilitation of bare and exposed areas	• Minimise any disturbance of areas undergoing rehabilitation. • Use plant species that are indigenous to the vegetation type and that were found there before the construction process. This will increase the likelihood of the area's functional integrity to return to a state similar to that of before the Construction Phase.	Authorisation Holder / Project Manager / ECO	To avoid degradation of the environment and regenerate habitat	Life of Rehabilitation

8. CONCLUSION

The study area is located within the Hantam Karoo vegetation type, listed as Least Threatened, and intersects a CBA1, CBA2 and ESA according to the Northern Cape CBA Map. The CBA1 are the NFEPA Rivers, Klein-Rooiberg and Rooiberg, both considered largely natural which must be excluded from development. CBA2 are mainly due to the FEPA catchment, FEPA rivers and associated 500m buffer and the vegetation type being located within the Succulent Karoo biome. The ESA towards the western section is the Krom River and associated wetlands, while the smaller scattered ESAs towards the eastern boundary are koppies which are large high value climate resilience areas. Linear infrastructure such as roads and internal powerlines can cross the watercourses, but care should be taken in the planning of this. The aquatic biodiversity assessment must also be consulted for additional mitigation measures to be considered during the design phase, as well as the construction and operational phases of the projects.

The majority of the SEF consist of Karoo shrubland with grassland patches on flat plains and gently sloping hills that are not considered sensitive. The watercourses and pans are considered sensitive and should be avoided during the construction period for placement of infrastructure, laydown areas and associated infrastructure. Roads and cables will cross watercourses, and the impacts can be mitigated by reducing it to acceptable levels since avoidance is not possible. The Koppie towards the north-east must be avoided from all development activities.

Large sections of the affected area are not considered highly sensitive and there are no specific features of the affected area which would indicate that it is of broad-scale significance for faunal movement or landscape connectivity. One individual of a sensitive species was recorded on site which should be protected *in situ* as it can be avoided by the proposed development. A 200m buffer has been placed around its location. For other provincially listed species which are affected by the proposed development, a permit application for their removal must be applied for with the provincial authority prior to the commencement of construction activities.

The loss of topsoil and fragmentation of natural habitats that is virtually unavoidable with any type of development, has a negative impact on the regional ecosystem as it disrupts the natural flow of ecosystem services and affects all fauna and flora that are dependent on those habitats. The impact of clearing of the vegetation is High Negative, especially for the construction of internal roads and temporary infrastructure (including construction camp and laydown area) during the construction phase. Permanent clearance is estimated to be about 20 ha.

Considering that the topsoil will not be disturbed for the panel construction and that heavy machinery will be utilised to only drill holes for the erection of the PV panels, approximately 3.5m above ground, the vegetation will not be completely transformed. An effective rehabilitation and management plan needs to be drafted to ensure the continuous functionality of the habitats taking the construction phase impacts into account. As little is known about the impacts of solar panels on vegetation in South Africa, it is unclear whether there would be a significant change to the system, and whether additional rehabilitation efforts and the extent of success will be required post-operational phase of the facilities.

Several renewable energy developments have and are being developed around the Helios Substation. The majority of the affected area is not considered sensitive, but there are specific features of the affected area which would indicate that it is of broad-scale significance for faunal movement and landscape connectivity.

Although there are two existing wind farms and several more applications in the area, the total extent of habitat loss due to the solar facilities is currently about 200ha.

8.1 EA conditions and recommendations

- Rehabilitation and monitoring plan required post-construction and post-operational phase of the project which addresses ecosystem functioning, fire management, alien invasive species management and effective methods of rehabilitating natural vegetation to functional systems (not just biomass replacement).
- Roads and underground cabling must avoid sensitive areas as far as possible by considering various layout alternatives. The karoo shrubland habitat will not be transformed completely (only PV related – this is not the case for roads and temporary laydown areas), accordingly with appropriate mitigation and rehabilitation measures post-construction and post-operational, the impact of the PV panels is considered medium for karoo shrubland.
- It is advised that an ecological specialist is appointed during the construction, operational and decommissioning phases to monitor impacts and related mitigation measures regarding natural and sensitive habitats and the faunal and floral assemblages occurring there.
- Care should be taken not to unnecessarily clear or destroy natural vegetation.
- Development and planned activities should therefore be planned in such a way that totally transformed areas are chosen for major developments and natural veld and especially any highly sensitive areas are avoided as far as possible.
- Sensitive species 144 must be protected in situ and a 200m buffer is applicable where no construction activities may take place.
- Provincially listed species which are affected by the proposed development requires a permit application for their removal from the provincial authority prior to the commencement of construction activities.

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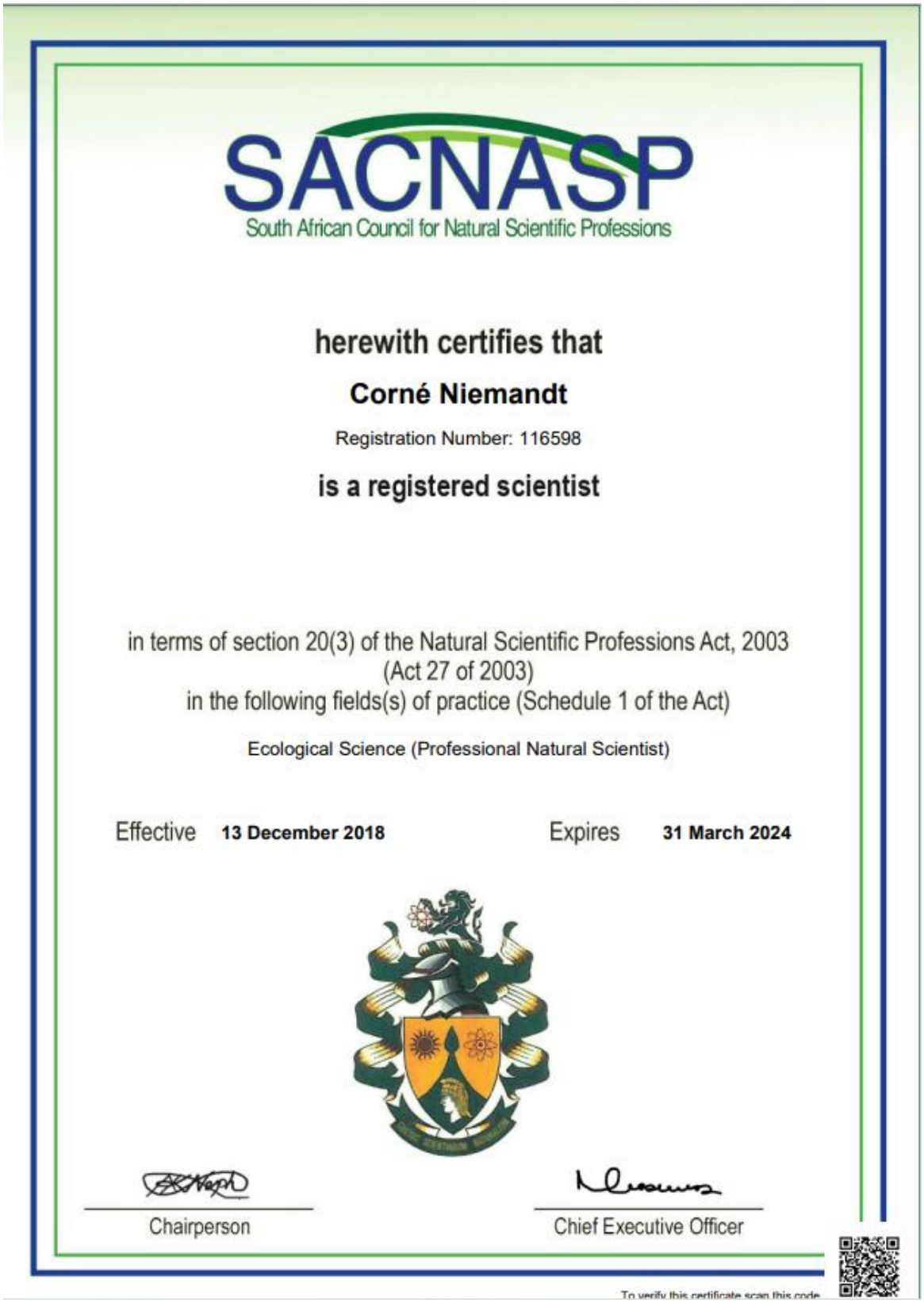
APPENDIX A: SACNASP PROFESSIONAL CERTIFICATE



SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Corné Niemandt

Registration Number: 116598

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

Ecological Science (Professional Natural Scientist)

Effective **13 December 2018** Expires **31 March 2024**

Chairperson

Chief Executive Officer

To verify this certificate scan this code