The Terrestrial Ecology Baseline & Impact Assessment for the proposed Dealesville Cluster Solar Photovoltaic (PV) Project - Notsi PV 5

Dealesville, Free State Province

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CLIENT

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1 Introduction

1.1 Background

The Biodiversity Company was appointed to undertake a terrestrial ecology (fauna and flora) baseline and impact assessment for the Dealesville Cluster (Notsi) Solar Photovoltaic (PV) Project. The proposed project involves the development of a cluster solar facility and associated infrastructure and is located near to the town of Dealesville in the Free State province.

The proposed cluster solar facility will be comprised of at least five PV areas, each treated as separate sub-projects, and each producing up to a total of 100 MW. Each sub-project will include a PV Panel Array, inverters, and connection to the grid, and supportive infrastructure will be developed which includes roads, fencing and small buildings. This report pertains only to the assessment of the Notsi PV 5 area and its associated footprint, a separate report is compiled for the assessment of the supportive grid infrastructure.

In order to assess the baseline ecological state of the area and to present a detailed description of the receiving environment, both a desktop assessment, as well as a field survey, were conducted from the 13th to the 15th of September 2022. Furthermore, the desktop assessment and field survey both involved the detection, identification and description of any locally relevant sensitive receptors and habitats, and the manner in which these sensitive features may be affected by the proposed development was also investigated. It is important to note that this assessment considers terrestrial fauna and flora with the exclusion of avifauna, as this aspect is considered as part of a separate assessment.

This assessment was conducted in accordance with the amendments to the Environmental Impact Assessment Regulations, 2014 (No. 326, 7 April 2017) of the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998). The approach has taken cognisance of the recently published Government Notice 320 in terms of NEMA dated 20 March 2020 as well as the Government Notice 1150 in terms of NEMA dated 30 October 2020: “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation”. The National Web based Environmental Screening Tool has characterised the terrestrial biodiversity theme for the area as ‘Very High’ sensitivity (National Environmental Screening Tool, 2022), which was disputed and the PAOI was assigned an overall sensitivity of ‘Medium’.

The purpose of conducting the specialist study is to provide relevant input into the overall Environmental Authorisation application process, with a focus on the proposed project activities and their associated impacts. This report, after taking into consideration the findings and recommendations provided by the specialist herein, should inform and guide the Registered Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making as to the ecological viability of the proposed project.

1.2 Project Details

Refer to Table 1-1 for details of the five sub-projects that are to be assessed as part of the overall project (each producing up to 100 MW):

Table 1-1 The five sub-projects included within the overall Dealesville Cluster (Notsi) PV project scope, with the sub-project relevant to this report in bold

Name	Size (ha)	Affected Farm Portion
Notsi PV 1	260	Ebenhaezer 1623
Notsi PV 2	220	Ebenhaezer 1623
Notsi PV 3	370	Welgeluk 1622
Notsi PV 4	220	Welgeluk 1622
Notsi PV 5	**195**	**Welgeluk 1622 Ebenhaezer 1623**

The following information has been received from the client with regards to the technical details for the proposed project.

The term photovoltaic describes a solid-state electronic cell that produces direct current electrical energy from the radiant energy of the sun through a process known as the Photovoltaic Effect. This refers to light energy placing electrons into a higher state of energy to create electricity. Each PV cell is made of silicon (i.e., semiconductors), which is positively and negatively charged on either side, with electrical conductors attached to both sides to form a circuit. This circuit captures the released electrons in the form of an electric current (direct current). The key components of the proposed project are described below:

- PV Panel Array - The proposed facility will require numerous linked rows of PV (single axis) modules placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility with associated support infrastructure (concrete footings, below ground electrical cables) to produce up to 100 MW electricity.
- Battery Energy Storage System (BESS) – The battery energy storage system will make use of solid state or flow battery technology and will have a capacity of up to 400 MWh. Both lithium-ion and Redox-flow technology are being considered for the project, depending on which is most feasible at the time of implementation. The extent of the system will be 3 ha. The containers may be single stacked only to reduce the footprint. The containers will include cells, battery charge controllers, inverters, transformers, HVAC, fire, safety and control systems.
- Inverters - Sections of the PV array will be wired to inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency.
- Supporting Infrastructure – The following auxiliary buildings with basic services including water and electricity will be required:
    - Temporary Laydown Areas; (~ 20000 m^2) and construction site camp/site office;
    - Site Administration Office (~500 m^2);
    - Switch gear and relay room (~400 m^2);
    - Staff lockers and changing room (~200 m^2);
    - Security control (~60 m^2);
    - Operations & Maintenance (O&M) building (~ 500 m^2); and

- Warehouse.

- Roads – Access will be obtained via the S322 secondary road and various gravel farm roads within the area and affected property. An internal site road network will also be required to provide access to the solar field and associated infrastructure. Access roads will be up to 8m wide (6m wide road surface, with 1m drainage either side).

- Fencing - For health, safety and security reasons, the facilities will require perimeter fencing and internal security fencing. The fencing will be up to 2.4 m in height.

Refer to

Table 1-2 for a breakdown of the technical specifications that apply to each of the five sub-projects:

Table 1-2 Technical specifications pertaining to each of the five sub-projects included within the overall Dealesville Cluster (Notsi) PV project scope

Component	Description / dimensions
Height of PV panels	Up to 4.5 meters
Area of PV Array	TBC
Number of inverters required	To be determined as part of the final facility layout design.
Area occupied by inverter / transformer stations / substations	On-site Facility Substation: Up to 4 ha Eskom Portion of the Substation: up to 5 ha BESS: 2 ha
Capacity of the on-site substation	33 kV / 132 kV
Area occupied by both permanent and construction laydown areas	Up to 4 ha
Area occupied by buildings	Administration Office (~500 m²); Switch gear and relay room (~400 m²); Staff lockers and changing room (~200 m²); Security control (~60 m²);
Width of internal roads	Between 6 and 8 meters
Height of fencing	Approximately 2.4 meters

1.3 Project Area of Influence

A 1265 ha Project Area is delineated to incorporate all five PV areas as part of the overall project. The Project area is approximately 13 km southwest of the town of Dealesville and lies adjacent to the large Beta substation. The region is characterised by undeveloped agricultural and grazing land and numerous large saltpans.

A map of the Project Area in relation to the local region is presented in Figure 1-1, and a detailed map of the Project Area and associated PV development footprints is presented in Figure 1-2.

A smaller 195 ha Project Area of Influence (PAOI) is delineated to incorporate the Notsi PV 5 Project Area, which is the focus area for this particular report (Figure 1-3).

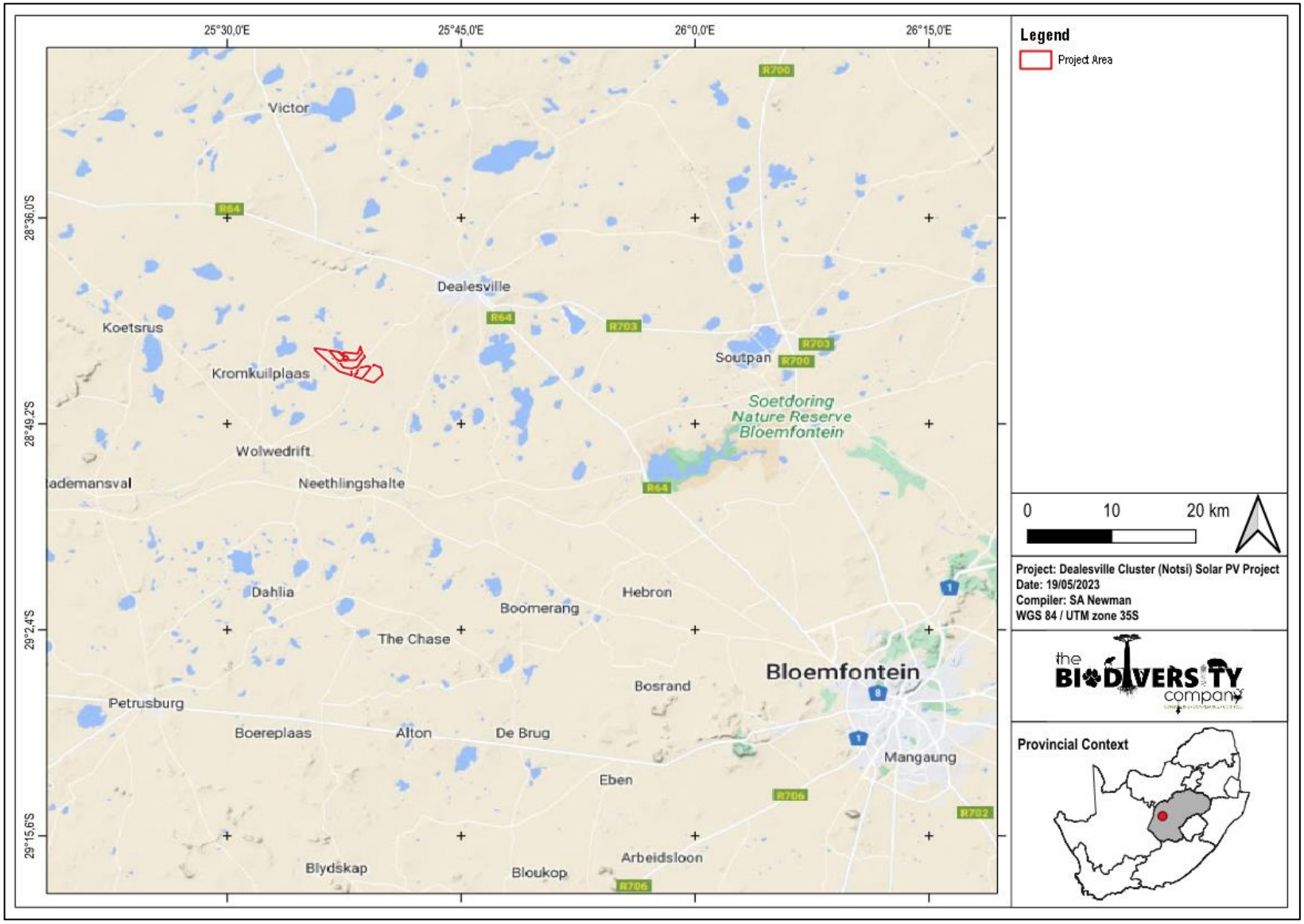


Figure 1-1 Map illustrating the regional context of the Project Area

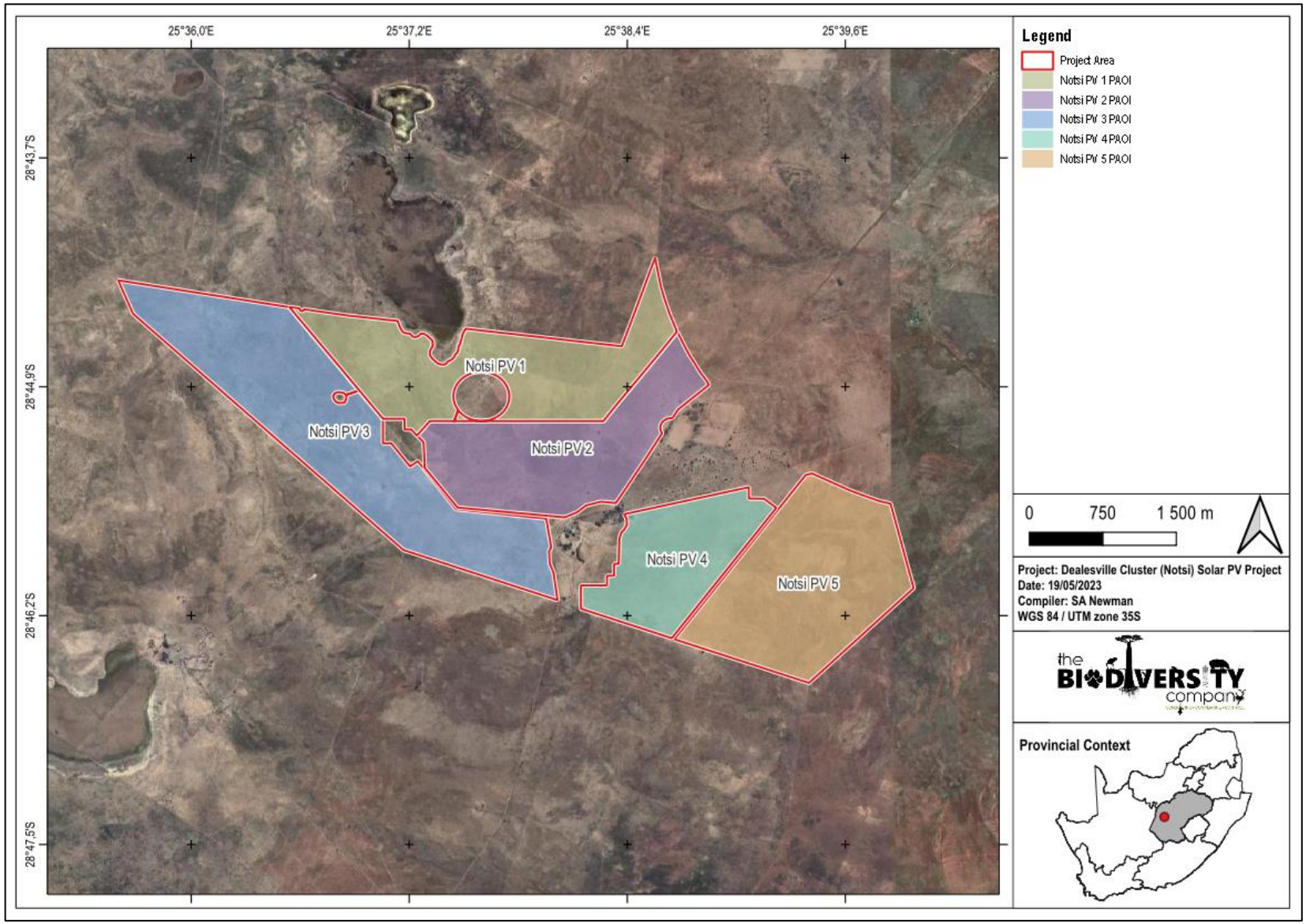


Figure 1-2 Map illustrating the details of the Project Area (all five sub-projects)

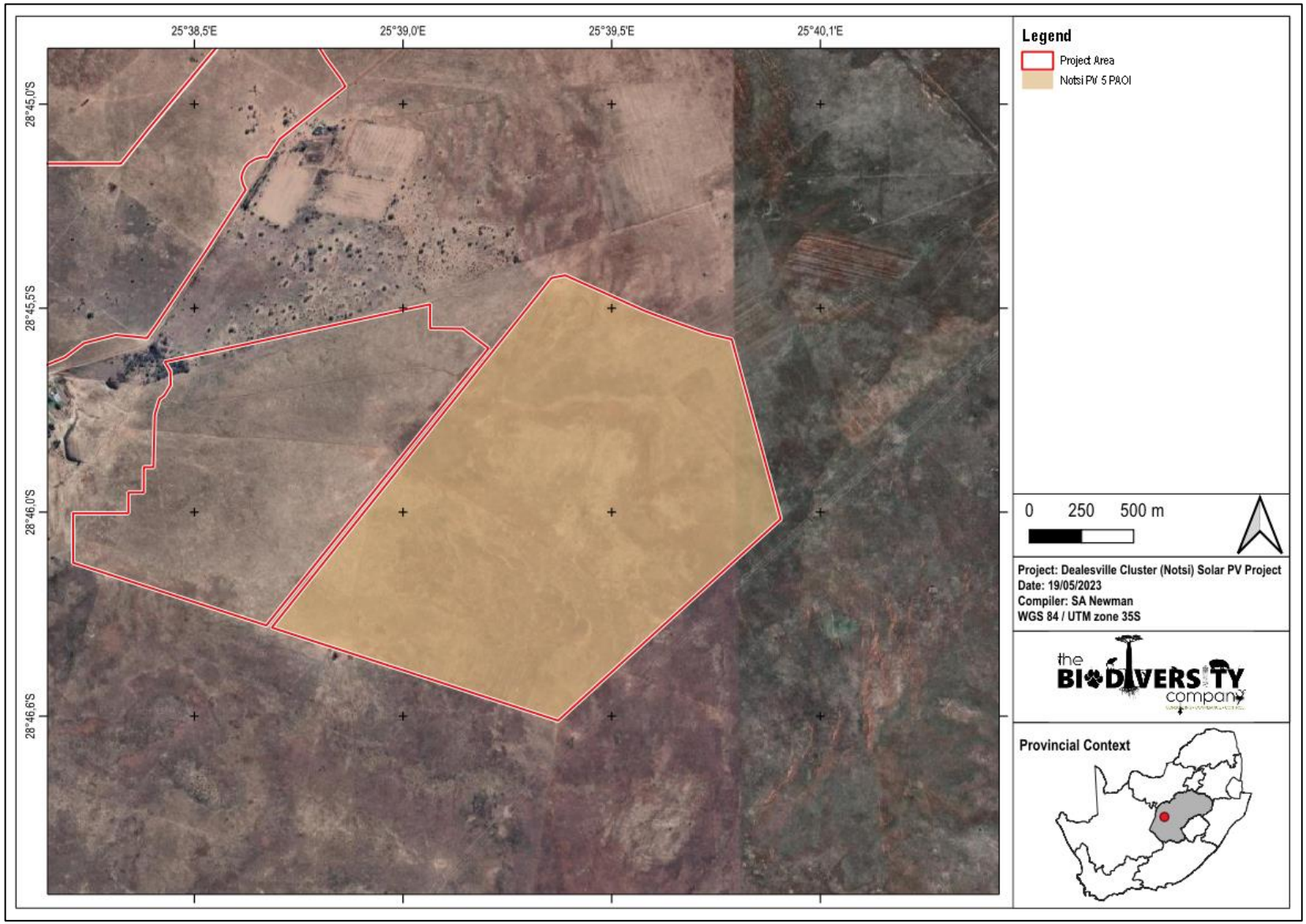


Figure 1-3 Map illustrating the Notsi PV 5 PAOI

1.4 Specialist Details

Report Name	**The Terrestrial Ecology Baseline & Impact Assessment for the proposed Dealesville Cluster Solar Photovoltaic (PV) Project - Notsi PV 5**
Reference	Dealesville PV
Submitted to / Client	ENVIRONAMICS
Fieldwork / Contributor	Carami Burger 
	Carami Burger has completed her Bachelor of Science Honours degree in Ecological Interactions and Ecosystem Resilience. Carami is an ecologist and has completed various studies as part of Basic Assessments and Environmental Impact Assessments.
Fieldwork / Report Writer	Michael Schrenk 
	Michael completed his professional Civil and Environmental engineering degree at the University of the Witwatersrand in 2016. He has been working in the fields of project management, biodiversity and habitat assessment and ecological restoration for over 4 years.
Report Contributor	Sarah Newman 
	Sarah Newman is a terrestrial environmental consultant (Cand. Sci. Nat. 158474) with experience working in the fields of ecology, conservation and biodiversity. Sarah obtained her Master of Science degree in Entomology from the University of Pretoria in 2018.
Reviewer	Andrew Husted 
	Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 12 years' experience in the environmental consulting field. Andrew has completed numerous wetland training courses, and is an accredited wetland practitioner, recognised by the DWS, and also the Mondi Wetlands programme as a competent wetland consultant.
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

1.5 Scope of Work

The principle aim of the assessment was to provide information to inform on the risk that the proposed activity has on the terrestrial ecosystems within the PAOI. This was achieved through the following:

- Identification and description of any sensitive receptors that occur in the Project Area of Influence, and the manner in which these sensitive receptors may be affected by the proposed activity;
- Conducting of a desktop assessment to identify the relevant ecologically important geographical features within or nearby to the Project Area of Influence;
- Conducting of a desktop assessment to compile an expected species list and identify flora and fauna Species of Conservation Concern (SCC) that may occur within the Project Area of Influence;
- Conducting of a field survey to ascertain the baseline species composition of the present flora and fauna community within the Project Area of Influence;
- Delineation and mapping of the habitats and their respective sensitivities that occur within the Project Area of Influence;
- Identification of the manners in which the proposed project impacts the flora and fauna communities, and an evaluation of the level of risk that these potential impacts present; and
- The prescription of mitigation measures and associated recommendations for the identified risks.

2 Key Legislative Requirements

The legislation, policies and guidelines listed below in Table 2-1 are applicable to the current project. The list below, although extensive, may not be complete and other legislation, policies and guidelines may apply in addition to those listed below.

Table 2-1 A list of key legislative requirements relevant to biodiversity and conservation in the Free State Province

Region	Legislation / Guideline
National	Constitution of the Republic of South Africa (Act No. 108 of 1996)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998)
	The National Environmental Management: Biodiversity Act (NEM:BA) (Act No. 10 of 2004)
	The National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
	The National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
	Threatened or Protected Species Regulations and lists (No. R. 152 of Government Gazette No. 29657 of 23 February 2007, and No. R. 1187 of Government Gazette No. 30568 of 14 December 2007)
	Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, GNR 320 of Government Gazette 43110 (March 2020); and GNR 1150 of Government Gazette 43855 (October 2020)
	Natural Scientific Professions Act (Act No. 27 of 2003)
	National Forests Act (Act No. 84 of 1998)
	National Veld and Forest Fire Act (101 of 1998)
	National Water Act (NWA) (Act No. 36 of 1998)
	World Heritage Convention Act (Act No. 49 of 1999)
	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations and Alien and Invasive Species List 2014-2020, published under NEM:BA
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA)

Provincial	Boputhatswana Nature Conservation Act 3 of 1973
	Free State Nature Conservation Ordinance 8 of 1969
	Free State Province Biodiversity Plan V1.0 of 2015

3 Definitions

3.1 Species of Conservation Concern

In accordance with the National Red List of South African Plants website, managed and maintained by the South African National Biodiversity Institute (SANBI), a Species of Conservation Concern (SCC) is a species that has a high conservation importance in terms of preserving South Africa's rich biodiversity. This classification covers a range of red list categories as illustrated in Figure 3-1 below.

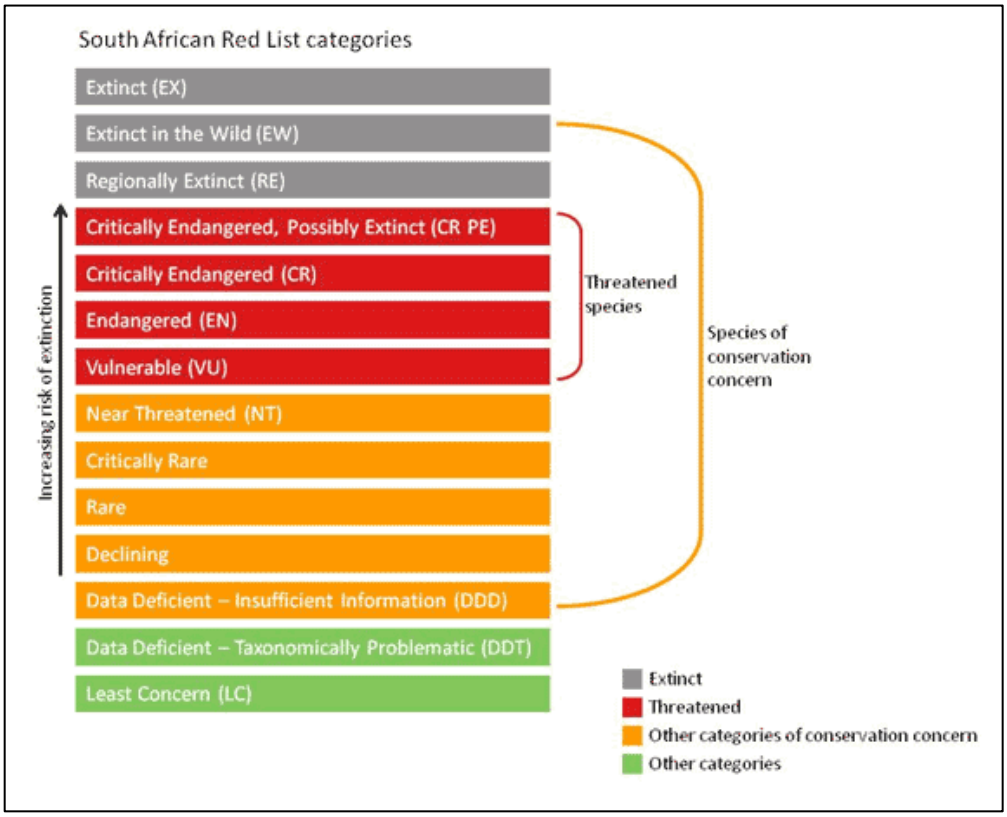


Figure 3-1 Threatened species and Species of Conservation Concern (SANBI, 2016)

South Africa uses the internationally endorsed International Union for Conservation of Nature (IUCN) Red List Categories and Criteria (IUCN, 2012). This scientific system is designed to measure species' risk of extinction and its purpose is to highlight those species that are in need of critical conservation action. As this system has been adopted from the IUCN, the definition of an SCC as described and categorised above is extended to all red list classifications relevant to fauna as well as the IUCN categories, for the purposes of this report.

3.2 Protected Species

Protected species include both flora and fauna species that are protected according to some form of relevant legislation, be it provincial, national, or international. Provincial legislation may include that published in the form of a provincial ordinance, bill, or act, and national legislation includes that which is published in terms of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) or the National Forests Act (Act No. 84 of 1998). Relevant international legislation includes the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 2021).

4 Methods

4.1 Desktop Assessments

The desktop assessment was principally undertaken using a Geographic Information System (GIS) to access the latest available spatial datasets to develop digital cartographs and species lists. These datasets and their respective dates of publishing are provided below.

4.1.1 Spatially Relevant Legislative Boundaries

Two aspects of legislation apply with regards to the development of certain project types within South Africa, and these have important implications for the EIA processes for these project types. These two aspects are briefly discussed below. Where relevant the spatial orientation of the proposed project is referenced with respect to these important legislative boundaries, as the applicable legislation may be relevant to not only the overall EIA process, but also the specialist assessment process that is to be followed.

- Strategic Transmission Corridors (EGI):

On the 16th of February 2018 Minister Edna Molewa published Government Notice No. 113 in *Government Gazette* No. 41445 which identified 5 strategic transmission corridors important for the planning of electricity transmission and distribution infrastructure as well as procedure to be followed when applying for environmental authorisation for electricity transmission and distribution expansion when occurring in these corridors.

On the 29th of April 2021, Minister Barbara Dallas Creecy published Government Notice No. 383 in *Government Gazette* No. 44504, which expanded the eastern and western transmission corridors and gave notice of the applicability of the application procedures identified in Government Notice No. 113, to these expanded corridors.

In June 2022 the Standard for the Development and Expansion of Power Lines and Substations within Identified Geographical Areas Revision 2, Prepared by the CSIR and SANBI, was published. This standard was then adopted as per Government Notice No. 2313 of *Government Gazette* No. 47095 of 27 July 2022. The Standard was prepared to allow a proponent to achieve planning, routing, siting and remediation objectives that will ensure the acceptability of the impacts of the development of EGI (including substations) on the environment, independently from the need for an assessment by the competent authority. The standard enforces the following key environmental principles as part of its application with regards to the planning of powerline routes and substation positions (Note: several additional principles apply as relevant to avifauna assessments, however these are not included below):

  - There must be no removal of threatened plant species;
  - There must be no impact on Tier 1 plant species (i.e. threatened species reliant on critical habitat) identified through the screening process and site verification process;
  - Clear-cutting during construction must be kept to a maximum of 8 m;
  - Wetlands must be avoided or, where wetland crossing is unavoidable, the power line should be routed over the narrowest part of the wetland. For the most part, wetlands and rivers can be traversed by the power line with little to no impact by placing the pylons outside of the wetland.

- Renewable Energy Development Zones (REDZs):

On 16 February 2018, Minister Edna Molewa published Government Notice No. 114 in *Government Gazette* No. 41445 which identified 8 renewable energy development zones important for the development of large scale wind and solar photovoltaic facilities. The Government Notice included the procedure to be followed when applying for environmental authorisation for large scale wind and solar photovoltaic energy facilities when occurring in these REDZs.

On 26 February 2021, Minister Barbara Dallas Creecy, published Government Notice No. 142, 144 and 145 in Government Gazette No. 44191 which identified 3 additional REDZs for implementation as well as the procedures to be followed when applying for environmental authorisation for electricity transmission or distribution infrastructure or large-scale wind and solar photovoltaic energy facilities in these REDZs.

4.1.2 Ecologically Important Landscape Features

Existing ecologically relevant data layers were incorporated into GIS software to establish how the proposed project might interact with any ecologically important entities. Emphasis was placed around the following spatial datasets:

- The Free State Province Biodiversity Plan of 2015 (Collins, 2015);
- 2018 National Biodiversity Assessment (NBA, 2018) (Skowno *et al.,* 2019);
- Vegetation Map of South Africa, Lesotho and Swaziland (SANBI, 2018);
- South Africa Protected and Conservation Areas Databases, 2022 (DFFE, 2022 & DFFE, 2022a);
- National Protected Areas Expansion Strategy, 2016 (DEA, 2016);
- Important Bird and Biodiversity Areas, 2015 (Marnewick *et al.,* 2015);
- South African Inventory of Inland Aquatic Ecosystems (SAIIAE), NBA 2018 Rivers and Wetlands (Awuah, 2018 & Van Deventer et al., 2019);
- National Freshwater Priority Areas, Rivers and Wetlands, 2011 (Nel, 2011); and
- Strategic Water Source Areas, 2021 (Lötter & Le Maitre, 2021).

Descriptions of these datasets, and their associated relevance to terrestrial biodiversity, are provided below.

4.1.2.1 Provincial Conservation Plan

The Free State Province Biodiversity Plan classifies areas within the province on the basis of their contributions to reaching the associated conservation targets within the province. These areas are primarily classified as either Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs). These biodiversity priority areas, 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 the landscape as a whole.

- **CBAs** are areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and healthy functioning of important species and ecosystems and the delivery of ecosystem services. Thus, if these areas are not maintained in a natural or near natural state then provincial biodiversity targets cannot be met (SANBI, 2017).
- **ESAs** are areas that are not essential for meeting biodiversity representation targets but play an important role in supporting the ecological functioning of ecosystems as well as adjacent Critical Biodiversity Areas, and/or in delivering ecosystem services that support socio-economic development (SANBI, 2017).

Provincial CBAs and ESAs are often further classified into sub-categories, such as CBA1 and CBA2 or ESA1 and ESA2. These present fine scale habitat and biodiversity area baseline requirements and associated land management objectives or outcomes. The highest categorisation level is often referred to as an ‘Irreplaceable Critical Biodiversity Area’ which usually represents pristine natural habitat that is very important for conservation.

4.1.2.2 National Biodiversity Assessment 2018

The National Biodiversity Assessment (NBA) was completed as a collaboration between the South African National Biodiversity Institute (SANBI), the then Department of Environmental Affairs (DEA), and other stakeholders including scientists and biodiversity management experts throughout the country over a three-year period (Skowno *et al.,* 2019).

The purpose of the NBA is to assess the state of South Africa's biodiversity with a view to understanding trends over time and informing policy and decision-making across a range of sectors. The two headline indicators assessed in the NBA are Ecosystem Threat Status and Ecosystem Protection Level (Skowno et al., 2019).

- **Ecosystem Threat Status (ETS)** outlines the degree to which ecosystems are still intact or alternatively losing vital aspects of their structure, function, and composition, on which their ability to provide ecosystem services ultimately depends. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Concern (LC), based on the proportion of each ecosystem type that remains in a good or healthy ecological condition (Skowno et al., 2019). CR, EN, or VU ecosystem types are collectively referred to as threatened ecosystems.
- **Ecosystem Protection level (EPL)** informs on whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Not Protected (NP), Poorly Protected (PP), Moderately Protected (MP) or Well Protected (WP), based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act (Skowno *et al.,* 2019). NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems.

4.1.2.3 South Africa Protected and Conservation Areas

The South African Protected Areas Database (SAPAD) and the South Africa Conservation Areas Database (SACAD) contains spatial data critical for the conservation of South Africa's natural resources. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection, such as conservation areas. These databases are updated regularly and form the basis for the Register of Protected Areas, which is a legislative requirement under the National Environmental Management: Protected Areas Act (Act 57 of 2003).

Formally protected areas are categorised according to several different types, and each type is subject to specific legislative restrictions and management guidelines, many of which restrict development to some degree. Generally, these areas are assigned a buffer of influence of between 5 and 10 km (the latter pertaining to National Parks and World Heritage Sites), within which certain laws and management actions may apply. Many of the protected area types are further classified into sub-types as well. Formally protected area types include:

- National Parks;
- Nature Reserves;
- Special Nature Reserves;
- Mountain Catchment Areas;
- World Heritage Sites;
- Protected Environments;
- Forest Nature Reserves and Forest Wilderness Areas;
- Specially Protected Forest Areas; and
- Marine Protected Areas.

4.1.2.3.1 National Protected Areas Expansion Strategy

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

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

4.1.2.4 Important Bird and Biodiversity Areas

Important Bird & Biodiversity Areas (IBAs) are sites of international significance for the conservation of the world's birds, and other conservation significant species, as identified through multi-stakeholder processes using globally standardised, quantitative, and scientifically agreed criteria. These sites are also Key Biodiversity Areas; sites that contribute significantly to the global persistence and health of biodiversity (Birdlife, 2020).

The selection of IBAs is achieved through the application of quantitative ornithological criteria, grounded in up-to-date knowledge on the sizes and trends of bird populations. The criteria ensures that sites selected as IBAs have true significance for the international conservation of bird populations, and it also ensures classification consistency among sites at all geographic levels.

IBAs constitute a global network of over 13 500 sites, of which 112 sites are found in South Africa. Approximately 60% of the IBA network is unprotected, leaving these sites vulnerable to habitat transformation and mismanagement. Additionally, habitats within many IBAs are poorly managed, leading to habitat degradation, especially in unprotected sites. (BirdLife SA, 2022)

4.1.2.5 Aquatic Habitats

Three inland aquatic habitat datasets are used to identify the ecological sensitivity of the project area with regards to local aquatic habitat, which is critical for the healthy functioning of both aquatic and terrestrial biodiversity. The presence of aquatic ecosystems is often a strong indicator for the presence of unique flora as well as the regular presence of fauna. Many national SCC are only found within or near to aquatic habitat.

- **The South African Inventory of Inland Aquatic Ecosystems (SAIIAE):** Established during the 2018 NBA, the SAIIAE is a collection of spatial data layers that represent the extent of river and inland wetland ecosystem types as well as the pressures on these systems. The same two headline indicators, and their associated categorisations, are applied as with the terrestrial ecosystem NBA, namely Ecosystem Threat Status and Ecosystem Protection Level. The Ecosystem Threat Status of river and wetland ecosystem types are based on the extent to which each ecosystem type had been altered from its natural condition.
- **National Freshwater Ecosystem Priority Areas, Rivers and Wetlands (NFEPA):** In an attempt to better conserve aquatic ecosystems, South Africa has categorised its inland aquatic systems according to set ecological criteria (i.e., ecosystem representation, water yield, connectivity, unique features, and threatened taxa) to identify Freshwater Ecosystem Priority Areas (FEPAs). The FEPAs are intended to be conservation support tools and it is envisioned that they will guide the effective implementation of measures to achieve the National Environment Management: Biodiversity Act's biodiversity conservation goals (Nel *et al.,* 2011).

- **Strategic Water Source Areas (SWSAs):** SWSAs are defined as areas of land that supply a disproportionate quantity of mean annual surface water runoff in relation to their size, and therefore contribute considerably to the overall water supply of the country, as well as national aquatic and terrestrial biodiversity resources. These are considered key ecological infrastructure assets and the effective protection of SWSAs is vital for national security because a lack of water security will compromise national security and human wellbeing on all levels.

4.1.3 Desktop Flora Assessment

The desktop flora assessment encompassed an assessment of all the vegetation units and habitat types within the PAOI as well as the identification of expected plant species and any locally occurring flora SCC.

The Vegetation of South Africa, Lesotho, and Swaziland (Mucina & Rutherford, 2006) and the 2018 Terrestrial & Freshwater Assessment by SANBI (2018) was used to identify the vegetation types that would have occurred under natural or pre-anthropogenically altered conditions. Furthermore, the Plants of Southern Africa (POSA, 2019) database was accessed to compile a list of expected flora species within the PAOI (Figure 4-1). The Red List of South African Plants website (SANBI, 2016) was used to provide the most current account of the national conservation status of flora.

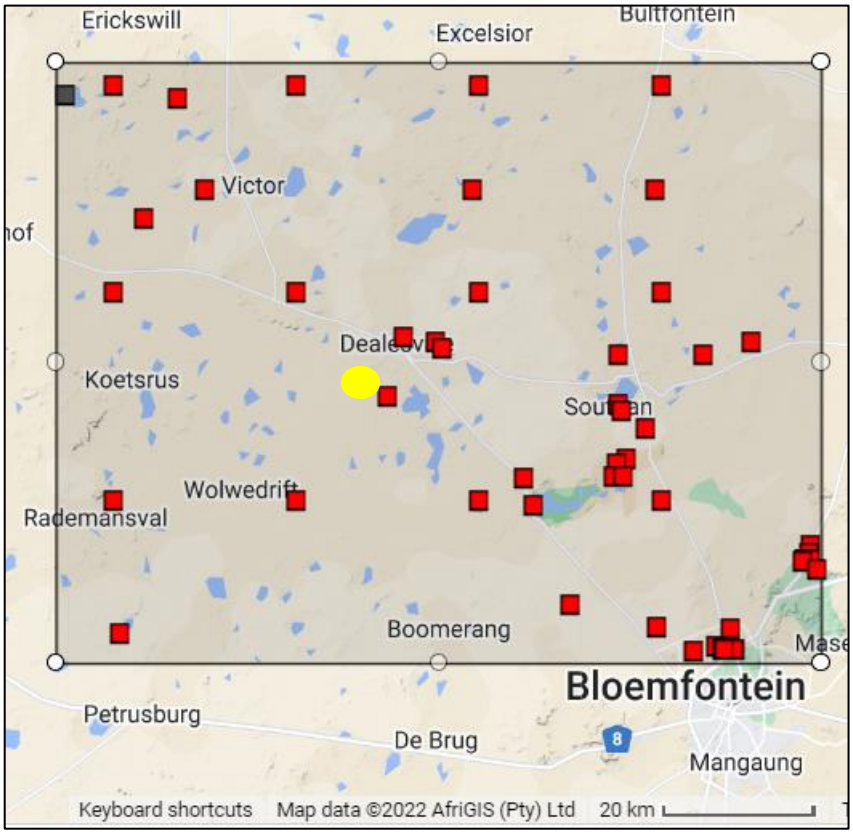


Figure 4-1 ***Map illustrating the extent of area used to obtain the expected flora species list from the Plants of South Africa (POSA) database. The yellow dot indicates the approximate location of the Project Area of Interest. The red squares are cluster markers of botanical records as per POSA data***

The latest information regarding provincially, and nationally protected flora was obtained from the following published legislative sources:

- Provincially Protected Plant Species (Schedule 6 of the Free State Nature Conservation Ordinance 8 of 1969); and
- List of Nationally Protected Tree Species (DEFF, 2022).

4.1.4 Desktop Fauna Assessment

The faunal desktop assessment involved the compilation of expected species lists and the identification of any protected and/or SCC fauna potentially occurring in the area. The respective species lists, and international Red-List statuses, were obtained from the IUCN spatial dataset (2017), in addition to the following sources:

- Mammal list: Generated from the ADU MammalMap database using the 2825 Degree Square (ADU, 2020);
- Reptile list: Generated from ADU ReptileMap database using the 2825 Degree Square (ADU, 2020a); and
- Amphibian list: Generated from ADU FrogMap database using the 2825 Degree Square (ADU, 2020b).

For data concerning the expected avifaunal species refer to the project avifaunal assessment.

South Africa's official site for Species Information and National Red Lists (SANBI, 2022) was used to provide the most current national Red-List status of fauna. The latest information regarding provincially, and nationally protected fauna was obtained from the following published legislative lists:

- Provincially Protected Wildlife Species (Schedules 1 and 2 of the Free State Nature Conservation Ordinance 8 of 1969); and
- Nationally Protected Wildlife species (The 2007 lists of Threatened or Protected Species (TOPS), published in terms of Section 56(1) of the NEM:BA, Act No. 10 of 2004).

4.2 Biodiversity Field Survey

A single season field survey was undertaken from the 13th to the 15th of September 2022, which constitutes a late dry season survey, to determine the presence of any local SCC and to achieve the delineation of local habitat types and their associated sensitivities. Effort was made to cover all the different habitat types within the PAOI, within the limits of time and access. This site visit is considered sufficient for the project.

4.2.1 Flora Survey

The dry season fieldwork and sample sites were placed within targeted areas (i.e., target sites) perceived as ecologically sensitive based on the preliminary interpretation of satellite imagery (Google Corporation) and GIS analysis (which included the latest applicable biodiversity datasets) available prior to the fieldwork. The focus of the fieldwork was therefore to maximise coverage and navigate to each target site in the field in order to perform a rapid vegetation and ecological assessment at each sample site.

Homogenous vegetation units were subjectively identified using satellite imagery and existing land cover maps (confirmed during the field survey). The floristic diversity and search for protected plants and flora SCC were conducted through timed meanders within representative habitat units. Emphasis was placed on sensitive habitats, especially those overlapping with the PAOI.

The timed random meander method is a highly efficient method for conducting floristic analysis, specifically in detecting protected plants and flora SCC and maximising floristic coverage. In addition, the method is time and cost effective and highly suited for compiling observed flora species lists and therefore gives a rapid indication of flora diversity. The timed meander search was performed based on the original technique described by Goff *et al*. (1982). Suitable habitat for SCC were identified according to Raimondo *et al.* (2009) and targeted as part of the timed meanders.

At each sample site notes were made regarding current impacts (e.g., roads, erosion etc.), and this included the subjective recording of dominant vegetation species and any sensitive features (e.g., wetlands, rock outcrops etc.). In addition, opportunistic observations were made while navigating through the area.

Relevant field guides and texts consulted for identification purposes included the following:

- A field guide to Wild flowers (Pooley, 1998), and Field Guide to the Wild Flowers of the Highveld (van Wyk & Malan, 1998);
- Orchids of South Africa (Johnson & Bytebier, 2015);
- Guide to the Aloes of South Africa (Van Wyk & Smith, 2014);
- Medicinal Plants of South Africa (Van Wyk *et al*., 2013);
- Freshwater Life: A field guide to the plants and animals of southern Africa (Griffiths & Day, 2016), and Aquatic and Wetland Plants of Southern Africa (van Ginkel & Cilliers, 2020);
- Identification guide to southern African grasses (Fish et al., 2015);
- Field guide to trees of Southern Africa, Struik Publishers (Van Wyk & Van Wyk, 1997); and
- Problem Plants and Alien Weeds of Southern Africa (Bromilow, 2018).

4.2.2 Fauna Survey

The faunal component of this report pertains only to mammals and herpetofauna (reptiles and amphibians). The faunal field survey utilised a variety of sampling techniques, including but not limited to:

- Visual and auditory searches: This involves strategic meandering and the use of binoculars and specialist camera equipment to view species from a distance without them being disturbed;
- Active hand-searches: Used for species that shelter in or under particular micro-habitats (typically rocks, exfoliating rock outcrops, fallen trees, leaf litter, bark etc.);
- The strategic placement of multi-day camera traps; and
- The identification of tracks and signs, listening to species calls, and the utilization of local knowledge.

The relevant field guides and texts consulted for identification purposes included the following:

- Roberts Bird Guide, Second Edition (Chittenden *et al*., 2016);
- The Mammals of the Southern African Subregion (Skinner & Chimimba, 2005);
- Bats of Southern and Central Africa (Monadjem *et al*., 2010);
- Spiders of Southern Africa (Leroy & Leroy, 2003);
- A Guide to the Reptiles of Southern Africa (Alexander & Marais, 2007), and Field Guide to Snakes and other Reptiles of Southern Africa (Branch, 1998);
- Tortoises, Terrapins, and Turtles of Africa (Branch, 2008);
- A Complete Guide to the Frogs of Southern Africa (du Preez & Carruthers, 2009); and
- A Field Guide to the Tracks and Signs of Southern and East African Wildlife (Stuart & Stuart, 2000).

4.3 Terrestrial Site Ecological Importance

The different habitat types within the PAOI were delineated and identified based on observations made during the field survey, and information from available satellite imagery. These habitat types were assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of SCC and their ecosystem processes.

Site Ecological Importance (SEI) is a function of the Biodiversity Importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present in the project area) and Receptor Resilience (RR) (its resilience to impacts).

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor. The criteria for the CI and FI ratings are provided in Table 4-1 and Table 4-2 respectively.

Table 4-1 Summary of Conservation Importance (CI) criteria

Conservation Importance	Fulfilling Criteria
Very High	Confirmed or highly likely occurrence of Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Extremely Rare or CR species that have a global extent of occurrence (EOO) of < 10 km^2. Any area of natural habitat of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent) of natural habitat of an EN ecosystem type. Globally significant populations of congregatory species (> 10% of global population).
High	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km^2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type. Presence of Rare species. Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	Confirmed or highly likely occurrence of populations of Near Threatened (NT) species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. Any area of natural habitat of threatened ecosystem type with status of VU. Presence of range-restricted species. > 50% of receptor contains natural habitat with potential to support SCC.
Low	No confirmed or highly likely populations of SCC. No confirmed or highly likely populations of range-restricted species. < 50% of receptor contains natural habitat with limited potential to support SCC.
Very Low	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

Table 4-2 Summary of Functional Integrity (FI) criteria

Functional Integrity	Fulfilling Criteria
Very High	Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. No or minimal current negative ecological impacts, with no signs of major past disturbance.
High	Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types. Good habitat connectivity, with potentially functional ecological corridors and a regularly used road network between intact habitat patches. Only minor current negative ecological impacts, with no signs of major past disturbance and good rehabilitation potential.
Medium	Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts, with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	Small (> 1 ha but < 5 ha) area. Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.
Very Low	Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.

BI can be derived from a simple matrix of CI and FI as provided in Table 4-3.

Table 4-3 Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI)

Biodiversity Importance		Conservation Importance				
		Very high	High	Medium	Low	Very low
Functional Integrity	Very high	Very high	Very high	High	Medium	Low
	High	Very high	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very low
	Low	Medium	Medium	Low	Low	Very low
	Very low	Medium	Low	Very low	Very low	Very low

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor, as summarised in Table 4-4.

Table 4-4 Summary of Receptor Resilience (RR) criteria

Resilience	Fulfilling Criteria
Very High	Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
Medium	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
Very Low	Habitat that is unable to recover from major impacts, or species that are unlikely to: (i) remain at a site even when a disturbance or impact is occurring, or (ii) return to a site once the disturbance or impact has been removed.

After the determination of BI and RR, the SEI can be ascertained using the matrix as provided in Table 4-5.

Table 4-5 Matrix used to derive Site Ecological Importance from Receptor Resilience (RR) and Biodiversity Importance (BI)

Site Ecological Importance		Biodiversity Importance				
		Very high	High	Medium	Low	Very low
Receptor Resilience	Very Low	Very high	Very high	High	Medium	Low
	Low	Very high	Very high	High	Medium	Very low
	Medium	Very high	High	Medium	Low	Very low
	High	High	Medium	Low	Very low	Very low
	Very High	Medium	Low	Very low	Very low	Very low

Interpretation of the SEI in the context of the proposed project is provided in Table 4-6.

Table 4-6 Guideline for interpreting Site Ecological Importance in the context of proposed activities

Site Ecological Importance	Interpretation in relation to proposed development activities
Very High	Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

The SEI evaluated for each taxon can be combined into a single multi-taxon evaluation of SEI for the assessment area. Either a combination of the maximum SEI for each receptor should be applied, or the SEI may be evaluated only once per receptor but for all necessary taxa simultaneously. For the latter, justification of the SEI for each receptor is based on the criteria that conforms to the highest CI and FI, and the lowest RR across all taxa.

4.4 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- It is assumed that all information received from the client and landowner is accurate;
- The specialist was not provided with an architectural plan or any engineering drawings with regards to the planned development activities and as such the potential impacts arising from these activities may only be assumed based on descriptive information received from the client and the landowner (note that the data collected is considered sufficient to derive a meaningful baseline);
- All datasets accessed and utilised for this assessment are considered to be representative of the most recent and suitable data for the intended purposes;
- The assessment area (PAOI) was based on the footprint areas as provided by the client, and any alterations to the area and/or missing GIS information pertaining to the assessment area would have affected the area surveyed and hence the results of this assessment;
- The area was only surveyed during a single site visit and therefore this assessment does not consider temporal trends (note that the data collected is considered sufficient to derive a meaningful baseline);
- The single site visit was conducted during the late dry season, and this means that certain flora and fauna would not have been present or observable due to seasonal constraints;
- Whilst every effort was made to cover as much of the PAOI as possible, representative sampling is completed, and by its nature it is possible that some plant and animal species that are present within the PAOI were not recorded during the field investigations; and
- The GPS used in the assessment has an accuracy of 5 m and consequently any spatial features may be offset by up to 5 m.

5 Results & Discussion

5.1 Desktop Assessments

The desktop assessment results pertain to the entire Project Area as relevant to all five sub-projects, which are part of the overall solar cluster project.

5.1.1 Spatially Relevent Legislative Boundaries

Due to the scope of planned infrastructure, the proposed project is relevant to both the Strategic Transmission Corridors (EGI) and Renewable Energy Development Zones (REDZs)[1] legislation. As presented in Figure 5-1 and Figure 5-2 below, the PAOI overlaps completely with both the central EGI corridor, as well as the phase 1 Kimberly solar REDZ.

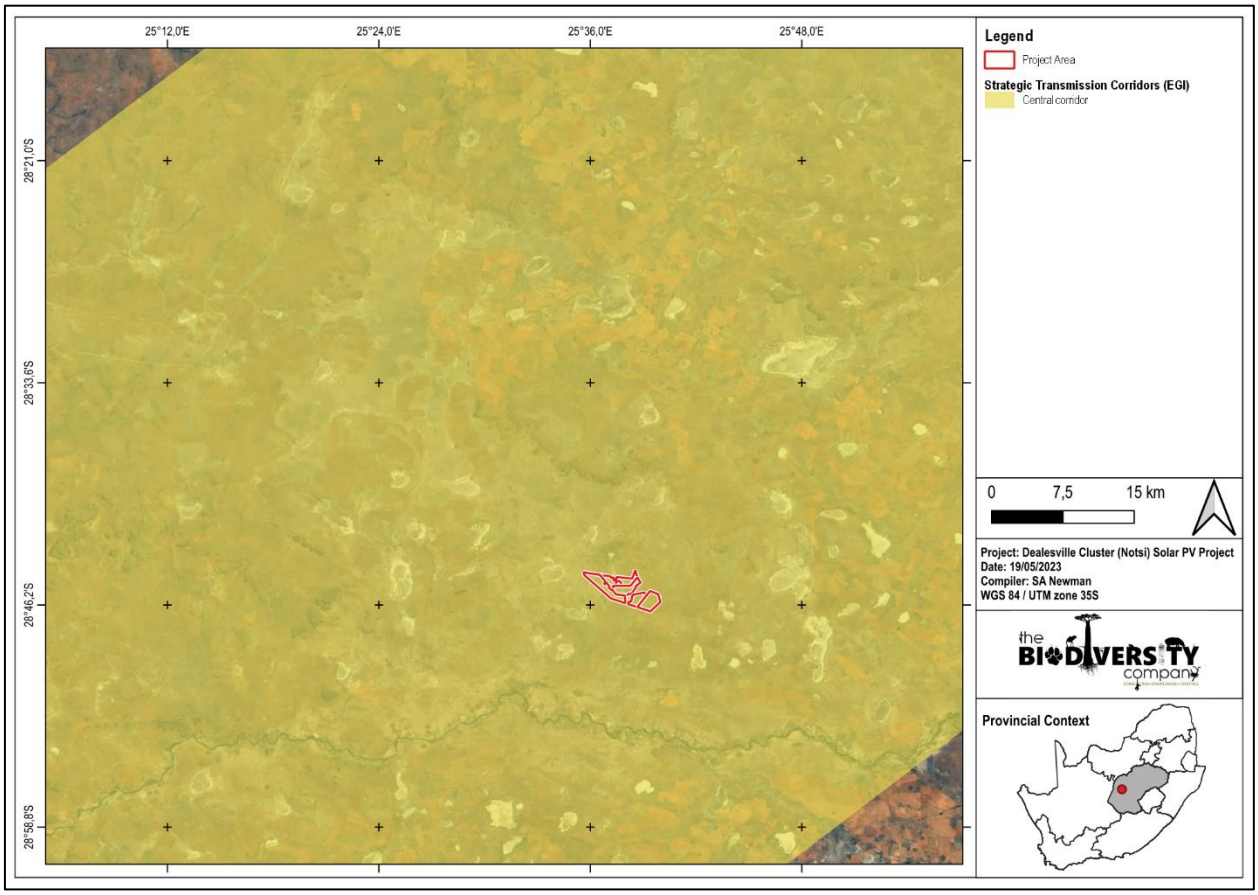


Figure 5-1 Map illustrating the Strategic Transmission Corridors (EGI) dataset relevance

[1] Kimberly Solar Renewable Development Zone (REDZ5)

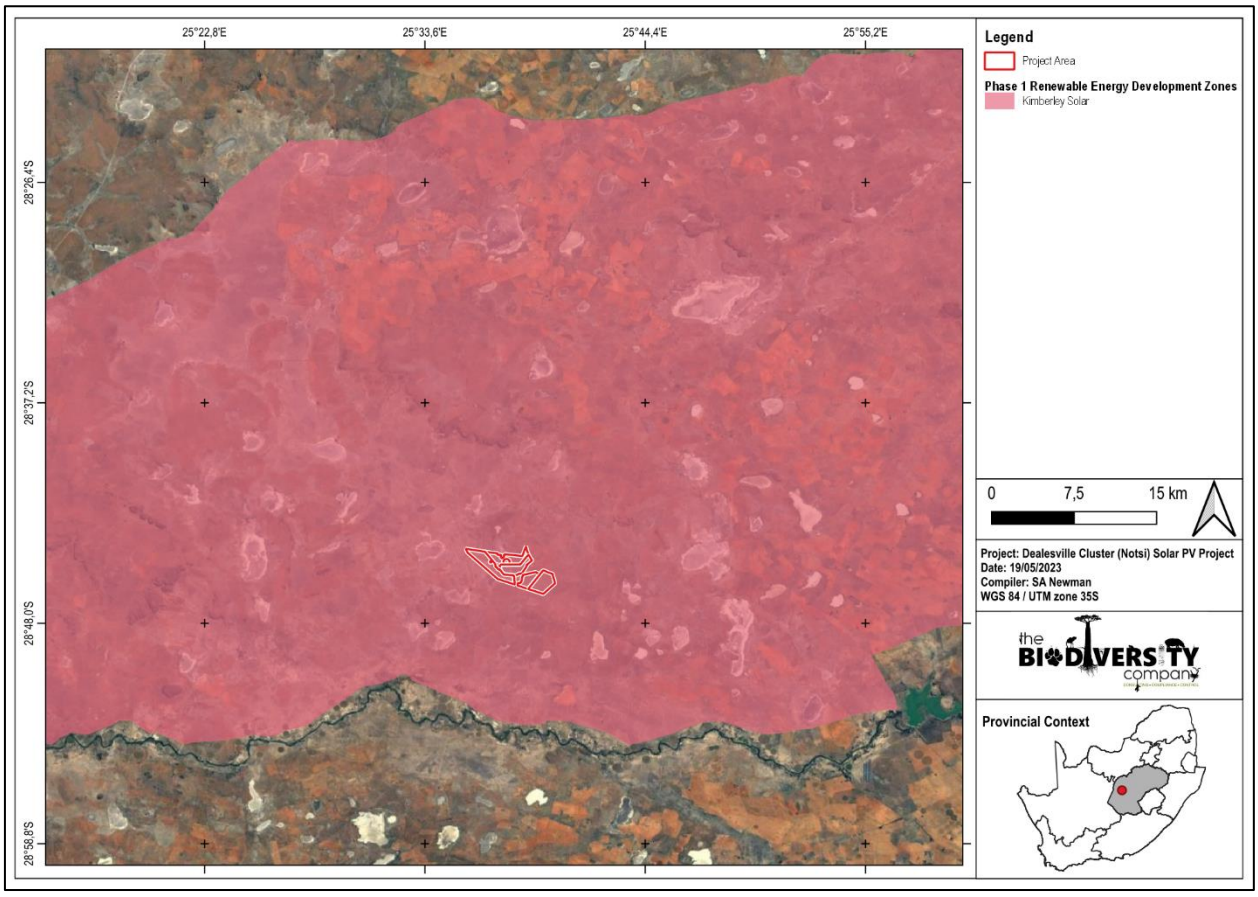


Figure 5-2 Map showing the Renewable Energy Development Zones (REDZs) dataset relevance

5.1.2 Ecologically Important Landscape Features

Table 5-1 below has been produced as a result of the spatial data collected and analysed (as provided by various sources such as the national and provincial environmental authorities and SANBI). It presents a summative breakdown of the ecological boundaries considered and the associated relevance that each has to the region or Project Area. Where a feature is regarded as relevant it is considered an ecologically important landscape feature and discussed further as part of the sub-sections that follow.

Table 5-1 Summary of the spatial relevance of the Project Area to local ecologically important landscape features

Desktop Information Considered	Relevant?	Reasoning	Section
Provincial Conservation Plan	Yes	The Project Area intercepts with ESA1, ESA2, 'Degraded' and 'Other' areas	5.1.2.1
NBA 2018: Ecosystem Threat Status	Yes	The Project Area overlaps with a 'Least Concern' ecosystem	5.1.2.2
NBA 2018: Ecosystem Protection Level	Yes	The Project Area overlaps with a 'Well Protected' ecosystem	5.1.2.2
South African Inventory of Inland Aquatic Ecosystems (SAIIAE)	Yes	One SAIIAE-listed wetland overlaps with the Project Area	5.1.2.3
National Freshwater Ecosystem Priority Areas	Yes	The NFEPA database lists one unclassified wetland and two FEPA wetlands within the Project Area	5.1.2.3
Protected and Conservation Areas (SAPAD & SACAD)	No	According to the latest datasets the nearest Protected Area, the Nielsview Nature Reserve, is located 7 km south east of the Project Area	-
Strategic Water Source Areas	No	No Strategic Water Source Areas occur nearby, according to the 2021 dataset	-
National Protected Areas Expansion Strategy (NPAES)	No	The closest NPAES priority focus area is over 6 km away	-
Important Bird and Biodiversity Areas (IBA)	No	The closest IBA lies over 27 km away	-

5.1.2.1 Provincial Conservation Plan

According to the 2015 Free State CBA and ESA map dataset the PAOI overlaps with areas classified as 'Other' (Figure 5-3). As per Collins (2016):

- ESA areas are those that play an important role in supporting the ecological functioning of a protected area or Critical Biodiversity Area, or in delivering ecosystem services. In most cases ESAs are currently in at least fair ecological condition and should remain in at least fair functioning condition.
    - ESA1 sites are those with minimal degradation; and
    - ESA2 sites are more degraded (they can be totally degraded, but not totally transformed).
- 'Degraded' areas are areas of degraded or transformed habitat that have not been selected as an ESA, i.e., all remaining areas; and
- 'Other' areas are areas of natural habitat not required to meet biodiversity targets for ecosystem types, species, or ecological processes, i.e., natural areas not selected as CBA or ESA.

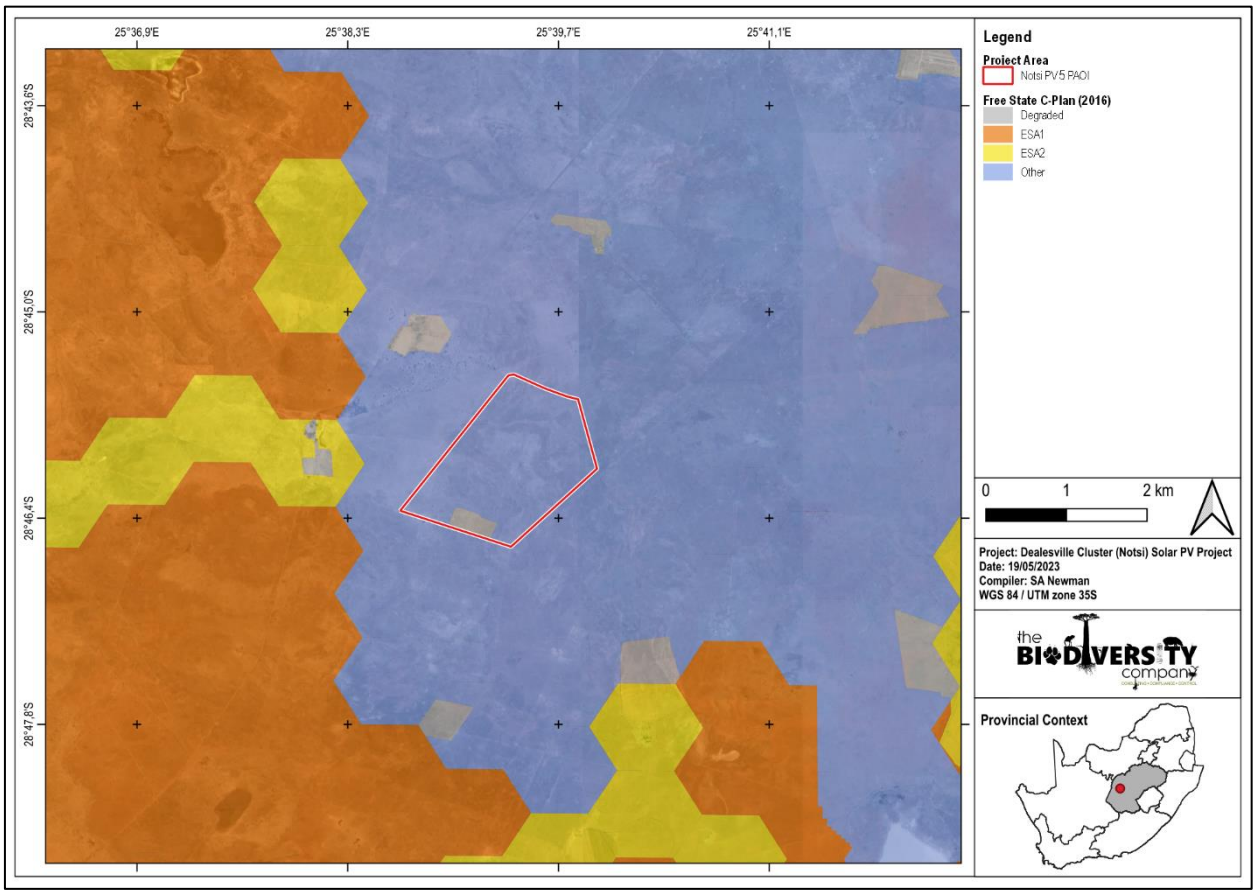


Figure 5-3 Map illustrating the Free State CBA and ESA map dataset relevance

5.1.2.2 National Biodiversity Assessment

According to the 2018 NBA spatial dataset the Project Area overlaps with a 'Least Concern' and 'Poorly Protected' ecosystem (Figure 5-4 and Figure 5-5).

A 'Least Concern' ecosystem type is one which has experienced little or no loss of natural habitat or deterioration in condition, and 'Poorly Protected' ecosystems are those where the extent protected is only between 5% and 49% (SANBI, 2019).

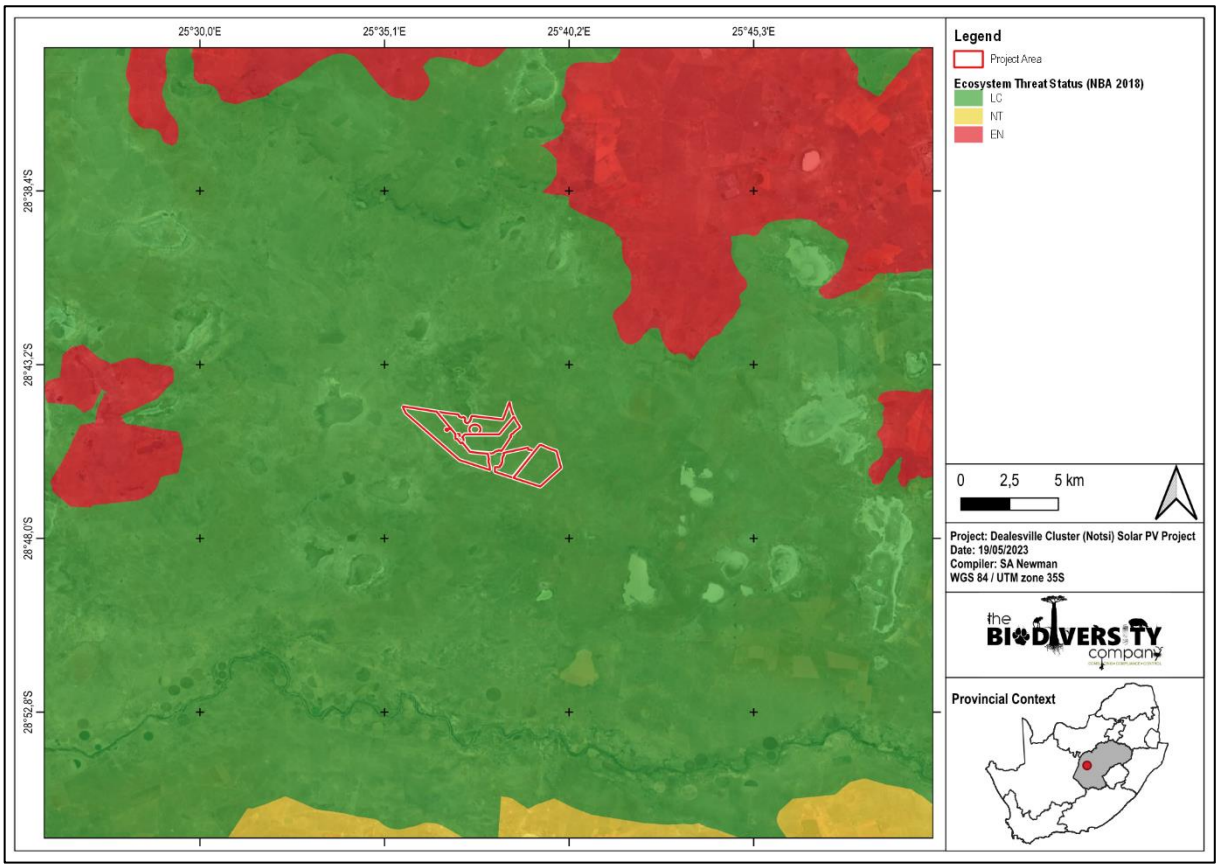


Figure 5-4 Map illustrating the Ecosystem Threat Status associated with the Project Area

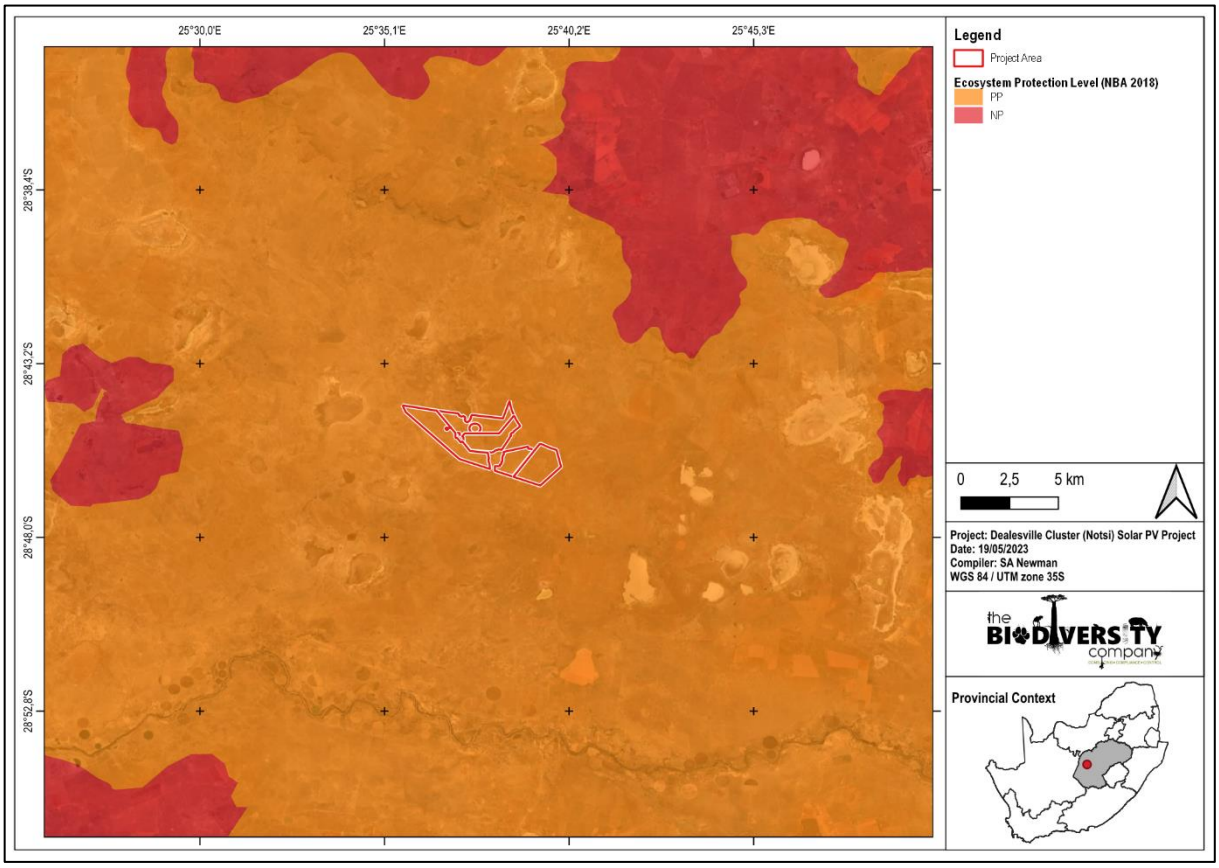


Figure 5-5 Map illustrating the Ecosystem Protection Level associated with the Project Area

5.1.2.3 Aquatic Habitats

According to the SAIIAE database, several 'Least Concern' depression wetlands fall within 500 m of the PAOI (Figure 5-6). The NFEPA database lists several NFEPA wetlands within 500 m of the PAOI (Figure 5-7).

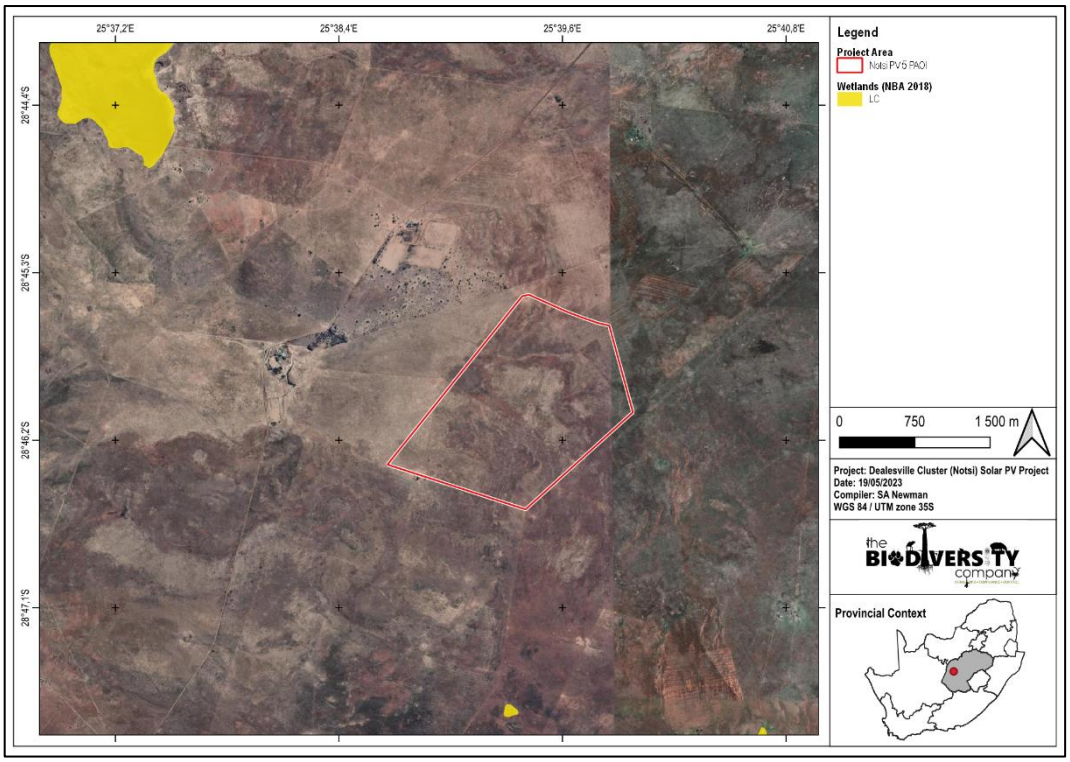


Figure 5-6 Map illustrating the Project Area location in relation to the SAIIAE dataset

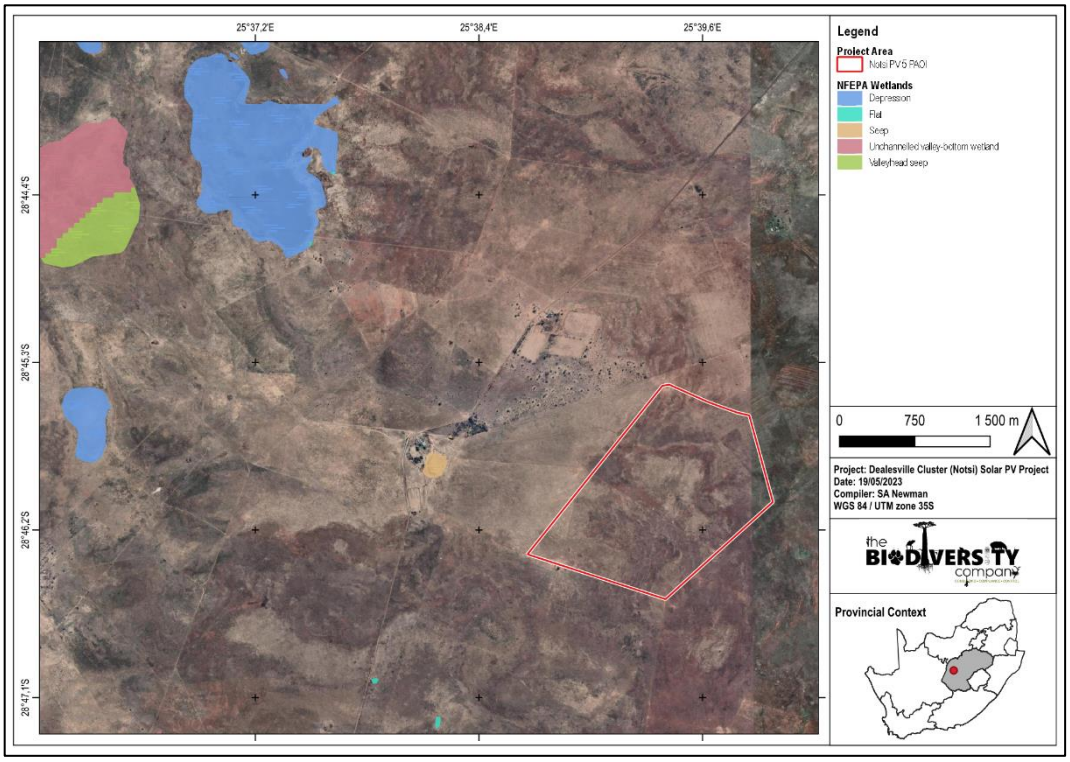


Figure 5-7 Map illustrating the Project Area location in relation to the NFEPA dataset

5.1.3 Flora Assessment

This section is divided into a description of the local vegetation type that would be expected under natural conditions, and the expected flora species.

5.1.3.1 Vegetation Type

The Project Area is situated within the Grassland Biome. The Grassland Biome in South Africa occurs mainly on the Highveld, the inland areas of the eastern seaboard, the mountainous areas of KwaZulu-Natal and the central parts of the Eastern Cape. The topography is mainly flat to rolling, but also includes mountainous regions and the Escarpment (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the Grassland Biome include:

- Summer to strong summer rainfall and winter drought; and
- Frost is common, and fog is found on the upper slopes of the Great Escarpment and seaward scarps (Mucina & Rutherford, 2006).

Grasslands characteristically contain herbaceous vegetation of a relatively short and simple structure that is dominated by graminoids, usually of the family Poaceae. Woody plants are rare (usually made up of low or medium-sized shrubs), absent, or confined to specific habitats such as smaller escarpments or koppies. Core grassland areas usually have deep, fertile soils although a wide spectrum of soil types do occur (Mucina & Rutherford, 2006).

The Grassland Biome is comprised of 4 parent bioregions and a total of 72 different vegetation types. The Project Area is situated within the Western Free State Clay Grassland of the Dry Highveld Grassland Bioregion (Figure 5-8).

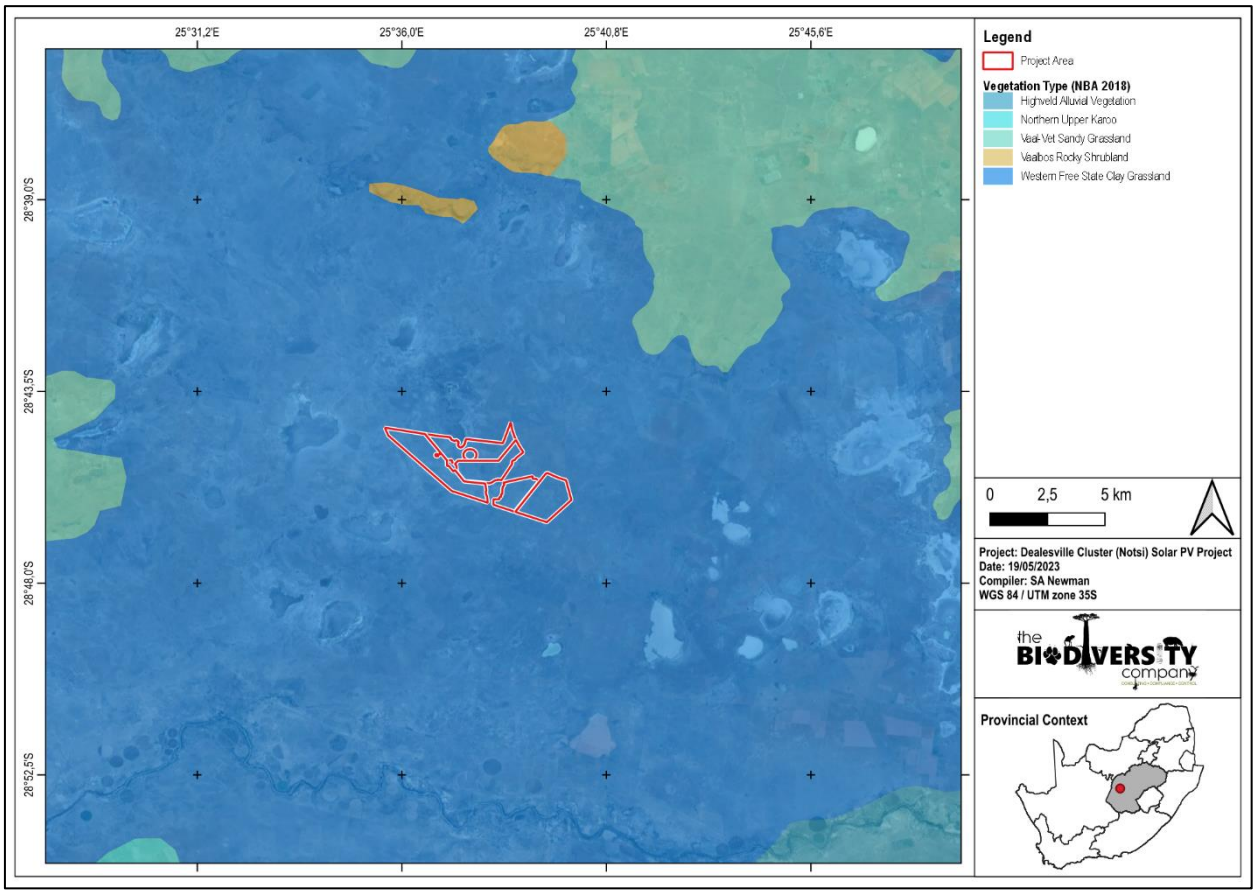


Figure 5-8 Map illustrating the vegetation type associated with the area

5.1.3.1.1 Western Free State Clay Grassland

Western Free State Clay Grassland occurs within the Free State, covering part of the western Bloemfontein District (south), Boshof (southwest), Hertzogville (west), Wesselsbron (north) and Brandfort (east) and consisting of three main areas, of which the southern and middle sections are separated by a slightly elevated area (dolerite hills) between Hertzogville, Boshof and Soutpan. The Vet River Valley separates the middle and northern sections, and all three sections are separated from one another by belts of Vaal-Vet Sandy Grassland (Mucina & Rutherford, 2006).

Important Plant Taxa

Important plant taxa are those species that have a high abundance, a frequent occurrence, or are prominent in the landscape within a particular vegetation type (Mucina & Rutherford, 2006). The following species are considered important in the Bloemfontein Dry Grassland vegetation type (d = dominant):

Graminoids: *Aristida adscensionis (d), A. bipartita (d), Cynodon dactylon (d), Eragrostis chloromelas (d), E. lehmanniana (d), Panicum coloratum (d), Themeda triandra (d), Aristida congesta, Cymbopogon pospischilii, Digitaria eriantha, Eragrostis bicolor, E. curvula, E. micrantha, E. obtusa, E. plana, E. superba, E. trichophora, Heteropogon contortus, Setaria nigrirostris, Tragus berteronianus, T. koelerioides, T. racemosus.*

Herbs: *Berkheya onopordifolia var. onopordifolia, Chamaesyce inaequilatera, Gnaphalium declinatum, Indigofera alternans, Kohautia cynanchica, Nidorella microcephala, Platycarpha parvifolia, Salvia stenophylla, Selago paniculata, Stachys spathulata.*

Geophytic Herbs: *Bulbine narcissifolia, Oxalis depressa.*

Succulent Herb: *Tripteris aghillana var. integrifolia.*

Low Shrubs: *Lycium cinereum (d), Pentzia globosa (d), Amphiglossa triflora, Aptosimum elongatum, Berkheya annectens, Felicia filifolia subsp. filifolia, F. muricata, Gnidia polycephala, Helichrysum dregeanum, Melolobium candicans, Nenax microphylla, Rosenia humilis, Selago saxatilis.*

Succulent Shrub: *Hertia pallens.*

Conservation Status of the Vegetation Type

According to Mucina and Rutherford (2006) this vegetation type is classified as ‘Least Concern’, with the national target for conservation protection being 24%.

No portion of the vegetation type is statutorily conserved, and only 20% has been transformed mainly for maize and wheat cultivation (Mucina and Rutherford, 2006).

5.1.3.2 Expected Flora Species

The POSA database indicates that over 500 species of plants could be expected to occur within and around the Project Area. Two (2) of the expected species are classified as SCC, based on their conservation statuses (Table 5-2), however, it is noted that both of the species native ranges are restricted to the Western Cape - and as such they are unlikely to be found naturally occurring within or nearby to the PAOI.

Table 5-2 SCC flora species that may occur within the Project Area of Influence

Family	Species	Author	SANBI Red-List Status	Ecology
Iridaceae	*Moraea debilis*	Goldblatt	EN	Indigenous; Endemic
Aizoaceae	*Trichodiadema pygmaeum*	L.Bolus	EN	Indigenous; Endemic

5.1.4 Fauna Assessment

This section of the report details the lists of expected SCC fauna species that may occur within the Project Area, where the fauna species considered include mammals, reptiles, and amphibians. Where the likelihood of a particular species occurring within the Project Area is rated by the specialist as being either moderate or high, based on the known habitat and prey/forage preferences of a particular species (linked with the field survey data obtained), the relevant species is then further discussed below a given table.

5.1.4.1 Mammals

The IUCN Red List spatial database, in addition to the MammalMap database, lists over 90 mammal species that could be expected to occur within and around the Project Area. Seventeen (17) of these expected species are regarded as SCC (Table 5-3), and of these SCC six (6) have a moderate-high likelihood of occurrence based on the presence of suitable habitat and food sources in the area.

Table 5-3 SCC mammal species that may occur within the Project Area

Species	Common Name	Conservation Status		Likelihood of Occurrence
		SANBI (2022)	IUCN (2021)	
Aonyx capensis	Cape Clawless Otter	NT	NT	Low
Atelerix frontalis	South Africa Hedgehog	NT	LC	Moderate
Damaliscus lunatus	Tsessebe	VU	LC	Low
Damaliscus pygargus pygargus	Bontebok	VU	VU	Low
Equus zebra hartmannae	Hartmann's Mountain Zebra	VU	VU	Low
Felis nigripes	Black-footed Cat	VU	VU	Moderate
Hippotragus equinus	Roan Antelope	EN	LC	Low
Hippotragus niger	Sable Antelope	VU	LC	Low
Hydrictis maculicollis	Spotted-necked Otter	VU	NT	Low
Leptailurus serval	Serval	NT	LC	Moderate
Mystromys albicaudatus	White-tailed Rat	VU	VU	Moderate
Panthera pardus	Leopard	VU	VU	Low
Parahyaena brunnea	Brown Hyaena	NT	NT	High
Pelea capreolus	Grey Rhebok	NT	NT	Low
Poecilogale albinucha	African Striped Weasel	NT	LC	Moderate
Rhinolophus denti	Dent's Horseshoe Bat	NT	LC	Low
Smutsia temminckii	Temminck's Ground Pangolin	VU	VU	Low

Atelerix frontalis (South African Hedgehog) has a tolerance of a degree of habitat modification and occurs in a wide variety of semi-arid and sub-temperate habitats (IUCN, 2017). Based on the Red List of Mammals of South Africa, Lesotho and Swaziland (2016), *A. frontalis* populations are decreasing due to the threats of electrocution, veld fires, road collisions, predation from domestic pets and illegal harvesting. Although the species is cryptic and therefore not often seen, there is suitable habitat in the project area and therefore the likelihood of occurrence is rated as moderate.

Felis nigripes (Black-footed cat) is endemic to the arid regions of southern Africa. This species is naturally rare, has cryptic colouring, is small in size and is nocturnal. These factors have contributed to a lack of information on this species. Given that the highest densities of this species have been recorded in the more arid Karoo region of South Africa, the habitat in the Project Area can be considered to be partially suitable for the species and the likelihood of occurrence is therefore rated as moderate.

Leptailurus serval (Serval) occurs widely through sub-Saharan Africa and is commonly recorded from most major national parks and reserves (IUCN, 2017). The Serval's status outside reserves is not certain, but they are inconspicuous and may be common in suitable habitat as they are tolerant of farming practices provided there is cover and food available. In sub-Saharan Africa, they are found in habitat with well-watered savanna long-grass environments and are particularly associated with reedbeds and other riparian vegetation types. Due to the presence of some variable natural grassland in the area, the likelihood of occurrence for this species is rated as moderate.

Mystromys albicaudatus (White-tailed Rat) is listed as 'Vulnerable' (VU) on a regional basis as well as on a global scale. It is relatively widespread across South Africa and Lesotho and the species is known to occur in shrubland and grassland areas. A known requirement of the species is black loam soils with good vegetation cover. Although the vegetation type may be considered suitable, no black loam seems to be present in the area, therefore the likelihood of occurrence of this species is only rated as moderate.

Parahyaena brunnea (Brown Hyaena) is endemic to southern Africa. This species occurs in dry areas, generally with annual rainfall less than 100 mm, particularly along the coast, semi-desert, open scrub and open woodland savanna. Given its known ability to persist outside of formally protected areas the likelihood of occurrence of this species in the project area is moderate to good. The presence of common small and medium herbivores nearby and on adjacent farms increases the likelihood of occurrence of this species.

Poecilogale albinucha (African Striped Weasel) is usually associated with savanna and grassland habitats, although it likely has a wider habitat tolerance (IUCN, 2017). Road kills have been collected from areas of pastures and cultivated fields. Due to its secretive nature, it is often overlooked in many areas where it does occur. There is sufficient habitat for this species in the Project Area and the likelihood of occurrence of this species is therefore considered to be moderate.

5.1.4.2 Reptiles

Based on the IUCN Red List spatial database and the ReptileMap database, over 40 reptile species may be expected to occur within and nearby to the Project Area. One (1) of these species is regarded as an SCC but it is assigned only a low likelihood of occurrence (Table 5-4).

Table 5-4 SCC reptile species that may occur within the Project Area

Species	Common Name	Conservation Status		Likelihood of Occurrence
		SANBI (2022)	IUCN (2021)	
Psammophis leightoni	Cape Sand Snake	VU	LC	Low

5.1.4.3 Amphibians

Based on the IUCN Red List spatial database and FrogMap, over 15 amphibian species may be expected to occur within and nearby to the Project Area. One (1) of these is regarded as an SCC and it is assigned a moderate likelihood of occurrence due to the presence of suitable wetland habitat (Table 5-5).

Table 5-5 SCC amphibian species that may occur within the Project Area

Species	Common Name	Conservation Status		Likelihood of Occurrence
		SANBI (2022)	IUCN (2021)	
Pyxicephalus adspersus	Giant Bull Frog	NT	LC	Moderate

Pyxicephalus adspersus (Giant Bullfrog) is listed as 'Near Threatened' (NT) on a regional scale. It is a species that inhabits drier savannahs where it is fossorial for most of the year, remaining buried in cocoons. They emerge at the start of the rain season and breed in shallow, temporary waters in pools, pans and ditches (IUCN, 2017). The presence of some suitable aquatic habitat within the Project Area means that this species has a moderate likelihood of occurrence.

5.2 Biodiversity Field Survey

The following sections discuss the results from the field survey that was conducted for the proposed project, which was undertaken from the 13th to the 15th of September 2022.

5.2.1 Flora Survey

This section is further divided into two subsections:

- Indigenous flora recorded; and
- Invasive Alien Plants (IAPs) of the project area.

5.2.1.1 Indigenous Flora

The general vegetation landscape is well defined by the historical classification assigned by Mucina & Rutherford (2006), this being short open grassland with scattered low shrubs in varying densities. The most dominant grasses included *Eragrostis chloromelas*, *E. lehmanniana*, *Aristida congesta*, and *Themeda triandra*. Prominent shrubs recorded include *Chrysocoma ciliata, Felicia filifolia, F. muricata, Lycium cinereum* and *Pentzia globosa.* Overall, forty-five (45) species of flora were recorded (Table 5-6) – including thirty-nine (39) indigenous species and six (6) exotics (of which four (4) are listed invasives, highlighted in brown below).

No SCC flora were recorded; however, two (2) individual provincially protected plants were observed (highlighted in blue below), refer to Figure 5-11 for a map showing the locations of the two plants. The plants are protected as per Schedule 6 of the Free State Nature Conservation Ordinance 8 of 1969. Note: All species of *Helichrysum* are protected in the Free State.

Figure 5-9 and Figure 5-10 presents photographs of some of the species observed within the PAOI, including the protected plants.

Table 5-6 Flora species recorded within the Project Area

Family	Species	SANBI Red-List Status	Ecology	Notes
Asparagaceae	***Agave americana***	**-**	**Naturalized exotic weed**	**NEMBA Category 3 (Western Cape)**
Hyacinthaceae	*Albuca virens*	LC	Not Endemic	
Asteraceae	*Amphiglossa triflora*	LC	Not Endemic	
Asteraceae	*Arctotis venusta*	LC	Not Endemic	
Poaceae	*Aristida adscensionis*	LC	Not Endemic	
Poaceae	*Aristida congesta subsp. congesta*	LC	Not Endemic	
Asparagaceae	*Asparagus laricinus*	LC	Not Endemic	
Asteraceae	*Berkheya annectens*	LC	Not Endemic	
Asteraceae	*Bidens pilosa*	-	Naturalized exotic weed	
Poaceae	*Chloris gayana*	LC	Not Endemic	
Asteraceae	*Chrysocoma ciliata*	LC	Not Endemic	
Poaceae	*Cynodon dactylon*	LC	Not Endemic	
Scrophulariaceae	*Diclis petiolaris*	LC	Not Endemic	
Poaceae	*Digitaria eriantha*	LC	Not Endemic	
Poaceae	*Eragrostis chloromelas*	LC	Not Endemic	
Poaceae	*Eragrostis curvula*	LC	Not Endemic	

Poaceae	*Eragrostis lehmanniana*	LC	Not Endemic	
Poaceae	*Eragrostis superba*	LC	Not Endemic	
Myrtaceae	***Eucalyptus camaldulensis***	**-**	**Naturalized exotic weed**	**NEMBA Category 2**
Asteraceae	*Felicia filifolia*	LC	Endemic	
Asteraceae	*Felicia muricata*	LC	Not Endemic	
Asteraceae	*Gazania krebsiana*	LC	Not Endemic	
Asteraceae	***Helichrysum sp.***	**LC**	**Not Endemic**	**Provincially Protected (Schedule 6)**
Asteraceae	***Helichrysum argyrosphaerum***	**LC**	**Not Endemic**	**Provincially Protected (Schedule 6)**
Asteraceae	*Hertia pallens*	LC	Not Endemic	
Scrophulariaceae	*Jamesbrittenia aurantiaca*	LC	Not Endemic	
Scrophulariaceae	*Jamesbrittenia tysonii*	LC	Endemic	
Thymelaeaceae	*Lasiosiphon polycephalus*	LC	Not Endemic	
Lobelioideae	*Lobelia erinus*	LC	Not Endemic	
Solanaceae	*Lycium cinereum*	LC	Not Endemic	
Fabaceae	*Melolobium candicans*	LC	Not Endemic	
Iridaceae	*Moraea pallida*	LC	Not Endemic	
Iridaceae	*Moraea stricta*	LC	Not Endemic	
Asteraceae	*Oedera humilis*	LC	Not Endemic	
Cactaceae	***Opuntia ficus-indica***	**-**	**Naturalized exotic weed**	**NEMBA Category 1b**
Asteraceae	*Pentzia globosa*	LC	Not Endemic	
Asteraceae	*Pentzia incana*	LC	Not Endemic	
Fabaceae	***Prosopis velutina***	**-**	**Naturalized exotic weed**	**NEMBA Category 1b**
Lamiacea	*Salvia verbenaca*	LC	Not Endemic	
Cyperaceae	*Scirpoides dioecus*	LC	Not Endemic	
Anacardiaceae	*Searsia lancea*	LC	Not Endemic	
Asteraceae	*Senecio inaequidens*	LC	Not Endemic	
Asteraceae	*Tagetes minuta*	-	Naturalized exotic weed	
Poaceae	*Themeda triandra*	LC	Not Endemic	
Fabaceae	*Vachellia karroo*	LC	Not Endemic	

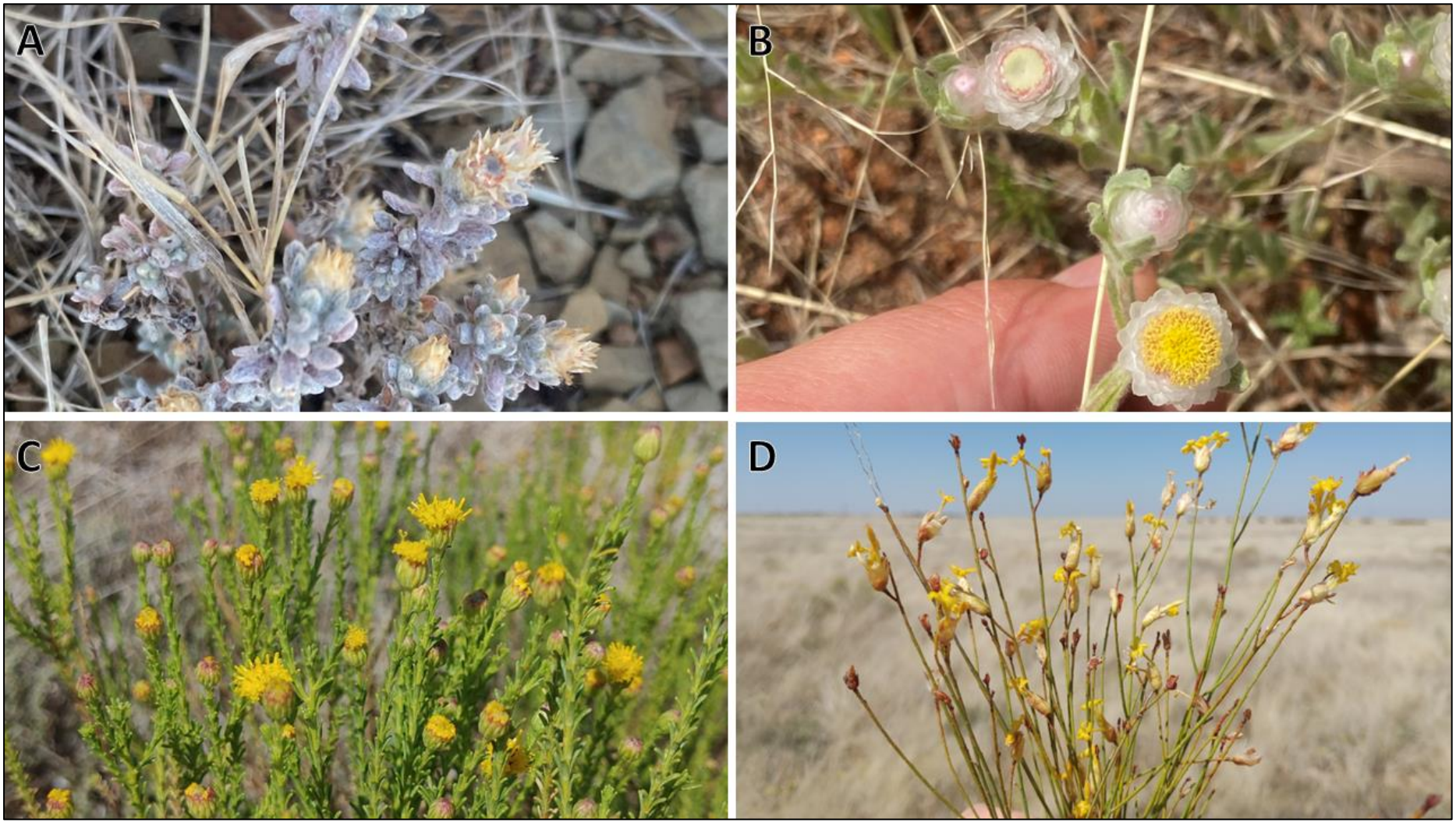


Figure 5-9 ***Photographs illustrating some of the indigenous flora species recorded – A) Helichrysum sp. (protected); B) Helichrysum argyrosphaerum (protected); C) Chrysocoma ciliata; and D) Lasiosiphon polycephalus***

Figure 5-10 ***Photographs illustrating some of the indigenous flora species recorded – A) Moraea pallida; B) Felicia muricata; C) Albuca virens; and D) Moraea stricta***

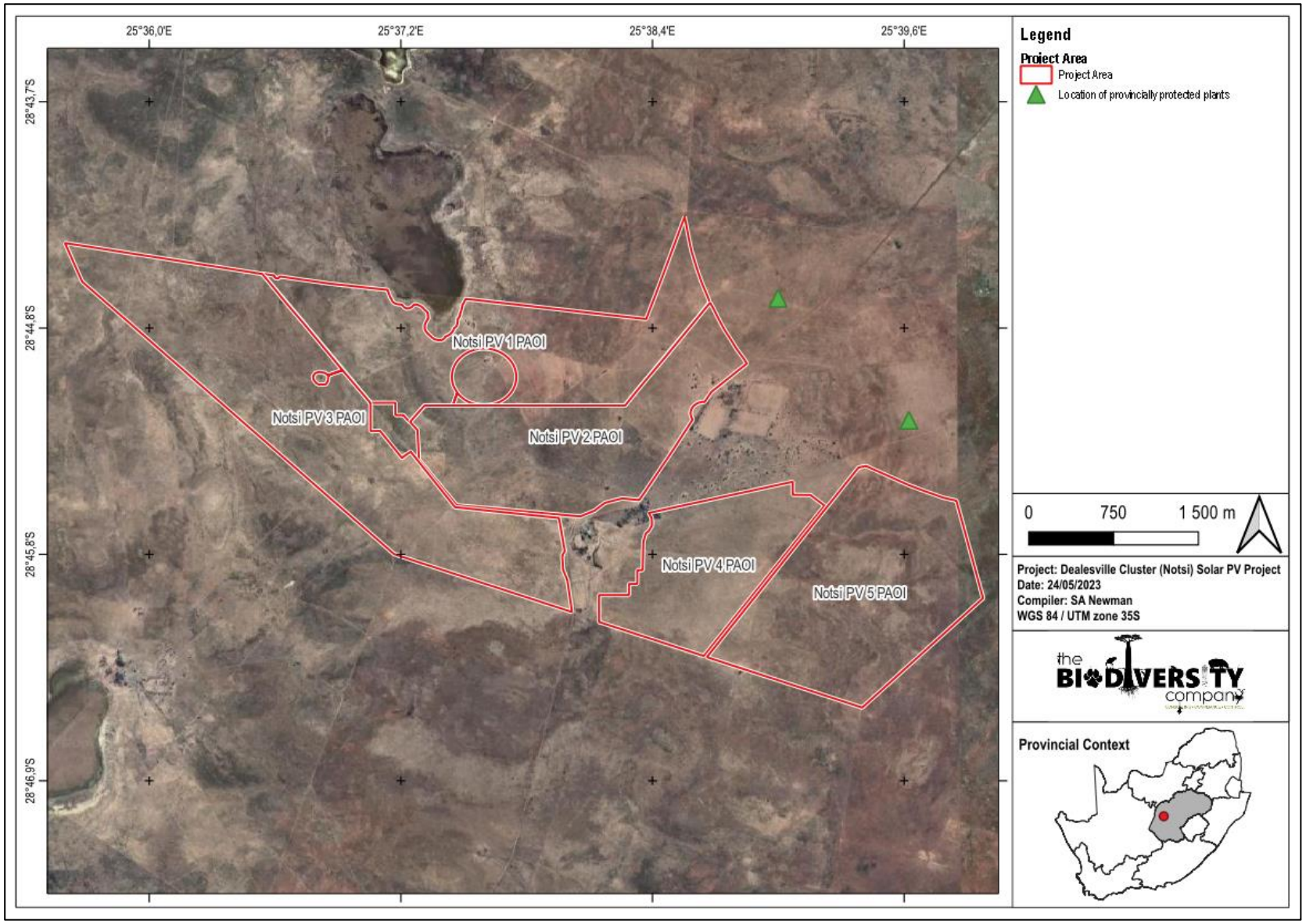


Figure 5-11 Map illustrating the locations of the recorded provincially protected plants (x2 individuals)

5.2.1.2 Invasive Alien Plants

The National Environmental Management: Biodiversity Act, Act No. 10 of 2004, (NEM:BA) is the national legislation that incorporates the mandatory regulation of Invasive Alien Plant (IAP) species, and in September 2020 the most current lists of IAP Species were published in terms of NEM:BA (in Government Gazette No. 43726 of 18 September 2020). The Alien and Invasive Species Regulations serve to define and regulate the various categories of Alien and Invasive Species and were recently updated and published in terms of NEM:BA in the Government Gazette No. 43735 of 25 September 2020. The 2020 Alien and Invasive Species Regulations and Lists were recently extended as published in the Government Gazette No. 44182, 24th of February 2021.

The legislation calls for the removal and/or control of IAP species (Category 1 species). In addition, unless authorised thereto in terms of the National Water Act, no land user shall allow Category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland. Category 3 plants are also prohibited from occurring within proximity to a watercourse. Below is a brief explanation of the three categories in terms of the NEM:BA:

- **Category 1a:** Invasive species requiring compulsory eradication. Remove and destroy. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
- **Category 1b:** Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.
- **Category 2:** Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones. Species existing outside of a regulated area shall be classified as category 1b.
- **Category 3:** Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities: import, possess, grow, breed, move, sell, buy or accept as a gift - involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones as these will be classified as category 1b species.

Note that according to the regulations, any person who has under his or her control a category 1b listed invasive species must immediately:

- Notify the competent authority in writing;
- Take steps to manage the listed invasive species in compliance with:
    - Section 75 of the NEM:BA;
    - The relevant local invasive species management programme developed in terms of regulation 4; and
    - Any directive issued in terms of section 73(3) of the NEMBA.

Four (4) IAP species were recorded during the field survey, namely *Agave americana*, *Eucalyptus camaldulensis, Opuntia ficus-indica, and Prosopis velutina.* The last two species are Category 1b species which must be controlled through the implementation of an IAP Management Programme. The common weeds *Tagetes minuta* and *Bidens pilosa* were also observed invading certain sections. Photographs of the observed IAP species are presented in Figure 5-12 below.

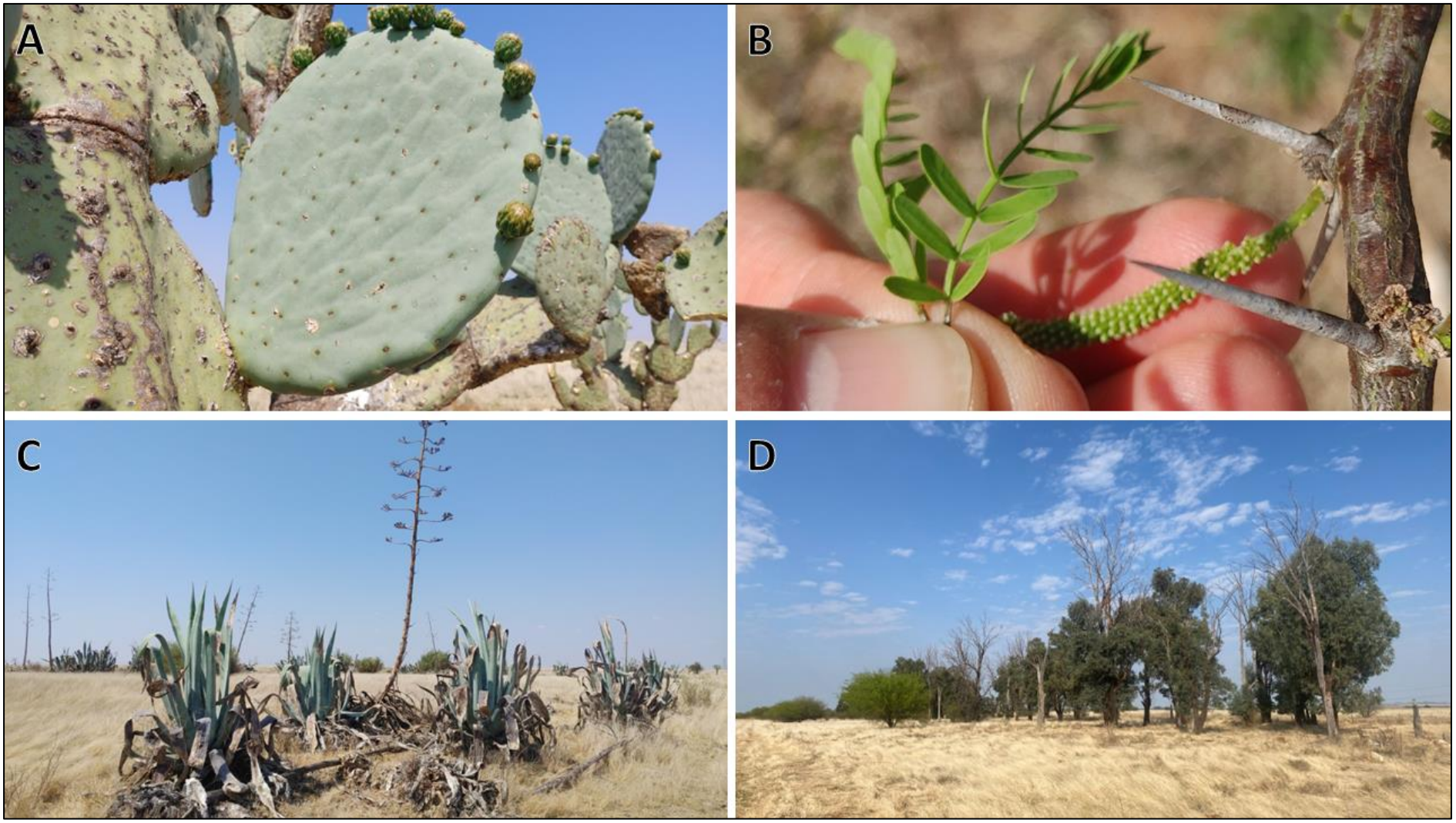


Figure 5-12 ***Photographs illustrating the listed IAP flora species recorded within the Project Area of Influence – A) Opuntia ficus-indica; B) Prosopis velutina; C) Agave americana; and D) Eucalyptus camaldulensis***

5.2.2 Fauna Survey

Mammal activity during the survey was good, as would be expected from a large area with no major signs of long-term historical disturbance. Fifteen (15) mammal species were recorded (Table 5-7), and two (2) herpetofauna species (one (1) reptile and one (1) amphibian) were observed during the survey (Table 5-8).

No fauna SCC were recorded, however, a larger number of mammal and herpetofauna species are expected to occur in the area, and longer-term multi-season surveys would be required in order to ensure extensive sampling. However, sampling was considered sufficient for the purposes of this assessment. Several provincially protected fauna (as per the Free State Nature Conservation Ordinance 8 of 1969) were observed, as noted in the tables below, Schedule 1 protected species shall not be hunted by any person, except under authority of a permit which may be issued by the Administrator.

Refer to Figure 5-13 and Figure 5-14 for photographs of some of the recorded fauna species.

Table 5-7 The mammal species recorded during the field survey

Species	Common Name	Conservation Status		Notes
		SANBI (2022)	IUCN (2021)	
Antidorcas marsupialis	Springbok	LC	LC	Provincially Protected (Schedule 2)
Canis mesomelas	Black-backed Jackal	LC	LC	
Cryptomys hottentotus	Common Mole-rat	LC	LC	
Cynictis penicillata	Yellow Mongoose	LC	LC	
Herpestes pulverulentus	Cape Grey Mongoose	LC	LC	
Herpestes sanguineus	Slender Mongoose	LC	LC	
Hystrix africaeaustralis	Cape Porcupine	LC	LC	
Ictonyx striatus	Striped Polecat	LC	LC	
Lepus capensis	Cape Hare	LC	LC	Provincially Protected (Schedule 2)
Orycteropus afer	Aardvark	LC	LC	Provincially Protected (Schedule 1)
Otocyon megalotis	Bat-eared Fox	LC	LC	Provincially Protected (Schedule 1)
Phacochoerus africanus	Common Warthog	LC	LC	
Raphicerus campestris	Steenbok	LC	LC	Provincially Protected (Schedule 2)
Suricata suricatta	Suricate	LC	LC	
Xerus inauris	Cape Ground Squirrel	LC	LC	

Table 5-8 The herpetofauna species recorded during the field survey

Species	Common Name	Conservation Status		Notes
		SANBI (2022)	IUCN (2021)	
Sclerophrys gutturalis	Guttural Toad	LC	LC	
Stigmochelys pardalis	Leopard Tortoise	LC	LC	Provincially Protected (Schedule 1)

Note: For results pertaining to the avifaunal species of the area refer to the avifaunal specialist assessment report.

Figure 5-13 ***Photographs: Mammal species recorded during the survey – A) Cynictis penicillate (Yellow Mongoose); B) Canis mesomelas (Black-backed Jackal); C) Suricata suricatta (Suricate); and D) Ictonyx striatus (Striped Polecat)***

Figure 5-14 ***Photographs: Fauna species recorded during the survey – A) Stigmochelys pardalis (Leopard Tortoise); B) Orycteropus afer (Aardvark); C) Antidorcas marsupialis (Springbok); and D) Sclerophrys gutturalis (Guttural Toad)***

5.3 Habitat Assessment

The main habitat types identified across the Project Area were initially delineated largely based on aerial imagery, and these main habitat types were then refined based on the field coverage and data collected during the survey. Five (5) habitats were delineated in total, and these are mapped over the entire Project Area in Figure 5-15 below.

Emphasis was placed on limiting timed meander searches to within the most functional habitats, and therefore habitats with a higher potential of hosting SCC. It is noted that the Modified Grassland habitat closely coincides with the regional historical vegetation type as described by Mucina & Rutherford (2006) – due to the low levels of historical disturbance present.

The five habitats are briefly discussed in the sub-sections that follow, and a summary of the habitat types delineated within the Project Area can be seen in Table 5-9.

Table 5-9 Summary of habitat types delineated within the Project Area

Habitat Type	Description	Dominant Flora	Habitat Sensitivity
Transformed	Portions of land with very little to no indigenous vegetation remaining, such as roads and buildings.	Exotic weeds and invasives such as *Bidens pilosa* and *Tagetes minuta*.	Very Low
Critically Modified Grassland	Gently undulating open savannah habitat of a low functionality, impacted by weedy annuals and invasive trees in most areas. Historically used as agriculture or cleared land.	*Aristida* spp. and *Eragrostis* spp. grasses with a dominant population of weeds such as *Bidens pilosa* and *Tagetes minuta*. Invasive trees such as *Prosopis velutina*.	Low
Modified Grassland	Gently undulating open savannah habitat with a good functionality and a higher diversity and density of flora species than the Critically Modified Grassland areas.	Diversity of grasses, including some climax grasses such as *Themeda triandra*. Diversity of herbs and shrubs such as *Chrysocoma ciliata*, *Pentzia globosa*, and *Felicia filifolia*.	Medium
Rocky Ridge	Isolated linear section of rocky outcrops that serve as important micro-habitat for unique flora and fauna.	A diversity of grass species and low shrubs and small herbs such as *Pentzia incana* and *Lycium cinereum*.	High
Wetland / Water Resource	Permanently to seasonally wet portions of land as delineated by the wetland specialist. Unique foraging resource for local fauna.	*Aristida* spp. and *Eragrostis* spp. grasses. Other grasses and some reeds typical of wet areas.	Medium - High

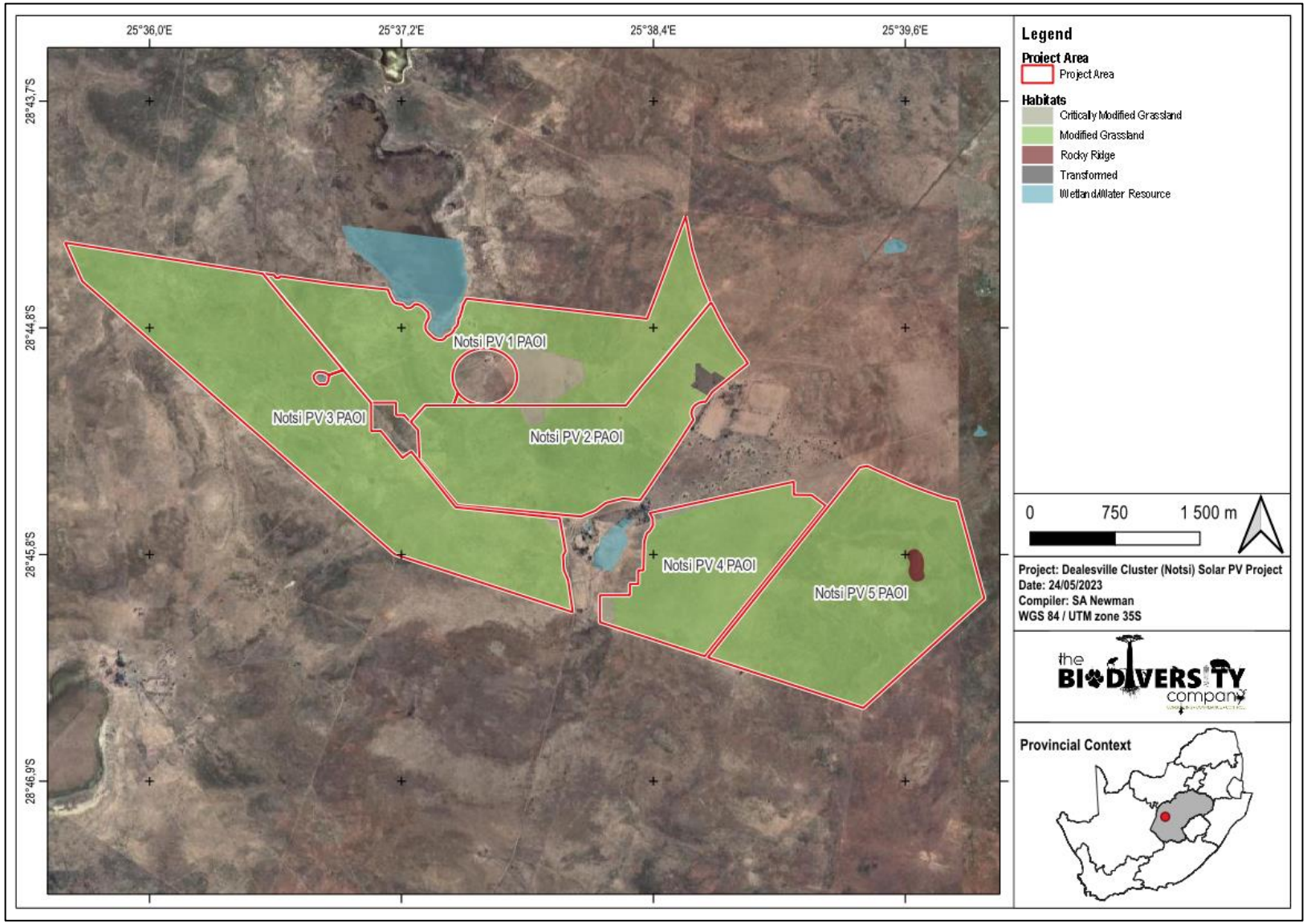


Figure 5-15 Map illustrating the habitats identified in the overall Project Area

5.3.1 Transformed Habitat

This habitat unit represents those areas of the Project Area that are considered to have practically no functionality from a terrestrial ecology perspective. Vegetation is almost entirely limited to exotic flora and IAPs, and no SCC fauna are likely to nest or regularly forage in these areas. The most common features include active agriculture, housing developments, roads, and cleared land.

The ecological services provided by this habitat are limited due to the extensive cover of impermeable surfaces and the large amount of bare land. Locally common bird species will forage and nest in the larger trees, and parts of the area may be considered a movement corridor.

Figure 5-16 presents a representative photograph of this habitat type.

Figure 5-16 A representative photograph of the Transformed habitat (main roadway)

5.3.2 Critically Modified Grassland Habitat

Critically Modified Grassland is characterised by open savannah impacted by extensive weed populations (herbaceous annuals), pioneer grasses, and IAPs. Historical imagery reveals that much of these areas were previously utilised for agricultural land and/or were recently cleared. The habitat has a low level of functionality in its current state and is unlikely to support the regular presence of regional SCC fauna species.

As with the Transformed habitat, ecological services provided by the Critically Modified Grassland are limited. Some erosion protection is provided, and locally common bird species will forage and nest in the larger trees. Parts of the area may be considered a movement corridor, particularly for small mammals. In some instances, these areas provide a buffer zone between the Transformed habitat and the more sensitive Modified Grassland. Figure 5-17 presents a representative photograph of this habitat type.

Figure 5-17 Photograph: Critically Modified Grassland habitat (recovering agricultural land)

5.3.3 Modified Grassland Habitat

The majority of the Project Area was found to be representative of Modified Grassland habitat, which encompasses open grassland areas with a higher diversity of herbaceous indigenous species and a greater density of climax grasses and shrublets. This habitat unit has a higher level of functionality than the Critically Modified Grassland and local SCC fauna species may occasionally forage in these areas.

This habitat provides important ecological services to the surrounding region, including runoff and erosion control enabling rainwater percolation, nutrient cycling within the topsoil layers supporting the healthy functioning of indigenous flora and re-seeding processes, carbon sequestration, and foraging and nesting resources for livestock and local indigenous fauna species (including occasional SCC). The Modified Grassland is also considered an important movement corridor for all types of fauna. Figure 5-18 presents a photograph of the Modified Grassland habitat type.

Figure 5-18 A representative photograph of the Modified Grassland habitat

5.3.4 Rocky Ridge Habitat

A small portion of land in the centre of the Notsi PV 7 area, south east of the Project Area, contains a linear collection of natural rocky material which serves as a unique microhabitat feature that is likely to be supportive of reptile and small mammal species native to the area. The feature is also likely to be supportive of habitat specialist flora which may not be observable in the drier seasons, such as geophytes and micro succulents. Figure 5-19 presents a photograph of this habitat feature.

Figure 5-19 A representative photograph of the rocky ridge habitat

5.3.5 Wetland/Water Resource Habitat

The Wetland/Water Resource areas include those portions of land which have been confirmed as at least seasonally or temporarily wet, such as wetland depressions, by the most recent wetland study. In both the wet and dry seasons these areas are likely to serve as unique foraging resources for local fauna. It is also possible that the 'Near Threatened' *Pyxicephalus adspersus* (Giant Bull Frog) utilises some of the seasonally wet areas for breeding habitat. For specific details pertaining to these areas, including ecological services provided, refer to the most recent wetland assessment – conducted by The Biodiversity Company. Figure 5-20 presents a representative photograph of this habitat unit.

Figure 5-20 A representative photograph of the wetland/water resource habitat

5.4 Site Ecological Importance

Based on the criteria provided in section 4.3 of this report, the five delineated habitat types have each been allocated a sensitivity category, or SEI, and this breakdown is presented in Table 5-10 below. In order to identify and spatially present sensitive features in terms of the relevant specialist discipline, the sensitivities of each of the habitat types delineated within the Notsi PV 5 PAOI are mapped in Figure 5-21.

It is important to note that this map does not replace any local, provincial, or national government legislation relating to these areas or the land use capabilities or sensitivities of these environments.

Table 5-10 Sensitivity summary of the habitat types delineated within the Project Area

Habitat		Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Transformed		Very Low	Low	**Very Low**	High	**Very Low**
Critically Modified Grassland		Medium	Medium	**Medium**	High	**Low**
Modified Grassland		Medium	High	**Medium**	Medium	**Medium**
Rocky Ridge		Medium	Medium	**Medium**	Low	**High**
Wetland	**Notsi PV 5 Wetland (FEPA)**	Medium	High	**Medium**	Low	**High**
	Other Wetlands	Medium	Medium	**Medium**	Medium	**Medium**

Consider the following guidelines when interpreting SEI in the context of any proposed development or disturbance activities (noted in conjunction with provincial guidelines pertaining to ESA areas):

- Very Low: Minimisation mitigation – Development activities of medium to high impact acceptable and restoration activities may not be required.
- Low: Minimisation and restoration mitigation – Development activities of medium to high impact acceptable followed by appropriate restoration activities.
- Medium: Minimisation and restoration mitigation – Development activities of medium impact acceptable followed by appropriate restoration activities.
- High: Avoidance mitigation wherever possible.
    - Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable.
    - Offset mitigation may be required for high impact activities.

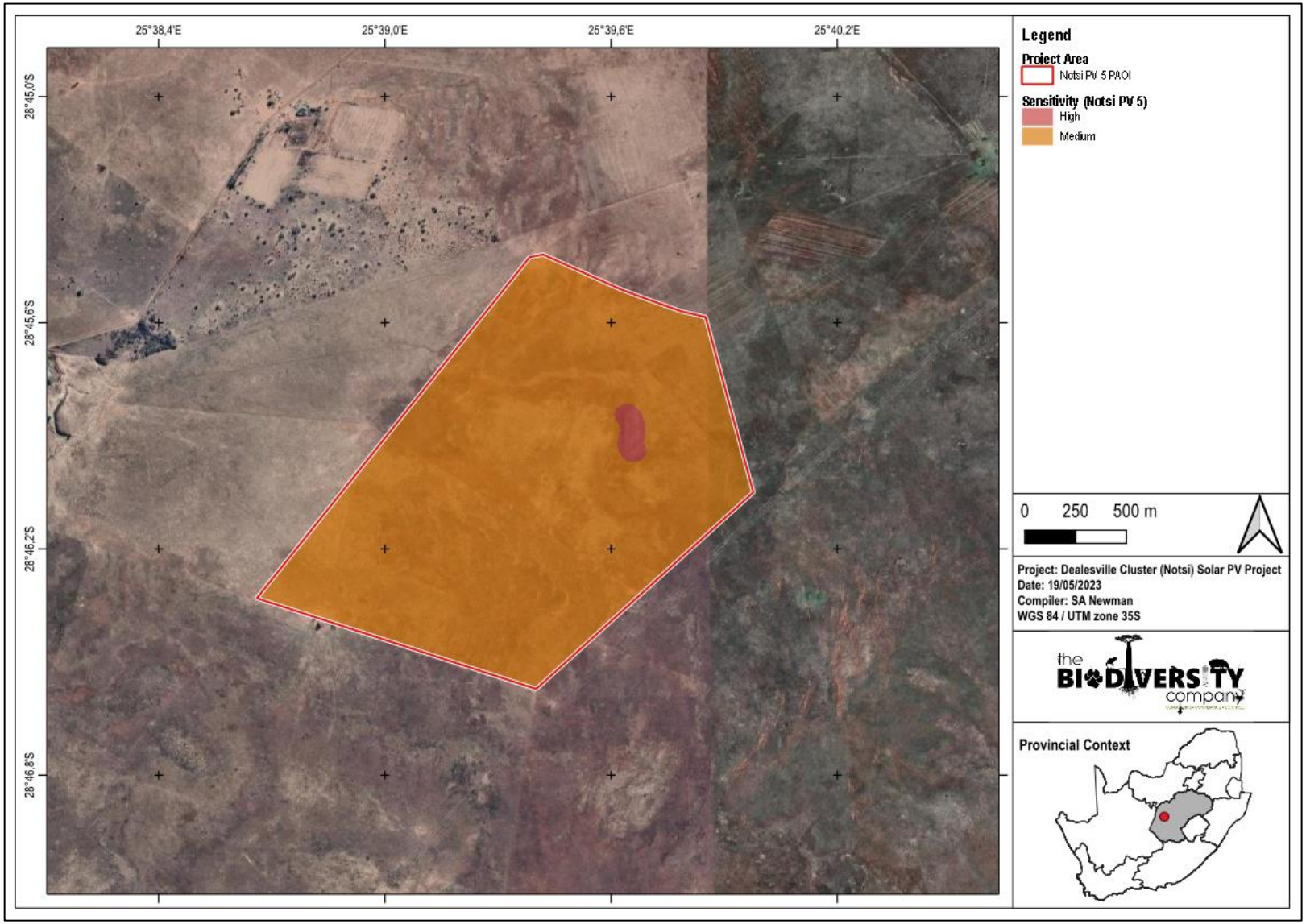
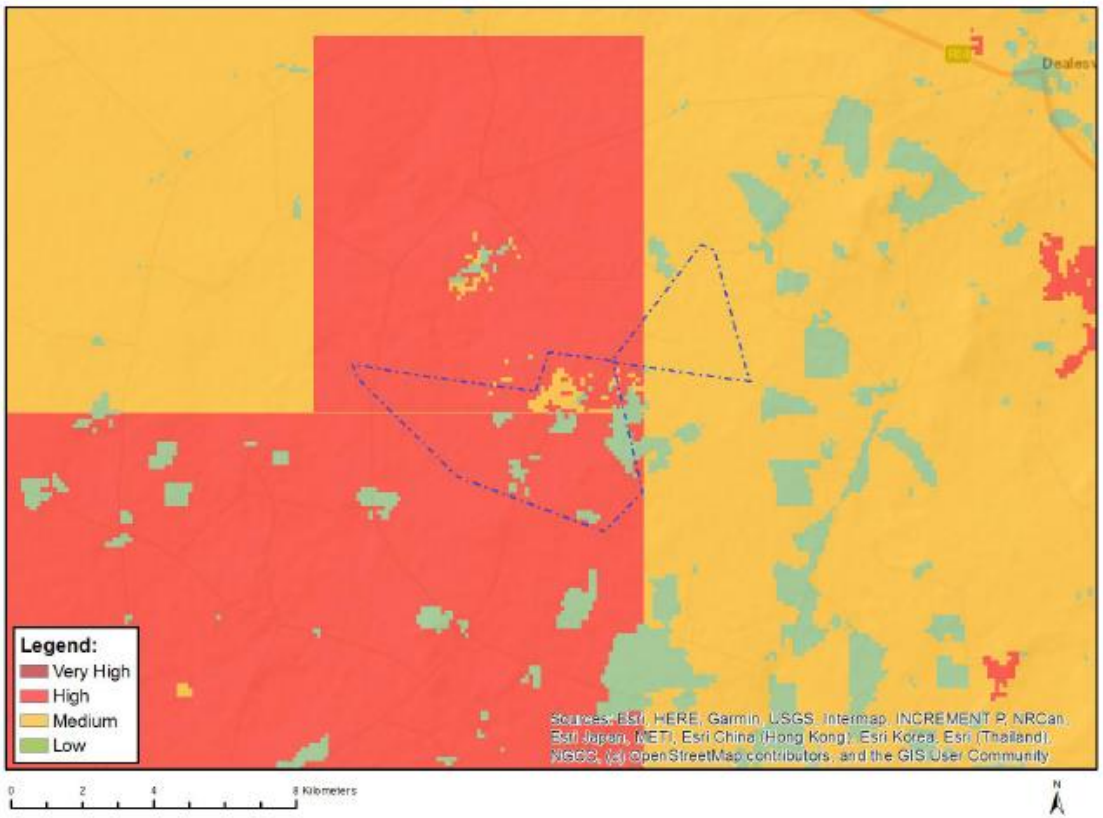


Figure 5-21 Map illustrating the sensitivities of the habitats delineated within the Project Area of Influence (Notsi PV 5)

5.4.1 Screening Tool Comparison

The relative animal species theme sensitivity as indicated by the screening tool report for the Notsi PV 5 PAOI was derived to be 'High' (Figure 5-22), due to the possible presence of two sensitive avian species.

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



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

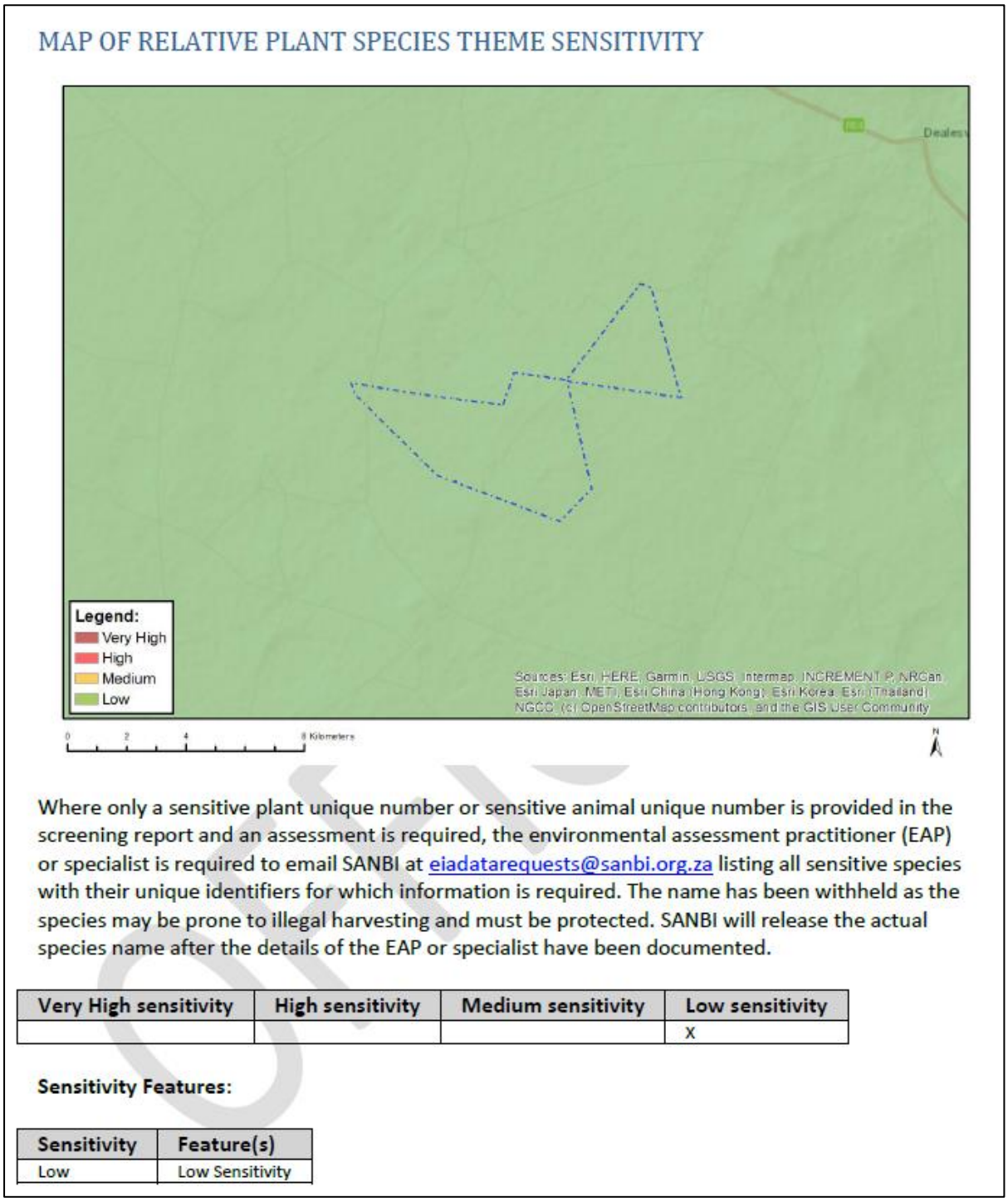
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Cursorius rufus
High	Aves-Neotis ludwigii
Low	Subject to confirmation
Medium	Aves-Aquila rapax
Medium	Aves-Neotis ludwigii

Figure 5-22 Relative Animal Species Theme Sensitivity for the Project Area of Influence (National Environmental Screening Tool, 2022)

The relative plant species theme sensitivity as indicated by the screening tool report for the Notsi PV 5 PAOI was derived to be 'Low' (Figure 5-23), due to the unlikely presence of any sensitive flora species (heavily traded or red-listed).



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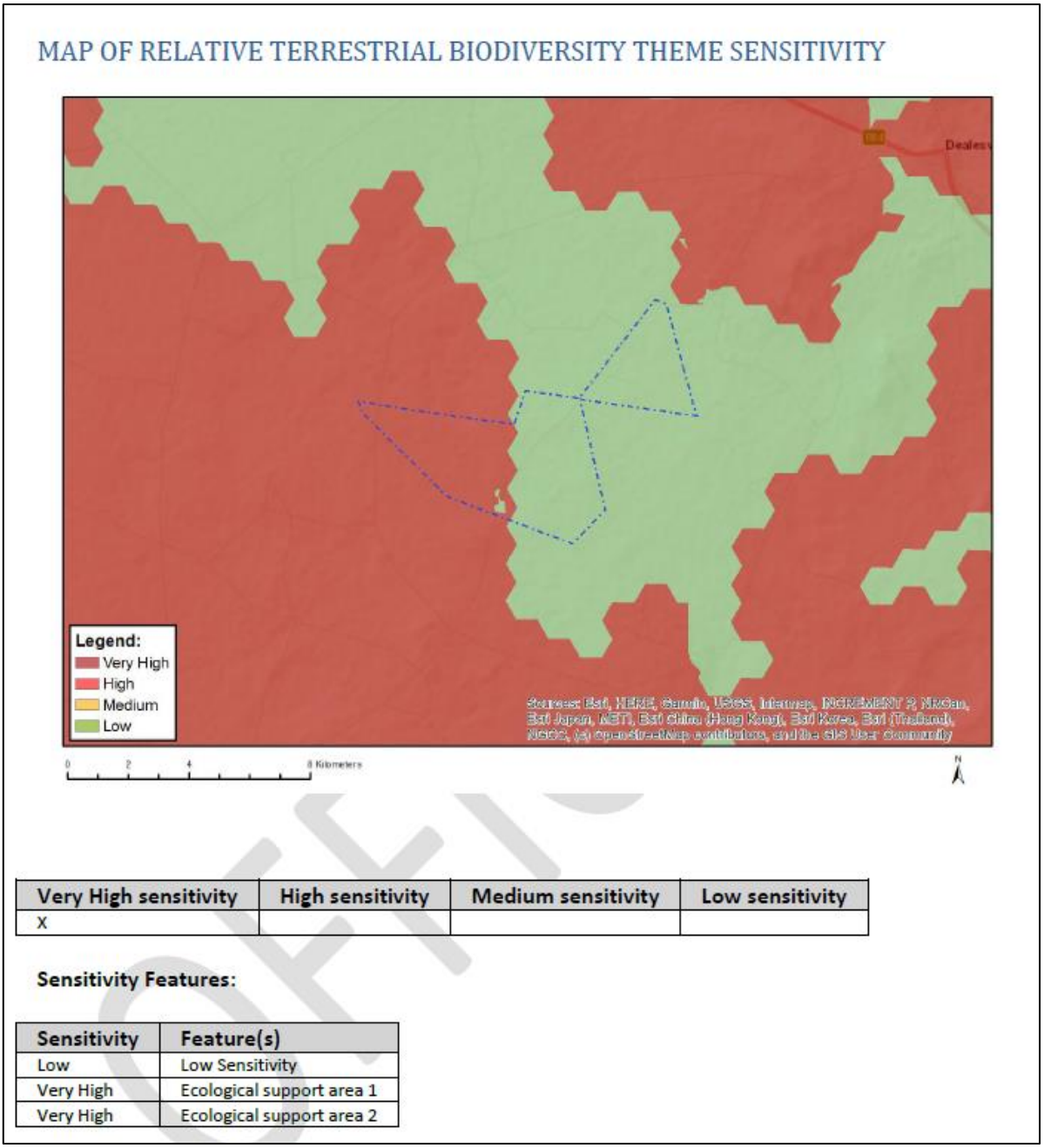
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

Figure 5-23 Relative Plant Species Theme Sensitivity for the Project Area of Influence (National Environmental Screening Tool, 2022)

The relative terrestrial biodiversity theme sensitivity as indicated by the screening tool report for the Notsi PV 5 PAOI was derived to be 'Low' (Figure 5-24).



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Very High	Ecological support area 1
Very High	Ecological support area 2

Figure 5-24 Relative Terrestrial Biodiversity Theme Sensitivity for the Project Area of Influence (National Environmental Screening Tool, 2022)

The allocated sensitivities for each of the themes are either disputed or validated for the Notsi PV 5 PAOI in Table 5-11 below. A summative explanation for each result is provided as relevant.

The specialist-assigned sensitivity ratings are based largely on the SEI process followed in the previous section, and consideration is given to any observed or likely presence of SCC or protected species.

Note: Avifauna are not considered, as this is treated as part of a separate specialist assessment.

Table 5-11 Summary of the screening tool vs specialist assigned sensitivities for the Notsi PV 5 PAOI

Sub-project	Animal Theme		Plant Theme		Terrestrial Theme		Reasoning
	Tool	Specialist	Tool	Specialist	Tool	Specialist	
Notsi PV 5	High	**Medium**	Low	**Low**	Low	**Medium**	Possible presence of several fauna SCC; Unlikely presence of sensitive flora; Functional grassland habitat present.

6 Impact Assessment and Management Plan

The sections below serve to outline and quantify the types of perceived impacts from the proposed activities on the terrestrial biodiversity and ecology of the Project Area of Influence. The associated significance of each impact is evaluated as relevant to the local biodiversity and the likely project activities.

6.1 Biodiversity Risk Assessment

6.1.1 Impact Assessment Considerations and Procedure

The project activities will have a negative effect on the natural environment of the area. Anthropogenic activities drive habitat destruction leading to the displacement of fauna and flora and possibly causing direct mortality. Land clearing destroys local wildlife habitat and can lead to the loss of local breeding grounds, foraging and nesting sites, and wildlife movement corridors such as rivers, streams and drainage lines, or other locally important features. The removal of natural vegetation is likely to reduce the habitat available for all types of fauna species and hence reduce animal populations and species compositions within the area.

Potential impacts were evaluated against the data captured during the desktop assessment and field survey to identify associated relevance to the habitats within the PAOI. The impacts associated with the proposed activities were then subjected to a prescribed impact assessment methodology as provided by the client, which is available on request. The planning, decommissioning and/or rehabilitation phases were not considered based on the nature of the likely activities and the associated negatable impacts expected during these phases. Refer to section 6.2 below for the full impact assessment.

6.1.2 Present Impacts to Biodiversity

Considering the fact that anthropogenic activities have historically taken place throughout most of the region, and continue to do so, several significantly negative impacts to biodiversity were observed within and adjacent to the PAOI. These include:

- Historic land modification largely in the form of agriculture, and road and powerline infrastructure, and the associated land clearing and edge effects;
- Domestic animal grazing, including herds of sheep, cattle and horses;
- Small to large scale informal dumping, including the dumping of hazardous scrap metal;
- Air, dust and noise pollution;
- Minor and major gravel roads;
- Invasive Alien Plants and exotic weeds;
- Bare land and the corresponding high erosion potential; and fences and the associated infrastructure.

As illustrated in Figure 6-1, Bare land, powerline infrastructure, extensive dumping, and cattle grazing pose some of the ongoing impacts to the biodiversity of the PAOI. These impacts are pre-existing and are currently degrading the ecological functionality of the area.

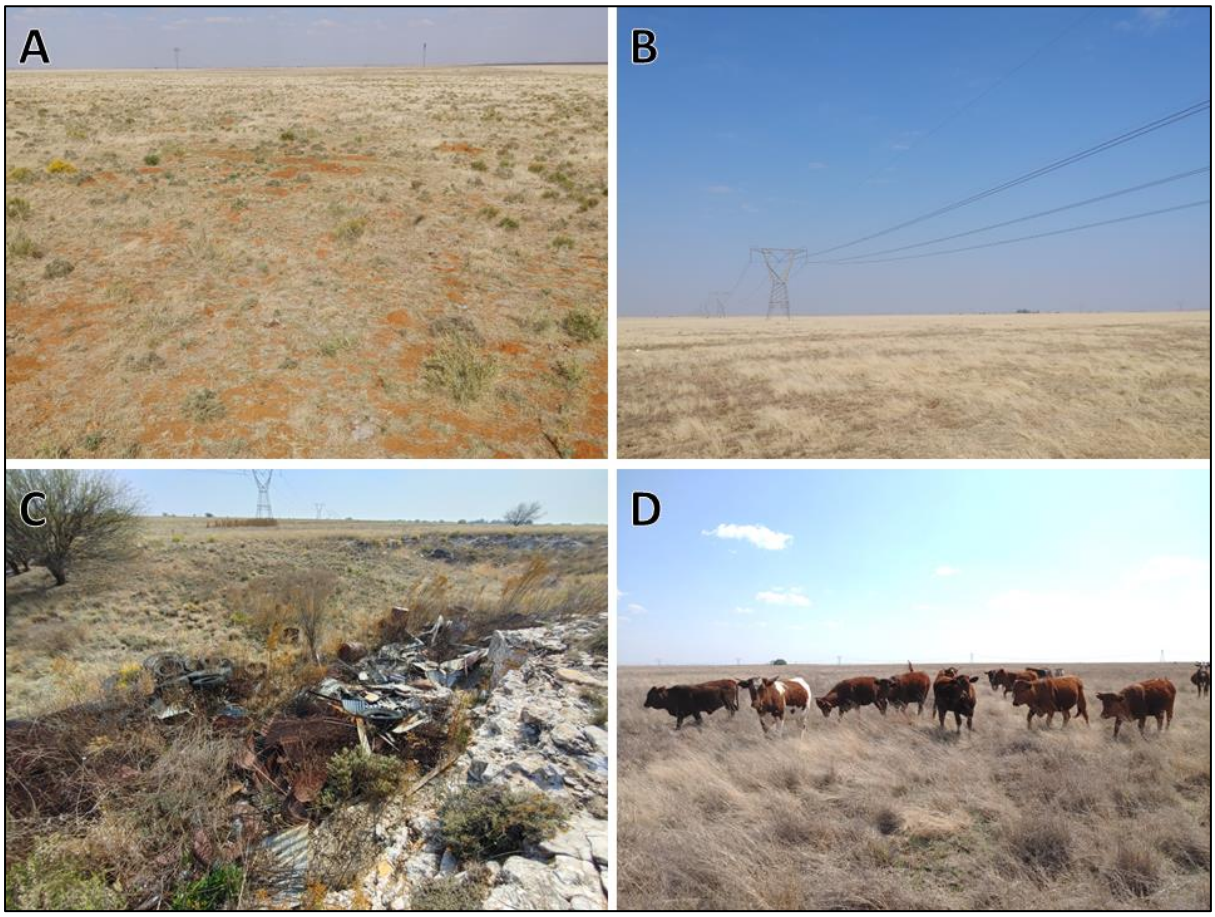


Figure 6-1 ***Photographs of current impacts: A) Bare land is susceptible to erosion; B) Extensive and large powerline infrastructure deteriorates the landscape; C) Dumping of metal waste is a major concern; and D) Grazing can promote the spreading of annual weeds and the dominance of pioneer species***

6.1.3 Loss of Irreplaceable Resources

The proposed activities are likely to be of a high impact and large footprint, and the careful placement of certain developments is therefore important so as to minimise the damage to natural resources.

The proposed activities will be conducted over 'Least Concern' Western Free State Clay Grassland habitat, and largely within functional Modified Grassland vegetation unit. It is therefore important to note that any irresponsible and/or overly expansive high impact activities will likely result in the loss of the following notable resources across the entire Project Area:

- Sensitive rocky outcrops and sensitive wetland areas;
- Functional ESA1 and ESA2 portions of land;
- Local fauna species, including possible SCC, (through direct mortality during clearing/construction activities, or indirectly via the inappropriate control of waste material); and
- Foraging and traversing routes, and/or nesting sites, relevant to the SCC fauna that may occasionally make use of the areas.

As many areas are in a functional state, the loss of these resources may be considered significant. Therefore, mitigations must be put in place and implemented to prevent the total and widespread destruction of valuable natural resources.

See section 6.4 below for a full overview of the project-specific mitigation measures that must be implemented in order to reduce the impact significance levels.

6.1.4 Anticipated Impacts

The project activities will lead to several significant impacts to terrestrial biodiversity, which are presented as an overview in Table 6-1 below. It is important to predict and quantify these impacts so as to assess the magnitude and effect that each may have on the local terrestrial biodiversity and ecology.

The impacts described are to be used as a guideline for the main impact assessment procedure that is to be followed.

Table 6-1 Anticipated impacts for the proposed activities on terrestrial biodiversity

Main Impact	Project activities that are likely to cause the impact	Secondary impacts anticipated
Destruction, fragmentation and degradation of habitats and ecosystems	Physical removal of vegetation, including protected species Development of access roads and servitudes Soil dust precipitation Dumping of waste products Random events such as fire (cooking fires or cigarettes) Walking and driving outside of demarcated routes (roads and paths)	• Displacement/loss of flora & fauna (including possible SCC); • Loss of protected species; • Increased potential for soil erosion; • Habitat fragmentation; • Increased potential for the establishment of IAP vegetation; and • Erosion
Spread and/or establishment of Invasive Alien Plants	The removal of indigenous vegetation Vehicles and people spreading seed Unsanitary conditions surrounding infrastructure, promoting the establishment of alien and/or invasive rodents Creation of infrastructure suitable for breeding activities of alien and/or invasive birds	• Habitat loss for native flora & fauna (including SCC); • Spreading of potentially dangerous diseases due to invasive and pest species; • Alteration of fauna assemblages due to habitat modification; and • Displacement of indigenous bird species
Direct mortality of fauna	Clearing of vegetation and/or the mass dumping of earth or construction waste Roadkill due to vehicle collision (non-compliance with speed limits etc.) Pollution of water resources due to dust effects, chemical spills, etc. Intentional killing of fauna for food or sale	• Loss of habitat; • Loss of ecosystem services; • Increase in rodent populations and associated disease risk; and • Deterioration of local ecology
Reduced dispersal/migration of fauna	Activities causing significant noise (heavy machinery) Construction of linear infrastructure (large roads and powerlines) Compacted roads Removal of vegetation	• Loss of landscape used as a corridor; • Reduced dispersal/migration of fauna; • Loss of ecosystem services; and • Reduced plant seed dispersal

Environmental pollution due to water runoff, spills from vehicles and erosion	Chemical (organic/inorganic) spills Erosion Poor maintenance and control of vehicles and machinery Pipe leaks (poor maintenance)	• Faunal mortality (direct and indirect – such as through poisoning); • Groundwater pollution; • Pollution of watercourses and the surrounding environment; and • Loss of ecosystem services
Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust, and light pollution	Operation of machinery (Large earth moving machinery, vehicles) Vehicle traffic Large, intense fluorescent and mercury vapor lighting	• Disruption/alteration of ecological life cycles due to noise; • Loss of ecosystem services; and • Loss of local faunal community
Loss of SCCs and/or protected species	All unregulated/unsupervised activities outdoors Poaching and trapping Staff and others interacting directly with fauna (potentially dangerous), or flora	• Loss of SCCs; and • Harm to people (dangerous fauna)

6.1.5 Unplanned Events

The planned activities will have anticipated impacts as discussed above; however, unplanned events may occur on any project, and these could lead to potential impacts which will require appropriate management and response.

Table 6-2 is a summary of the findings of an unplanned event assessment conducted from a terrestrial ecology perspective. Note that not all potential unplanned events may be captured herein, and this process must therefore be managed throughout all phases and according to new events that take place or other events that have a high likelihood of taking place.

Table 6-2 Summary of unplanned events, potential impacts and mitigations

Unplanned Event	Potential Impact	Mitigation
Spills into the surrounding environment	Contamination of habitat as well as water resources associated with a spillage.	A spill response kit must be available at all times. The incident must be reported on, and if necessary, a biodiversity specialist must investigate the extent of the impact and provide rehabilitation recommendations.
Fire	Uncontrolled/unmanaged fire that spreads to the surrounding functional grassland.	An appropriate fire management plan needs to be compiled and implemented.
Erosion caused by water runoff from the surface	Erosion on the side of the roads and cleared areas.	A storm water management plan must be compiled and implemented.

6.1.6 Alternatives considered

No alternative footprint layout options were provided by the client and thus it is anticipated that most of the PAOI will be developed. Layouts must avoid any 'High' sensitivity areas as far as possible.

6.2 Quantitative Biodiversity Impact Assessment

6.2.1 Overview: Assessment of Impact Significance

The assessment of impact significance considers both pre-mitigation as well as post-mitigation scenarios as relevant to each potential impact. Construction phase, operational phase, and cumulative impacts are discussed and assessed below, and the project specific mitigation actions required to lower the risks of the impacts are provided in section 6.4 of this report. No planning or decommissioning/rehabilitation phases were considered based on the nature of the activities.

Certain details have been provided by the client with regards to the nature of the intended development activities, and these have been used as part of the assessment process to aid in the estimation of the likely significance ratings for each predicted impact type.

6.2.2 Construction Phase Impacts

Three main impacts on the terrestrial biodiversity of the PAOI were considered for the construction phase of the proposed activities (based on the framework discussed above). This phase refers to the period during site preparation, clearing and construction and is considered to have the largest short-term and direct impact on biodiversity - partly as a result of the high levels of regular activity, and the extensive clearing that usually takes place. The following potential impacts to terrestrial biodiversity were considered, and these are each assessed for their significance in Table 6-3 and Table 6-4 that follows:

- Destruction, loss and fragmentation of habitats (including wetlands or rocky ridge habitats in certain sub-project areas), ecosystems and the vegetation community (including protected plants in some sub-project areas);
- Introduction of IAP species and invasive fauna;
- Displacement of the indigenous faunal community (including SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching).

All likely impacts are rated as Medium-Highly negative pre-mitigation but may be reduced to Low significance through the proper implementation of effective mitigation measures. The most important mitigation measures for this phase are as follows:

- Ensure that the site footprint is as small as possible and responsibly positioned, the development area must be properly and safely fenced off during construction;
- All laydown activities must be restricted to the ‘Very Low’ and ‘Low’ sensitivity areas as far as possible. Clearing and construction activities should avoid ‘High’ sensitivity wetland and ridge areas;
- Land clearing must be done over at least three days and conducted linearly and successively – always towards an open area and away from the centre of the PAOI (allowing animals a safe evacuation route);
- Protected plants must be avoided where possible, if activities will result in the disturbing of these species then a plant rescue and protection plan must be developed and implemented; and
- No trapping, killing, or poisoning of any wildlife is to be allowed and signs must be put up to enforce this. Monitoring must take place in this regard.

Table 6-3 Notsi PV 5 - Construction phase Impact Assessment – Pre Mitigation

Impact	Pre Mitigation (Notsi PV 5)							
	Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
Destruction, loss and fragmentation of habitats (including wetlands), ecosystems and the vegetation community.	2	4	3	3	3	3	3	
	Local/district: Will affect the local area or district.	Definite: Impact will certainly occur (Greater than a 75% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).	Barely reversible: The impact is unlikely to be reversed even with intense mitigation measures.	Significant loss of resources: The impact will result in significant loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	High: Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.	**Negative High Impact**
Introduction of IAP species and invasive fauna.	2	4	2	2	2	3	3	
	Local/district: Will affect the local area or district.	Definite: Impact will certainly occur (Greater than a 75% chance of occurrence).	Medium term: The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Marginal loss of resource: The impact will result in marginal loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	High: Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.	**Negative Medium Impact**
Displacement of the indigenous faunal community (including SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching).	3	3	3	4	3	3	3	
	Province/region: Will affect the entire province or region.	Probable: The impact will likely occur (Between a 50% to 75% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).	Irreversible: The impact is irreversible and no mitigation measures exist.	Significant loss of resources: The impact will result in significant loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	High: Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.	**Negative High Impact**

Table 6-4 Notsi PV 5 - Construction phase Impact Assessment – Post Mitigation

Impact	Post Mitigation (Notsi PV 5)							
	Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
Destruction, loss and fragmentation of habitats (including wetlands), ecosystems and the vegetation community.	2	3	2	2	2	2	2	
	Local/district: Will affect the local area or district.	Probable: The impact will likely occur (Between a 50% to 75% chance of occurrence).	Medium term: The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Marginal loss of resource: The impact will result in marginal loss of resources.	Low cumulative impact: The impact would result in insignificant cumulative effects.	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Low Impact**
Introduction of IAP species and invasive fauna.	1	2	2	2	2	2	1	
	Site: The impact will only affect the site.	Possible: The impact may occur (Between a 25% to 50% chance of occurrence).	Medium term: The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Marginal loss of resource: The impact will result in marginal loss of resources.	Low cumulative impact: The impact would result in insignificant cumulative effects.	Low: Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.	**Negative Low Impact**
Displacement of the indigenous faunal community (including SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching).	1	2	2	2	2	2	2	
	Site: The impact will only affect the site.	Possible: The impact may occur (Between a 25% to 50% chance of occurrence).	Medium term: The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Marginal loss of resource: The impact will result in marginal loss of resources.	Low cumulative impact: The impact would result in insignificant cumulative effects.	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Low Impact**

6.2.3 Operational Phase Impacts

The impacts of daily activities associated with the operational phase of the project are anticipated to further spread the IAP species, and lead to the further deterioration of habitats due to the continuing presence of dust and other edge effect impacts. Dust inhibits the ability of plants to photosynthesize and thus leads to the degradation of surrounding natural areas. Additionally, moving maintenance vehicles do not only cause sensory disturbances to fauna, affecting their life cycles and movement, but will also lead to displacement and direct faunal mortalities due to collisions.

The operational phase is often the longest phase of a project and as such the effects from impacts have the opportunity to cumulate over long periods of time and cause significant cumulative damage to the environment. It is important to actively and continuously implement and update the relevant mitigation measures for this phase so as to effectively reduce this compounding effect.

The following potential impacts were considered for this phase of the project, and these are each assessed for their significance in Table 6-5 and Table 6-6 below:

- Continued fragmentation and degradation of natural habitats and ecosystems (including sensitive wetland and ridge areas in some sub-project areas);
- Continuing spread of IAP and weed species; and
- Ongoing displacement and direct mortalities of the faunal community (including SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, etc.).

All potential impacts may be reduced from a significance rating of High to Low with the proper implementation of ongoing mitigation measures. The most important mitigation measures to implement during this phase include:

- The continual usage of the same roadways, parking areas and walkways, and the following of speed limits;
- The monitoring of, and enforcement against, any illegal hunting, poaching, and/or trapping activities;
- The responsible management of all waste. No waste must be dumped or stored in any ‘High’ sensitivity areas; and
- An IAP management and habitat rehabilitation plan must be implemented and updated annually.

Table 6-5 Notsi PV 5 - Operational phase Impact Assessment – Pre-Mitigation

Impact	Pre Mitigation (Notsi PV 5)							
	Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
Continued fragmentation and degradation of natural habitats and ecosystems (including wetlands).	2	3	3	3	3	3	3	
	Local/district: Will affect the local area or district.	Probable: The impact will likely occur (Between a 50% to 75% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).	Barely reversible: The impact is unlikely to be reversed even with intense mitigation measures.	Significant loss of resources: The impact will result in significant loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	High: Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.	**Negative High Impact**
Continuing spread of IAP and weed species.	3	4	3	2	2	3	3	
	Province/region: Will affect the entire province or region.	Definite: Impact will certainly occur (Greater than a 75% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Marginal loss of resource: The impact will result in marginal loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	High: Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.	**Negative High Impact**
Ongoing displacement and direct mortalities of the faunal community (including SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, etc.)	3	3	3	4	3	3	3	
	Province/region: Will affect the entire province or region.	Probable: The impact will likely occur (Between a 50% to 75% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).	Irreversible: The impact is irreversible and no mitigation measures exist.	Significant loss of resources: The impact will result in significant loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	High: Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.	**Negative High Impact**

Table 6-6 Notsi PV 5 - Operational phase Impact Assessment – Post Mitigation

Impact	Post Mitigation (Notsi PV 5)							
	Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
Continued fragmentation and degradation of natural habitats and ecosystems (including wetlands).	2	2	2	2	2	2	2	
	Local/district: Will affect the local area or district.	Possible: The impact may occur (Between a 25% to 50% chance of occurrence).	Medium term: The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Marginal loss of resource: The impact will result in marginal loss of resources.	Low cumulative impact: The impact would result in insignificant cumulative effects.	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Low Impact**
Continuing spread of IAP and weed species.	1	2	2	2	2	2	2	
	Site: The impact will only affect the site.	Possible: The impact may occur (Between a 25% to 50% chance of occurrence).	Medium term: The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Marginal loss of resource: The impact will result in marginal loss of resources.	Low cumulative impact: The impact would result in insignificant cumulative effects.	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Low Impact**
Ongoing displacement and direct mortalities of the faunal community (including SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, etc.)	1	2	2	2	2	2	2	
	Site: The impact will only affect the site.	Possible: The impact may occur (Between a 25% to 50% chance of occurrence).	Medium term: The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Marginal loss of resource: The impact will result in marginal loss of resources.	Low cumulative impact: The impact would result in insignificant cumulative effects.	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Low Impact**

6.2.4 Cumulative Impacts

The impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation this provides a good method of assessing a project's impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts pre-existing in an area or region, it is appropriate to consider the cumulative effects of development or disturbance activities. This is similar to the concept of shifting baselines, which describes how the environmental baseline at a specific point in time may actually represent a significant change from the original state of the system. This section describes the potential cumulative impacts of the project on local fauna and flora specifically.

Cumulative impacts are assessed within the context of the extent of the proposed PAOI, other similar developments and activities in the area (existing and in-process), and general habitat loss and transformation resulting from any other activities in the area. Localised cumulative impacts include those from operations that are close enough (within 30 km) to potentially cause additive effects on the local environment or any sensitive receptors (relevant operations include nearby large road networks, other solar PV facilities, dense urban development, and power infrastructure). Relevant impacts include the overall reduction of foraging and nesting habitat, dust deposition, noise and vibration, disruption of functional corridors of habitat important for movement and migration, disruption of waterways, groundwater drawdown, and groundwater and surface water quality depletion.

Long-term cumulative impacts associated with the site development activities can lead to the loss of endemic and threatened species, including natural habitat and vegetation types, and these impacts can even lead to the degradation of conserved areas such as nearby game parks and reserves.

6.2.4.1 Cumulative Impact Assessment

In order to spatially quantify the cumulative effects of the proposed developments, each sub-project in isolation (and then also the total combined project) is compared with the overall effects of surrounding development (including total transformation and transformation as a result of new and proposed developments of a similar type, i.e., solar).

According to the 2018 National Biodiversity Assessment, the total amount of Western Free State Clay Grassland habitat within 30 km of the PAOI amounts to 189 816 ha, but when considering the transformation that has taken place within this radius – 173 033 ha remains. Therefore, the area within 30 km of the project has experienced approximately 8.8% loss in natural clay grassland habitat. Additionally, it is noted that the largest sub-project footprint is 370 ha (for Notsi PV 3, and assuming the total extent of the EIA footprint for the sub-project area is developed), and up to 17 additional similar projects exist, or will soon be constructed, in the 30 km region (as per the latest South African Renewable Energy EIA Application Database) – measuring up to a total of 14 500 ha. This means that the total amount of remaining habitat lost as a result of all existing and/or approved solar projects in the region amounts to 8.6% (the sum of all related developments as a percentage of the total remaining habitat). If all five sub-projects are developed, measuring a total of up to 1265 ha, then the total remaining habitat lost would amount to 9.1%. Table 6-7 outlines the calculation procedure for the spatial assessment of cumulative impacts.

Table 6-7 Loss of Western Free State Clay Grassland habitat within a 30 km radius

	Total Habitat (ha)	Tot. Remaining Habitat (ha)	Total Historical Loss	Footprint (ha)	Similar Projects (ha)	Cumulative Habitat Lost
Sub-project cumulative effects (Spatial)	189 816	173 033	**8.8%**	370	14 500	**8.6%**
Total project cumulative effects (spatial)				1265	14 500	**9.1%**

The overall cumulative impact assessment, if only one sub-project were to be developed, is presented in Table 6-8 and Table 6-9 below. And the overall assessment for the total project is presented in Table 6-10 and Table 6-11. Note that these assessments also account for the relative importance of the habitats within and adjacent to the PAOI, in the context of the value of the regional habitat.

The cumulative impact of a single sub-project development is rated as ‘Low’, due to the smaller overall footprint of the individual area and the fact that more functional habitat remains as viable corridor area (note: this assessment assumes that no other sub-projects would be developed).

Although only a low quantity of the local habitat has already been transformed, the contribution of the total new development (overall project) to further loss is considered high, due to the extensive number of approved solar developments immediately adjacent and nearby – and because of the fact that a large number of protected areas and an IBA exist within the 30 km radius. Therefore, the overall cumulative impact of the overall project is rated as ‘Medium’. Careful and considerate spatial management and planning within the region must be a priority, in order to preserve important and functional habitat corridors.

Table 6-8 Cumulative Impacts to biodiversity associated with the proposed project – One sub-project in Isolation

Impact	Sub-Project in Isolation							
	Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
Loss of habitat, and disruption of surrounding ecological corridors. As well as the influences of pollution (water, noise, air, etc.).	1	3	2	2	2	3	2	
	Site: The impact will only affect the site.	Probable: The impact will likely occur (Between a 50% to 75% chance of occurrence).	Medium term: The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Marginal loss of resource: The impact will result in marginal loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Low Impact**

Table 6-9 Cumulative Impacts to biodiversity associated with the proposed project – Cumulative Effect of one sub-project

Impact	Cumulative Effect (sub-project)							
	Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
Loss of habitat, and disruption of surrounding ecological corridors. As well as the influences of pollution (water, noise, air, etc.).	2	3	2	2	2	3	2	
	Local/district: Will affect the local area or district.	Probable: The impact will likely occur (Between a 50% to 75% chance of occurrence).	Medium term: The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Marginal loss of resource: The impact will result in marginal loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Low Impact**

Table 6-10 Cumulative Impacts to biodiversity associated with the proposed project – Overall-project in Isolation

Impact	Overall Project in Isolation							
	Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
Loss of habitat, and disruption of surrounding ecological corridors. As well as the influences of pollution (water, noise, air, etc.).	2	3	2	2	2	3	2	
	Local/district: Will affect the local area or district.	Probable: The impact will likely occur (Between a 50% to 75% chance of occurrence).	Medium term: The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Marginal loss of resource: The impact will result in marginal loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Low Impact**

Table 6-11 Cumulative Impacts to biodiversity associated with the proposed project – Cumulative Effect of overall project

Impact	Cumulative Effect							
	Extent	Probability	Duration	Reversibility	Irreplaceability	Cumulative Effect	Magnitude/ Intensity	**Significance**
Loss of habitat, and disruption of surrounding ecological corridors. As well as the influences of pollution (water, noise, air, etc.).	3	3	3	2	2	3	2	
	Province/region: Will affect the entire province or region.	Probable: The impact will likely occur (Between a 50% to 75% chance of occurrence).	Long term: The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).	Partly reversible: The impact is partly reversible but more intense mitigation measures are required.	Marginal loss of resource: The impact will result in marginal loss of resources.	Medium cumulative impact: The impact would result in minor cumulative effects.	Medium: Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).	**Negative Medium Impact**

6.3 No-Go Scenario

The current land use is predominantly grazing and foraging for domestic cattle, sheep and horses – as well as local wildlife, and the associated impacts of this on the local terrestrial ecology is considered to be relatively low. It is also noted that the overall functionality and value of the land is high, as the land is apparently well managed such that the ingress of weed species is controlled and indigenous climax grasses are able to proliferate in areas. Given the current land use and associated functionality of the area, the overall 'no-go' alternative is considered to represent a low negative to low positive long-term impact on the environment.

Should the project be approved, it would be preferable for the 'High' sensitivity areas to be avoided, and for only light rotational grazing to be permitted within these 'Medium' sensitivity portions post-development (maximum twice per year).

6.4 Impact Management and Mitigation Plan

The aim of the management outcomes is to present mitigation actions in such a way that they can be incorporated into the Environmental Management Programme (EMPr), and possible biodiversity management programme, for the project, which should in turn allow for a more successful implementation and auditing of the mitigations and monitoring guidelines. Table 6-12 presents the recommended mitigation measures and the respective timeframes, targets, and performance indicators relative to the terrestrial assessment.

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

- Prevent the significant loss and fragmentation of vegetation communities (including functional ESA1 areas, and protected flora) within the Project Area;
- Reduce the negative fragmentation effects of the development and enable the safe movement of fauna species;
- Prevent the direct and indirect loss and disturbance of fauna species and communities, including SCC and protected species; and
- Adequately follow the guidelines for interpreting the Site Ecological Importance ratings assigned to the Project Area of Influence (see Table 4-6).

Special attention must be paid to the 'Vegetation and Habitats' and 'Fauna' sections below as these sections provide recommended and important mitigation measures pertaining to the presence of protected species, and the possible occasional presence of SCC fauna.

Table 6-12 Project specific mitigation measures including requirements for timeframes, roles and responsibilities

Management outcome: Vegetation and Habitats				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Any 'High' sensitivity areas should be avoided, and these areas should be clearly demarcated by non-hazardous/dangerous fencing. Brush cutting should be implemented beneath the panels, no vegetation clearing should be permitted.	Construction Phase	Project manager & Environmental Officer	Development footprint	Ongoing
Laydown and construction preparation activities (such as cement mixing, temporary toilets, etc.) must be limited to the 'Very Low' and 'Low' sensitivity areas.	Construction Phase	Project manager, Environmental Officer	Development footprint	Ongoing
The clearing of vegetation must be minimized where possible. All activities must be restricted to within the authorised areas. It is recommended that areas to be developed be specifically and responsibly demarcated so that during the construction phase only the demarcated areas be impacted upon.	Life of operation	Project manager, Environmental Officer	Areas of indigenous vegetation	Ongoing
Any observed SCC flora or protected plants must be clearly demarcated prior to the commencement of site clearing. If construction activities are likely to affect any SCC or protected plants these individuals must be relocated as part of a plant rescue and protection plan, and a permit may need to be obtained before doing so.	Planning Phase	Environmental Officer	Protected plants and SCC	During phase
Existing access routes, especially roads, must be made use of.	Construction/Operational Phase	Environmental Officer & Design Engineer	Roads and paths used	Ongoing
Any materials may not be stored for extended periods of time and must be removed from the PAOI once the construction phase has been concluded. No permanent construction phase structures should be permitted. Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated laydown areas.	Construction and Operational Phase	Environmental Officer, Design Engineer, and Contractor	Laydown areas	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by invasive alien plant species. All grazing mammals must be kept out of the areas that have recently been re-planted.	Operational phase	Environmental Officer & Contractor	Assess the state of rehabilitation and encroachment of alien vegetation	Quarterly for up to two years after the closure

A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. • **Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use.** • **No servicing of equipment on site unless necessary.** • **All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers.** • **Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment.** • **Construction activities and vehicles could cause spillages of lubricants, fuels and waste material negatively affecting the functioning of the ecosystem.** • **All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area.**	Life of operation	Environmental Officer & Contractor	Spill events, Vehicles dripping.	Ongoing
It must be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.	Life of operation	Project manager, Environmental Officer	Any instances	Ongoing
A fire management plan needs to be complied and implemented to restrict the impact fire would have on the surrounding areas.	Life of operation	Environmental Officer & Contractor	Fire Management	During Phase
All construction waste must be removed from site at the closure of the construction phase.	Construction phase	Environmental Officer & Contractor	Construction waste	During Phase
Management outcome: Fauna				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency

A qualified environmental control officer must be on site when activities begin. A site walk through is recommended by a suitably qualified ecologist prior to any activities taking place and any SSC or protected species should be noted. In situations where these species are observed and must be removed, the proponent may only do so after the required permission/permits have been obtained in accordance with national and provincial legislation. In the abovementioned situation the development and implementation of a search, rescue and recovery program is suggested for the protection of these species. Should animals not move out of the area on their own relevant specialists must be contacted to advise on how the species can be relocated.	Construction Phase	Environmental Officer, Contractor	Presence of any floral or faunal SCC	During phase
Clearing and disturbance activities must be conducted in a progressive linear manner, always outwards and away from the centre of the PAOI and over several days, so as to provide an easy escape route for all small mammals and herpetofauna.	Construction Phase	Environmental Officer & Contractor	Progressive land clearing operations and the movement of fauna	Ongoing
The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this.	Construction/Operational Phase	Project manager, Environmental Officer	Infringement into these areas	Ongoing
The duration of the activities should be minimized to as short a term as possible, to reduce the period of disturbance on fauna.	Construction	Project manager, Environmental Officer & Design Engineer	Construction/Closure Phase	Ongoing
Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to reptile species and nocturnal mammals.	Construction/Operational Phase	Environmental Officer	Noise levels	Ongoing
No trapping, killing, or poisoning of any wildlife is to be allowed and Signs must be put up to enforce this. Monitoring must take place in this regard.	Life of operation	Environmental Officer	Evidence of trapping etc	Ongoing
Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible.	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Light pollution and period of light	Ongoing
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited.	Life of operation	Health and Safety Officer	Compliance to the training	Ongoing

Schedule activities and operations during least sensitive periods, to avoid migration, nesting, and breeding seasons.	Life of operation	Project manager, Environmental Officer & Design Engineer	Activities should take place during the day	Ongoing
Any holes/deep excavations must be dug in a progressive manner and shouldn't be left open overnight. Should any holes remain open overnight they must be properly covered temporarily to ensure that no small fauna species fall in. Holes must be subsequently inspected for fauna prior to backfilling.	Planning and Construction	Environmental Officer & Contractor, Engineer	Presence of trapped animals and open holes	Ongoing
Fencing mitigations: • **Top 2 strands must be smooth wire** • **Routinely re-tension loose wires** • **Minimum 30cm between wires** **Place markers on fences.**	Planning, construction, and operation	Environmental Officer & Contractor, Engineer	Fence construction. Limiting risk to large bird species and mammals	Ongoing
Wildlife-permeable fencing with holes large enough for mongoose and other smaller mammals should be installed, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area.	Planning and construction	Environmental Officer & Contractor, Engineer	Fauna movement corridor	Ongoing
Use environmentally friendly cleaning and dust suppressant products.	Construction and operation	Environmental Officer & Contractor, Engineer	Presence of chemicals in and around the project area	Ongoing
Once the development layout has been confirmed, the footprint area must be fenced off appropriately in segments pre-construction to allow animals to move or be moved out of these areas before breaking ground activities occur. Construction activities must take place systemically and the perimeter fence should not be completed (i.e., leaving sections unfenced to allow fauna to escape) until systematic clearing is completed. Drilling etc. should start one side of the site and progress towards the section of the site where fences are incomplete (away from the center of the PAOI).	Planning/Construction Phase	Environmental Officer & Design Engineer	Areas not to be developed and construction direction	Ongoing
Management outcome: Alien species				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
An Invasive Alien Plant Management Plan must be compiled and implemented. This should regularly be updated to reflect the annual changed in IAP composition.	Life of operation	Project manager, Environmental Officer & Contractor	Manage and assess presence and encroachment of alien vegetation	Twice a year
The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprints of the roads must be kept to prescribed widths.	Construction/Operational Phase	Project manager, Environmental Officer & Contractor	Footprint Area	Life of operation

Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site. A location specific waste management plan must be put in place to limit the presence of rodents and pests and waste must not be allowed to enter surrounding areas.	Life of operation	Environmental Officer & Health and Safety Officer	Presence of waste	Life of operation
A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests due to the likely occasional presence of SCC.	Life of operation	Environmental Officer & Health and Safety Officer	Evidence or presence of pests	Life of operation
Management outcome: Dust				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes the wetting of exposed soft soil surfaces. **No non-environmentally friendly suppressants may be used as this could result in the pollution of water sources.**	Construction phase	Contractor	Dustfall	Dust monitoring program.
Management outcome: Waste management				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
Waste management must be a priority and all waste must be collected and stored effectively and responsibly according to a site-specific waste management plan. Dangerous waste such as metal wires and glass must only be stored in fully sealed and secure containers, before being moved off site as soon as possible.	Life of operation	Environmental Officer & Contractor	Waste Removal	Weekly
Litter, spills, fuels, chemical and human waste in and around the project area must be minimised and controlled according to the waste management plan.	Construction/Closure Phase	Environmental Officer & Health and Safety Officer	Presence of Waste	Daily
Cement mixing may not be performed on the ground. It is recommended that only closed side drum or pan type concrete mixers be utilised. Any spills must be immediately contained and isolated from the natural environment, before being removed from site.	Construction Phase	Environmental Officer & Contractor	Cement mixing and spills	Every occurrence

A minimum of one toilet must be provided per 10 persons. Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area.	Life of operation	Environmental Officer & Health and Safety Officer	Number of toilets per staff member. Waste levels	Daily
The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility within every 10 days at least.	Life of operation	Environmental Officer & Health and Safety Officer	Availability of bins and the collection of the waste	Ongoing
Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regards to waste management. Under no circumstances may domestic waste be burned on site or buried on open pits.	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Collection/handling of the waste	Ongoing
Refuse bins will be responsibly emptied and secured. Temporary storage of domestic waste shall be in covered and secured waste skips. Maximum domestic waste storage period will be 10 days.	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Management of bins and collection of waste	Ongoing, every 10 days

Management outcome: Environmental awareness training				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency
All personnel and contractors are to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. **Discussions are required on sensitive environmental receptors within the PAOI to inform contractors and site staff of the presence of protected species, their identification, conservation status and importance, biology, habitat requirements and management requirements in line with the Environmental Authorisation and within the EMPr.** **Contractors and employees must all undergo the induction and must be made aware of any sensitive areas to be avoided.**	Pre-construction phase	Health and Safety Officer, Environmental Officer	Compliance to the training	Ongoing

Management outcome: Erosion				
Impact Management Actions	**Implementation**		**Monitoring**	
	Phase	Responsible Party	Aspect	Frequency

Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds.	Life of operation	Project manager, Environmental Officer	Water Runoff from road surfaces	Ongoing
Only existing access routes and walking paths must be made use of where possible.	Life of operation	Project manager, Environmental Officer	Routes used within the area	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events etc.	Life of operation	Project manager, Environmental Officer	Re-establishment of indigenous vegetation	Progressively
A stormwater management plan must be compiled and implemented.	Life of operation	Project manager, Environmental Officer	Management plan	Before construction phase: Ongoing

7 Conclusion and Impact Statement

The Notsi PV 5 PAOI overlaps with functional portions of land that are provincially classified as 'Other Natural Areas'. Therefore, it is important that the management outcomes presented above be adhered to, in order to properly mitigate the negative environmental impacts that will stem from the project activities.

No flora or fauna SCC were recorded during the survey, and it is unlikely that any flora SCC occur within the PAOI. Certain local fauna SCC may however occasionally be found foraging within the PAOI, and the regionally 'Near Threatened' *Pyxicephalus adspersus* (Giant Bull Frog) could potentially utilise some of the seasonally wet areas as breeding habitat. No protected tree species are likely to occur, although two provincially protected plants were recorded and several Schedule 1 provincially protected fauna species were observed, including *Otocyon megalotis* (Bat-eared Fox) and *Stigmochelys pardalis* (Leopard Tortoise).

Completion of the terrestrial biodiversity assessment led to a disputing of the 'Very High' classification for the terrestrial biodiversity theme sensitivity as allocated by the National Environmental Screening Tool. The Notsi PV 5 PAOI is instead assigned an overall sensitivity of 'Medium', because of the relatively low levels of historical disturbance present in the area – which means that the ecosystems may be considered functional.

7.1 Impact Statement

The main impacts that may be expected to occur, as a result of the proposed activities, include the following:

- Direct habitat loss and fragmentation (including the loss of functional ONA areas and protected plants);
- Degradation of surrounding habitat;
- Disturbance and displacement of protected fauna (including direct mortality); and
- Introduction and further spreading of IAP and weed species.

All mitigation measures as described in this report must be implemented so as to reduce the significance of all anticipated impacts to an acceptable level (from 'Medium' – 'High' to 'Low'). The cumulative impact of the overall project, taking into account the transformation of surrounding land, is rated as 'Medium'. This is because the proposed development results in the loss of some important habitat corridors and the overall project footprint is regarded as relatively large, especially considering the fact that a number of other solar projects are approved in the region (within a 30 km radius).

Considering the assessment findings, no fatal flaws are evident for the proposed project. It is the opinion of the specialists that the project may be favourably considered, on condition that all prescribed mitigation measures are implemented.

7.2 Specialist Recommendations

It is recommended that a plant rescue and protection plan be developed for the proposed project, and implemented prior to the start of the construction phase and during the wet season. This is to limit the loss of any provincially protected plant species that were confirmed to occur within the Project Area.

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9 Appendix Items

9.1 Appendix A – Specialist Declarations

DECLARATION

I, Carami Burger, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Carami Burger

Terrestrial Ecologist

The Biodiversity Company

May 2023

DECLARATION

I, Michael Schrenk, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Michael Schrenk

Environmental Consultant

The Biodiversity Company

May 2023

DECLARATION

I, Sarah Newman, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Sarah Newman

Environmental Consultant

The Biodiversity Company

May 2023

DECLARATION

I, Andrew Husted, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Andrew Husted

Terrestrial Ecologist

The Biodiversity Company

May 2023

9.2 Appendix B – Specialist SACNASP Registration

SACNASP
South African Council for Natural Scientific Professions

herewith certifies that

Andrew Husted

Registration Number: 400213/11

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)

Aquatic Science (Professional Natural Scientist)
Ecological Science (Professional Natural Scientist)
Environmental Science (Professional Natural Scientist)

Effective **13 July 2011** Expires **31 March 2024**

Chairperson

Chief Executive Officer

To verify this certificate scan this code