



# Proposed Development of the Amper Daar Facility – Terrestrial Biodiversity Assessment

## De Aar, Northern Cape, South Africa

May 2023

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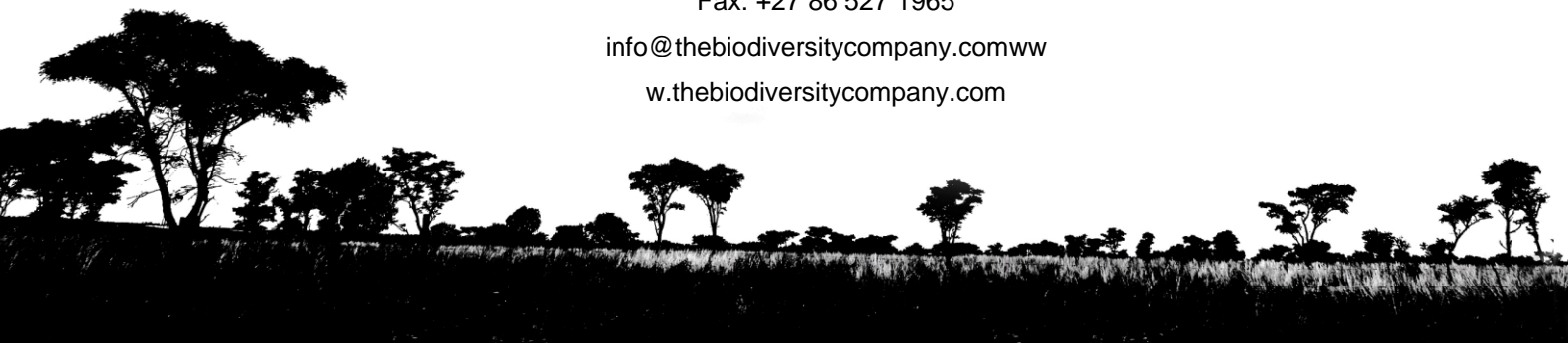
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|                       |  |
|-----------------------|--|
| Report Name           | <b>Proposed Development of the Amper Daar Facility – Terrestrial Biodiversity Assessment</b>   |
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| Declaration           | <p>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.</p> |

## List of Abbreviations

|                 |   |
|-----------------|---|
| <b>BI</b>       | Biodiversity Importance   |
| <b>BSP</b>      | Biodiversity Spatial Plan   |
| <b>CBA</b>      | Critical Biodiversity Area  |
| <b>CI</b>       | Conservation Importance   |
| <b>CR</b>       | Critically Endangered   |
| <b>EN</b>       | Endangered  |
| <b>ESA</b>      | Ecological Support Area   |
| <b>FI</b>       | Functional Integrity  |
| <b>HGM</b>      | Hydro-geomorphic  |
| <b>IBA</b>      | Important Bird and Biodiversity Areas                                       |
| <b>IUCN</b>     | International Union for Conservation of Nature                              |
| <b>LC</b>       | Least Concern   |
| <b>MASL</b>     | Metres Above Sea Level  |
| <b>MP</b>       | Moderately Protected  |
| <b>NBA</b>      | National Biodiversity Assessment  |
| <b>NEMBA</b>    | National Environmental Management Biodiversity Act                          |
| <b>NFEPA</b>    | National Freshwater Ecosystem Priority Area                                 |
| <b>NP</b>       | Not Protected   |
| <b>NPAES</b>    | National Protected Areas Expansion Strategy                                 |
| <b>NT</b>       | Near Threatened   |
| <b>PES-EIES</b> | Present Ecological State – Ecological Importance and Ecological Sensitivity |
| <b>POSA</b>     | Plants of Southern Africa   |
| <b>PP</b>       | Poorly Protected  |
| <b>SABAP2</b>   | Southern African Bird Atlas Project 2                                       |
| <b>SACAD</b>    | South Africa Conservation Areas Database                                    |
| <b>SAIAE</b>    | South African Inventory of Inland Aquatic Ecosystems                        |
| <b>SAPAD</b>    | South Africa Protected Areas Database                                       |
| <b>SCC</b>      | Species of Conservation   |
| <b>SEI</b>      | Site Ecological Importance  |
| <b>SWSA</b>     | Strategic Water Source Area   |
| <b>VU</b>       | Vulnerable  |
| <b>WP</b>       | Well Protected  |

## Table of Contents

|       |   |    |
|-------|---|----|
| 1     | Introduction.....                               | 1  |
| 1.1   | Background .....                                | 1  |
| 1.2   | Project Information .....                       | 1  |
| 1.3   | Scope of Work.....                              | 3  |
| 1.4   | Assumptions and Limitations .....               | 3  |
| 1.5   | Key Legislative Requirements.....               | 3  |
| 1.6   | Definitions.....                                | 4  |
| 1.6.1 | Species of Conservation Concern.....            | 4  |
| 1.6.2 | Protected Species .....                         | 5  |
| 1.6.3 | Project Area of Influence.....                  | 5  |
| 2     | Methods.....                                    | 7  |
| 2.1   | Desktop Assessment .....                        | 7  |
| 2.1.1 | Ecologically Important Landscape Features ..... | 7  |
| 2.1.2 | Desktop Flora Assessment .....                  | 8  |
| 2.1.3 | Desktop Faunal Assessment .....                 | 9  |
| 2.2   | Field Assessment.....                           | 9  |
| 2.2.1 | Flora Assessment.....                           | 10 |
| 2.2.2 | Faunal Assessment.....                          | 10 |
| 2.3   | Site Ecological Importance (SEI) .....          | 12 |
| 3     | Results & Discussion .....                      | 16 |
| 3.1   | Desktop Assessment .....                        | 16 |
| 3.1.1 | Ecologically Important Landscape Features ..... | 16 |
| 3.1.2 | Flora Assessment.....                           | 22 |
| 3.1.3 | Faunal Assessment.....                          | 26 |
| 3.2   | Field Assessment.....                           | 28 |
| 3.2.1 | Land use and Current Impacts.....               | 28 |
| 3.2.2 | Flora Assessment.....                           | 30 |
| 3.2.3 | Faunal Assessment.....                          | 37 |
| 4     | Site Ecological Importance (SEI) .....          | 40 |
| 5     | Impact Risk Assessment.....                     | 46 |
| 5.1   | Biodiversity Risk Assessment .....              | 46 |
| 5.1.1 | Present Impacts to Biodiversity .....           | 46 |

|       |  |    |
|-------|--|----|
| 5.1.2 | Identification of Additional Potential Impacts .....                       | 46 |
| 5.1.3 | Alternatives considered.....   | 48 |
| 5.2   | Assessment of Impact Significance .....                                    | 48 |
| 6     | Management Objectives: Biodiversity.....                                   | 57 |
| 7     | Conclusion and Impact Statement .....                                      | 65 |
| 7.1   | Conclusion.....  | 65 |
| 7.2   | Impact Statement .....   | 65 |
| 8     | References .....   | 66 |
| 9     | Appendix Items .....   | 69 |
| 9.1   | Appendix A – Protocol Checklist.....                                       | 69 |
| 9.2   | Appendix B – Flora species expected to occur in the project area.....      | 73 |
| 9.3   | Appendix C – Amphibian species expected to occur in the project area.....  | 85 |
| 9.4   | Appendix D – Reptile species expected to occur in the project area.....    | 86 |
| 9.5   | Appendix E – Mammal species expected to occur within the project area..... | 88 |
| 9.6   | Appendix F – Specialists Qualifications .....                              | 90 |
| 9.7   | Appendix G – Specialists Declaration of Independence .....                 | 94 |

## List of Tables

|           |   |    |
|-----------|---|----|
| Table 1-1 | A list of key legislative requirements relevant to biodiversity and conservation in the Northern Cape <sup>3</sup>                                |    |
| Table 2-1 | Summary of surveys undertaken for the biodiversity assessment.....  | 9  |
| Table 2-2 | Summary of Conservation Importance (CI) criteria.....   | 12 |
| Table 2-3 | Summary of Functional Integrity (FI) criteria.....  | 13 |
| Table 2-4 | Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI).....                           | 13 |
| Table 2-5 | Summary of Resource Resilience (RR) criteria .....  | 14 |
| Table 2-6 | Matrix used to derive Site Ecological Importance (SEI) from Receptor Resilience (RR) and Biodiversity Importance (BI).....                        | 14 |
| Table 2-7 | Guidelines for interpreting Site Ecological Importance (SEI) in the context of the proposed development activities.....                           | 14 |
| Table 3-1 | Summary of relevance of the proposed development to ecologically important landscape features.  | 16 |
| Table 3-2 | Reptile SCC expected in the project area.....   | 26 |
| Table 3-3 | List of mammal Species of Conservation Concern that may occur in the project area as well as their global and regional conservation statuses..... | 27 |
| Table 3-4 | Alien Invasive Plants recorded from the project area .....  | 34 |
| Table 3-5 | Proposed monitoring framework for the control of invasive alien plants within the project area  | 34 |
| Table 3-6 | Summary of amphibian species recorded within the project area during the survey period. LC = Least Concern.....                                   | 37 |
| Table 3-7 | Summary of reptile species recorded within the project area during the survey period. LC = Least Concern.....                                     | 37 |
| Table 3-8 | Mammal SCC recorded within the project area during the survey periods. ....   | 38 |
| Table 4-1 | Habitat types and associated SEI delineated within the field assessment area of the proposed development.....                                     | 42 |
| Table 4-2 | Summary of the screening tool vs. specialist assigned sensitivities.....  | 43 |
| Table 5-1 | Potential impacts to biodiversity associated with the proposed activity.....  | 46 |
| Table 5-2 | Impacts to biodiversity associated with the proposed construction phase. ....   | 49 |
| Table 5-3 | Impacts to biodiversity associated with the proposed construction phase. ....   | 49 |
| Table 5-4 | Impacts to biodiversity associated with the proposed construction phase. ....   | 51 |
| Table 5-5 | Impacts to biodiversity associated with the proposed operational phase.....   | 52 |
| Table 5-6 | Impacts to biodiversity associated with the proposed operational phase.....   | 53 |
| Table 5-7 | Impacts to biodiversity associated with the proposed operational phase.....   | 53 |

|           |   |    |
|-----------|---|----|
| Table 5-8 | The cumulative impacts considered for avifauna.....   | 55 |
| Table 5-9 | Cumulative Impacts to biodiversity associated with the proposed project.....                          | 55 |
| Table 6-1 | Mitigation measures including requirements for timeframes, roles and responsibilities for this report | 58 |

## List of Figures

|             |  |    |
|-------------|--|----|
| Figure 1-1  | Map illustrating the location of the project area .....  | 2  |
| Figure 1-2  | Threatened species and Species of Conservation Concern (SANBI, 2016) .....   | 5  |
| Figure 1-3  | Project Area of Influence (PAOI).....  | 6  |
| Figure 2-1  | Map illustrating extent of area used to obtain the expected flora species list from the Plants of South Africa (POSA) database .....   | 9  |
| Figure 2-2  | Map illustrating the location of the meanders and points utilised for the biodiversity impact assessment .....   | 11 |
| Figure 3-1  | Map illustrating the ecosystem threat status associated with the assessment area ....  | 17 |
| Figure 3-2  | Map illustrating the ecosystem protection level associated with the assessment area  | 18 |
| Figure 3-3  | Map illustrating the location of the IBAs proximal to the project area .....   | 19 |
| Figure 3-4  | Map illustrating the location of Critical Biodiversity Areas proximal to the project area  | 20 |
| Figure 3-5  | The inland water features associated with the project area.....  | 21 |
| Figure 3-6  | Map illustrating the NFEPA wetland and river systems associated with the assessment area   | 22 |
| Figure 3-7  | Map illustrating the vegetation types associated with the assessment area and surrounding landscape based on the Vegetation Map of South Africa, Lesotho & Swaziland.....  | 23 |
| Figure 3-8  | Land use and current impacts of the study area in general. A: invasive alien plant species and fences, B: overgrazing and fences, C: Sheep grazing, D: invasive alien plants, E: roads and associated alien plant species and F: Cattle grazing.....   | 29 |
| Figure 3-9  | Photographs illustrating the Karoo Grassland of the Amper Daar site. ....  | 31 |
| Figure 3-10 | Photographs illustrating some of the dominant plant species A: <i>Asparagus sauvoles</i> B: <i>Ruschia intricata</i> , C: <i>Eriocephalus ericoides</i> , D: <i>Pteronia incana</i> , E <i>Roepera lichtenseinii</i> and F: <i>Chrysocoma ciliate</i> .....  | 32 |
| Figure 3-11 | Photographs illustrating a portion of the alien invasive species recorded from the project area A: <i>Prosopis velutina</i> , B: <i>Tagetes minuta</i> , C: <i>Eucalyptus camaldulensis</i> , D: <i>Agave americana</i> , E: <i>Datura ferox</i> .   | 36 |
| Figure 3-12 | Photographs illustrating a portion of the herpetofauna recorded from the project area. A: <i>Stigmochelys pardalis</i> , B: <i>Leptotyphlops scutifrons scutifrons</i> , C: <i>Trachylepis punctatissima</i> , and D: <i>Acontias gracilicauda</i> .   | 38 |
| Figure 3-13 | Photographs illustrating a portion of the mammals recorded within the project area during the survey period. A: <i>Raphicerus campestris</i> (Steenbok), B: <i>Hystrix africae australis</i> (Cape porcupine), C: <i>Genetta genetta</i> (Small-spotted Genet), D: <i>Proteles cristata</i> (Aardwolf), E: <i>Otocyon megalotis</i> (Bat-eared Fox) and F: <i>Vulpes chama</i> (Cape fox)..... | 39 |

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|            |   |    |
|------------|---|----|
| Figure 4-1 | Combined Terrestrial Biodiversity Sensitivity of the assessment area .....  | 40 |
| Figure 4-2 | Relative Animal Species Theme Sensitivity of the assessment area .....  | 41 |
| Figure 4-3 | Relative Plant Species Theme Sensitivity of the assessment area .....   | 42 |
| Figure 4-4 | Map illustrating the habitats defined within the project area .....   | 44 |
| Figure 4-5 | Map illustrating Site Ecological Importance (SEI) of the habitat types within the project area                                      | 45 |
| Figure 5-1 | Map illustrating the additional renewable energy developments within the landscape overlaid onto the remnant vegetation types ..... | 55 |



# 1 Introduction

## 1.1 Background

The Biodiversity Company (TBC) was appointed to undertake a terrestrial biodiversity assessment for the proposed Amper Daar Solar Photovoltaic (PV) facility near De Aar, Northern Cape Province. The project area is located approximately 20km north of Philipstown and 30km west of Petrusville.

The National Web based Environmental Screening Tool has characterised the terrestrial theme sensitivity of the project area as “Very High”. Accordingly, this assessment was conducted in accordance with the amendments to the Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The approach has taken cognisance of the recently published Government Notices (GN) 320 (20 March 2020) and GN 1150 (30 October 2020): “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation” (Reporting Criteria). See Appendix A for the protocol checklist and where they can be found within the report.

The purpose of the specialist studies is to provide relevant input into the impact assessment process and to provide a report for the proposed activities associated with the development. This report, after taking into consideration the findings and recommendations provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making as to the ecological viability of the proposed project.

## 1.2 Project Information

A consortium consisting of Akuo Energy Afrique, Africoast Investments and Golden Sunshine Trading propose to develop the Amper Daar Solar PV Facility and its associated electrical infrastructure on Remainder of the Farm Wolwe Kuil 44 in the Renosterberg Local Municipality in the greater Pixley ka Seme District Municipality in the Northern Cape Province. The project site is located approximately 20km north of Philipstown and 30km west of Petrusville and within the Central Transmission Corridor. The Project (Amper Daar Solar PV Facility) is part of a cluster known as the Crossroads Green Energy Cluster. The Cluster entails the development of up to Twenty-one (21) solar energy facilities.

A technically suitable project site of ~1281ha has been identified by Akuo Energy Afrique for the establishment of the PV facility. The proposed facility will have a contracted capacity of 100MW and will include the following infrastructure:

- Solar PV array comprising PV modules and mounting structures (monofacial or bifacial and a single axis tracking system);
- Inverters and transformers;
- Cabling between the project components;
- Battery Energy Storage System (BESS);
- On-site facility substation and power lines between the solar PV facility and the Eskom substation (to be confirmed and assessed through a separate process);
- Site offices, Security office, operations and control, and maintenance and storage laydown areas; and
- Access roads, internal distribution roads.

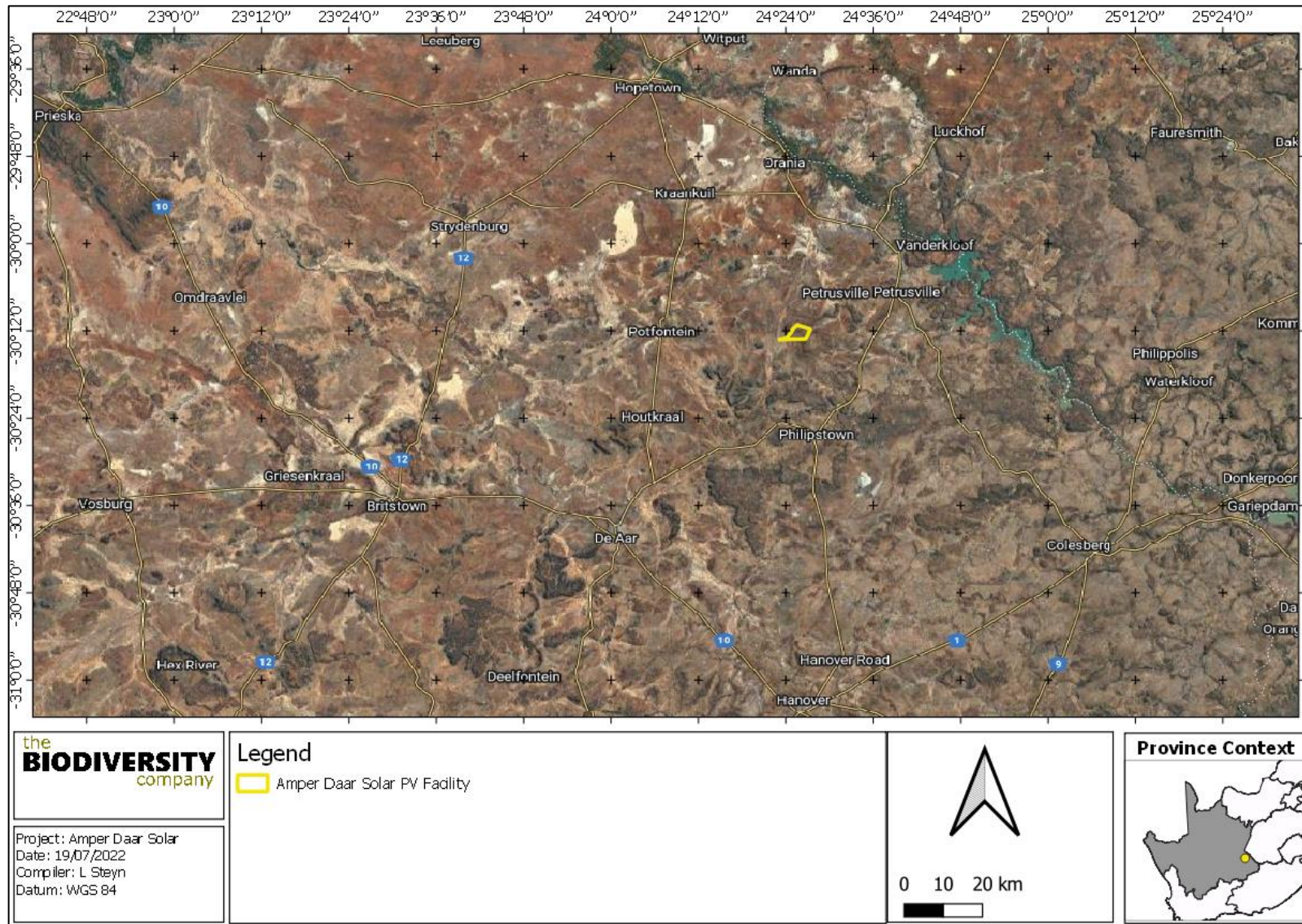


Figure 1-1 Map illustrating the location of the project area

### 1.3 Scope of Work

The aim of the biodiversity assessment was to provide information to guide the risk of the proposed activity to the current state of the associated ecosystems within the development area. This was achieved through the following:

- Desktop assessment to identify the ecologically important features within the landscape comprising of terrestrial & freshwater features;
- Desktop assessment to identify possible Species of Conservation Concern (SCC) that occur within the landscape;
- Field survey to record flora and fauna species, especially Species of Conservation Concern (SCC);
- Determination of the Site Ecological Importance (SEI), also commonly referred to as sensitivity;
- A biodiversity impact assessment; and
- The prescription of mitigation measures for identified risks, including assigning buffer areas, were necessary.

### 1.4 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- The GPS used for the assessment is accurate to 5 metres and therefore any spatial features may be offset by this distance;
- Information relating to project activities, spatial data and infrastructure locations for the proposed development was obtained from information provided by the client. The potential impacts and recommendations described in this report apply specifically to the provided information;
- Although considerable time has been spent to ensure that information utilised in this report is verified. It is assumed that all third-party information utilised in the compilation of this report is correct at the time of compilation (e.g., spatial data, online databases, and species lists); and
- The fieldwork component of the assessment comprised of winter (dry season) survey. The survey was conducted from the 4<sup>th</sup> of July to the 13<sup>th</sup> of July 2022. Therefore, the probability of detection of certain faunal species will be lowered as certain species or groups of fauna are inherently secretive and require extensive sampling periods. Spring and summer season flowering flora (particularly geophytes, which require an inflorescence for identification) may have been missed. Although it is not considered necessary for another site visit to be conducted in flowering season (summer), it is considered necessary that a walkover be conducted in the correct season prior to any construction taking place to determine the presence of any SCC or protected species and then the required permit applications undertaken.

### 1.5 Key Legislative Requirements

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

**Table 1-1** *A list of key legislative requirements relevant to biodiversity and conservation in the Northern Cape*

| Region        | Legislation                                    |
|---------------|--|
| International | Convention on Biological Diversity (CBD, 1993) |

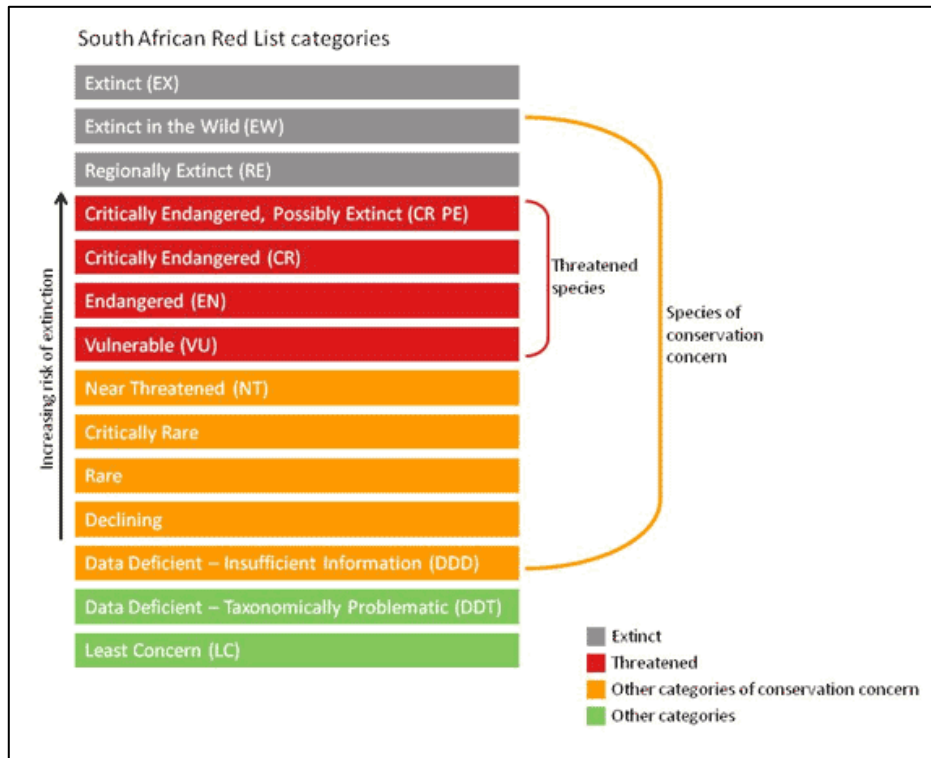


|                   |  |
|-------------------|--|
|                   | <p>The Convention on Wetlands (RAMSAR Convention, 1971)</p> <p>The United Nations Framework Convention on Climate Change (UNFCCC, 1994)</p> <p>The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973)</p> <p>The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979)</p> <p>Constitution of the Republic of South Africa (Act No. 108 of 2006)</p> <p>The National Environmental Management Act (NEMA) (Act No. 107 of 1998)</p> <p>The National Environmental Management Protected Areas Act (Act No. 57 of 2003)</p> <p>The National Environmental Management Biodiversity Act (Act No. 10 of 2004)</p> <p>The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24 , No 42946 (January 2020)</p> <p>The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24 , No 43110 (March 2020)</p> <p>The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);</p> <p>The Environment Conservation Act (Act No. 73 of 1989) and associated EIA Regulations</p> <p>National Protected Areas Expansion Strategy (NPAES)</p> <p>Environmental Conservation Act (Act No. 73 of 1983)</p> <p>Natural Scientific Professions Act (Act No. 27 of 2003)</p> <p>National Biodiversity Framework (NBF, 2009)</p> <p>National Forest Act (Act No. 84 of 1998)</p> <p>National Veld and Forest Fire Act (101 of 1998)</p> <p>National Spatial Biodiversity Assessment (NSBA)</p> <p>World Heritage Convention Act (Act No. 49 of 1999)</p> <p>National Heritage Resources Act, 1999 (Act 25 of 1999)</p> <p>Municipal Systems Act (Act No. 32 of 2000)</p> <p>Alien and Invasive Species Regulations, 2014</p> <p>South Africa's National Biodiversity Strategy and Action Plan (NBSAP)</p> <p>Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)</p> <p>Sustainable Utilisation of Agricultural Resources (Draft Legislation).</p> <p>White Paper on Biodiversity</p> |
| <b>National</b>   |  |
| <b>Provincial</b> | <p>Northern Cape Nature Conservation act no. 9 of 2009</p> <p>Northern Cape Planning and Development Act no. 7 of 1998</p> <p>Northern Cape Critical Biodiversity Area 2017</p>  |

## 1.6 Definitions

### 1.6.1 Species of Conservation Concern

In accordance with the National Red List of South African Plants website, managed and maintained by the South African National Biodiversity Institute (SANBI), a Species of Conservation Concern (SCC) is a species that has a high conservation importance in terms of preserving South Africa's rich biodiversity. This classification covers a range of red list categories as illustrated in Figure 1-2 below.



**Figure 1-2 Threatened species and Species of Conservation Concern (SANBI, 2016)**

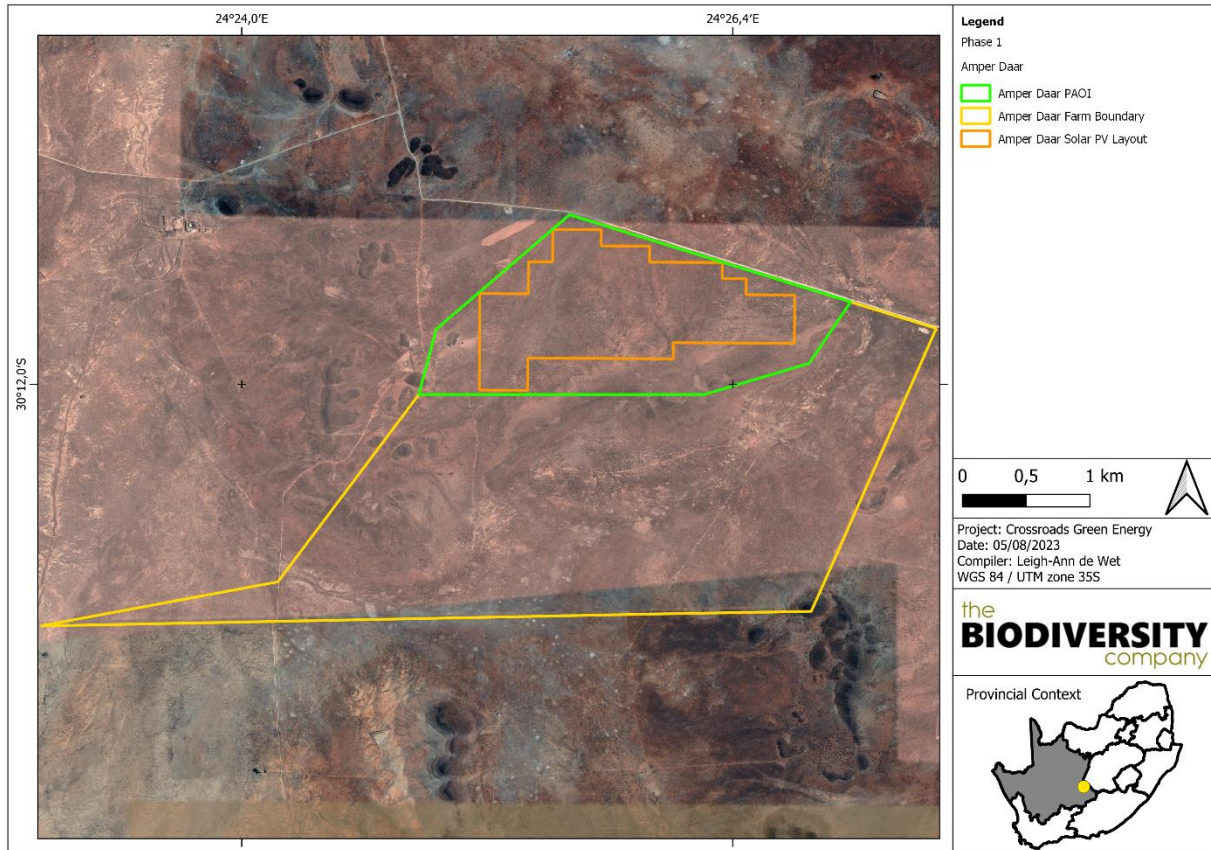
South Africa uses the internationally endorsed International Union for Conservation of Nature (IUCN) Red List Categories and Criteria (IUCN, 2012). This scientific system is designed to measure species' risk of extinction and its purpose is to highlight those species that are in need of critical conservation 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.

**1.6.2 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).

**1.6.3 Project Area of Influence**

The Project Area of Influence (PAOI) encompasses the geographical extent of the potential impacts of the proposed development on the receiving environment. Essentially, the PAOI is defined according to the important ecosystem processes and functions that may be plausibly affected by the proposed development and its associated activities. The PAOI was considered to be the proposed footprint of the solar PV infrastructure for the site (Figure 1-3).



**Figure 1-3** Project Area of Influence (PAOI).

## 2 Methods

### 2.1 Desktop Assessment

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

#### 2.1.1 Ecologically Important Landscape Features

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

- National Biodiversity Assessment 2018 (Skowno *et al*, 2019) - The purpose of the National Biodiversity Assessment (NBA) is to assess the state of South Africa's biodiversity based on best available science, with a view to understanding trends over time and informing policy and decision-making across a range of sectors. The NBA deals with all three components of biodiversity: genes, species and ecosystems; and assesses biodiversity and ecosystems across terrestrial, freshwater, estuarine and marine environments. The two headline indicators assessed in the NBA are:
- Ecosystem Threat Status – indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition.
- Ecosystem Protection Level – indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. Not Protected, Poorly Protected or Moderately Protected ecosystem types are collectively referred to as under-protected ecosystems.
- Protected areas:
- South Africa Protected Areas Database (SAPAD) and South Africa Conservation Areas Database (SACAD) (DEA, 2021) – The South African Protected Areas Database (SAPAD) and South Africa Conservation Areas Database (SACAD) contains spatial data for the conservation of South Africa. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. The database is updated on a continuous basis and forms the basis for the Register of Protected Areas which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.
- National Protected Areas Expansion Strategy (NPAES) (SANBI, 2010) – The National Protected Area Expansion Strategy (NPAES) provides spatial information on areas that are suitable for terrestrial ecosystem protection. These focus areas are large, intact and unfragmented and are therefore, of high importance for biodiversity, climate resilience and freshwater protection.
- Conservation/Biodiversity Sector Plans:

The Northern Cape Department of Environment and Nature Conservation has developed the Northern Cape CBA Map which identifies biodiversity priority areas for the province, called Critical Biodiversity Areas (CBAs) and 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.

The identification of Critical Biodiversity Areas for the Northern Cape was undertaken using a Systematic Conservation Planning approach. Available data on biodiversity features (incorporating both pattern and process, and covering terrestrial and inland aquatic realms), their condition, current Protected Areas and Conservation Areas, and opportunities and constraints for effective conservation were collated.

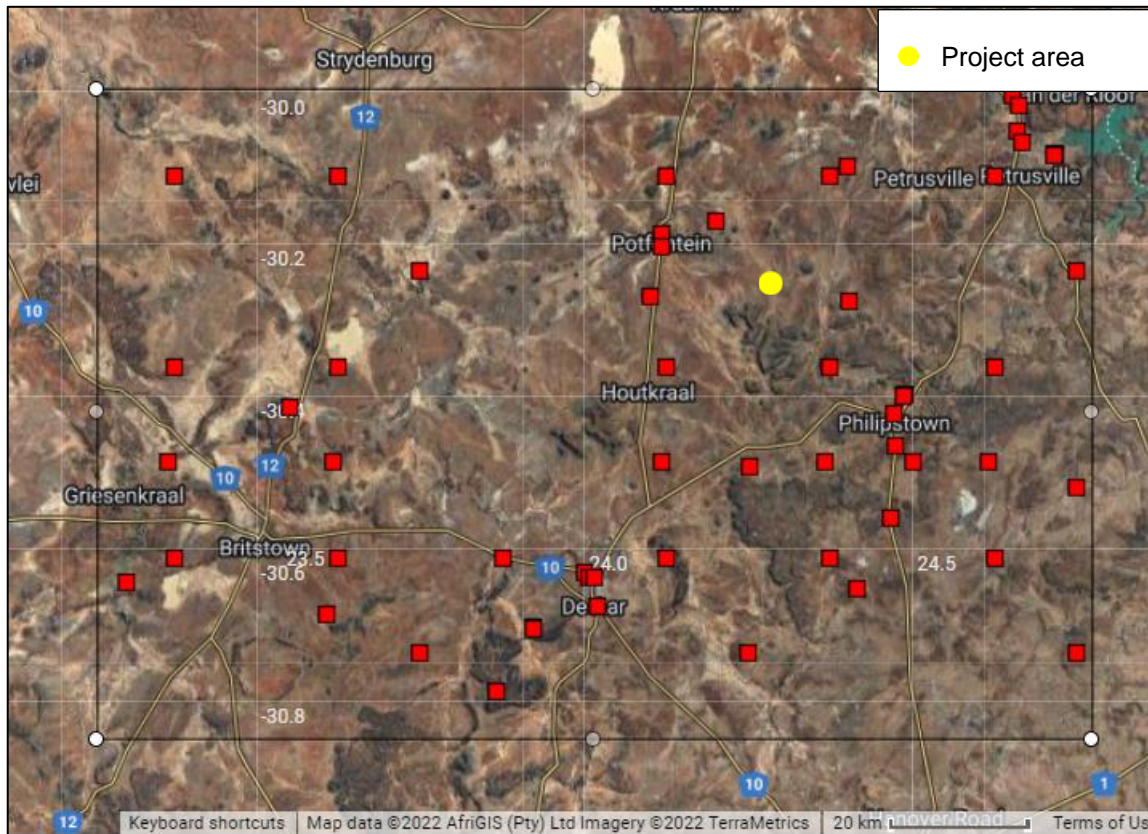
The Northern Cape Critical Biodiversity Area (CBA) Map updates, revises and replaces all older systematic biodiversity plans and associated products for the province. These include the:

- Namakwa District Biodiversity Sector Plan;
- Cape Fine-Scale Plan (only the extent of the areas in the Northern Cape i.e. Bokkeveld and Nieuwoudtville); and
- Richtersveld Municipality Biodiversity Assessment.
- Important Bird and Biodiversity Areas (BirdLife South Africa, 2015) – Important Bird and Biodiversity Areas (IBAs) constitute a global network of over 13 500 sites, of which 112 sites are found in South Africa. IBAs are sites of global significance for bird conservation, identified through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria; and
- Hydrological Setting:
  - South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer *et al*, 2018) – A South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was established during the National Biodiversity Assessment of 2018. It is a collection of data layers that represent the extent of river and inland wetland ecosystem types as well as pressures on these systems.
  - Strategic Water Source Areas (SWSAs) (Le Maitre *et al*, 2018) – SWSAs are defined as areas of land that supply a quantity of mean annual surface water runoff in relation to their size and therefore, contribute considerably to the overall water supply of the country. These are key ecological infrastructure assets and the effective protection of surface water SWSAs areas is vital for national security because a lack of water security will compromise national security and human wellbeing.
  - National Freshwater Ecosystem Priority Area (NFEPAs) (Nel *et al.*, 2011) – The NFEPAs database provides strategic spatial priorities for conserving the country's freshwater ecosystems and associated biodiversity as well as supporting sustainable use of water resources.

### 2.1.2 Desktop Flora Assessment

The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006) was used in order to identify the vegetation type that would have occurred under natural or pre-anthropogenically altered conditions. Furthermore, the Plants of Southern Africa (POSA) database was accessed to compile a list of expected flora species within the proposed development area and surrounding landscape (Figure 2-1). The Red List of South African Plants (Raimondo *et al.*, 2009; SANBI, 2020) was utilized to provide the most current national conservation status of flora species.





**Figure 2-1** Map illustrating extent of area used to obtain the expected flora species list from the Plants of South Africa (POSA) database

### 2.1.3 Desktop Faunal Assessment

The faunal desktop assessment comprised of the following:

- Compiling an expected amphibian list generated from the IUCN spatial dataset (2017) and the FrogMap database of the Animal Demography Unit (<http://vmus.adu.org.za/>) using the 3024-degree square;
- Compiling an expected reptile list generated from the IUCN spatial dataset (2017) and the ReptileMap database of the Animal Demography Unit (<http://vmus.adu.org.za/>) using the 3024-degree square; and
- Compiling an expected mammal list generated from the IUCN spatial dataset (2017) and the MammalMap database of the Animal Demography Unit (<http://vmus.adu.org.za/>) using the 3024-degree square.

## 2.2 Field Assessment

One field survey was undertaken to confirm the presence of SCC, as well as any sensitive habitat features. Table 2-1 summarises the timing and period of the surveys undertaken

**Table 2-1** Summary of surveys undertaken for the biodiversity assessment

| Survey Number | Season       | Date/s                | Comments  |
|---------------|--------------|-----------------------|---|
| 1             | Dry (Winter) | 4 July – 13 July 2022 | Survey to determine the presence of flora and fauna of the site, as well as likelihood of occurrence within the PAOI as well as the footprint of the proposed development. Vegetation and habitat units were also identified. |

|  |  |  |
|--|--|--|
|  |  | This included the identification of faunal habitats and any fauna present. Avifauna is presented in a separate report, though the site visit was conducted concurrently. |
|--|--|--|

Effort was made to cover all the different habitat types within the limits of time and access. During the survey, notes were made regarding current impacts, recording of dominant vegetation species and any sensitive or important features (e.g., drainage lines, rock outcrops, termite mounds etc.).

### 2.2.1 Flora Assessment

The flora assessment consisted of timed meanders of the survey area. This primarily involved meandering through habitat types and identifying all species observed and particularly locating any species of conservation concern.

Relevant field guides and texts consulted for identification purposes included, but was not limited, to the following:

- Identification Guide to Southern African Grasses: An Identification Manual with Keys, Descriptions, and Distributions (Fish *et al*, 2015);
- Karoo: South African Wild Flower Guide 6. (Shearing 2008);
- Problem Plants and Alien Weeds of South Africa (Bromilow, 2018);
- Field Guide to Succulents in Southern Africa (Smith *et al*, 2017);
- Field Guide to Wildflowers of South Africa (Manning, 2009); and
- iNaturalist. Available at <https://www.inaturalist.org/home>.

### 2.2.2 Faunal Assessment

The faunal assessment within this report pertains to herpetofauna and mammals. The faunal field survey comprised of the following active and passive techniques:

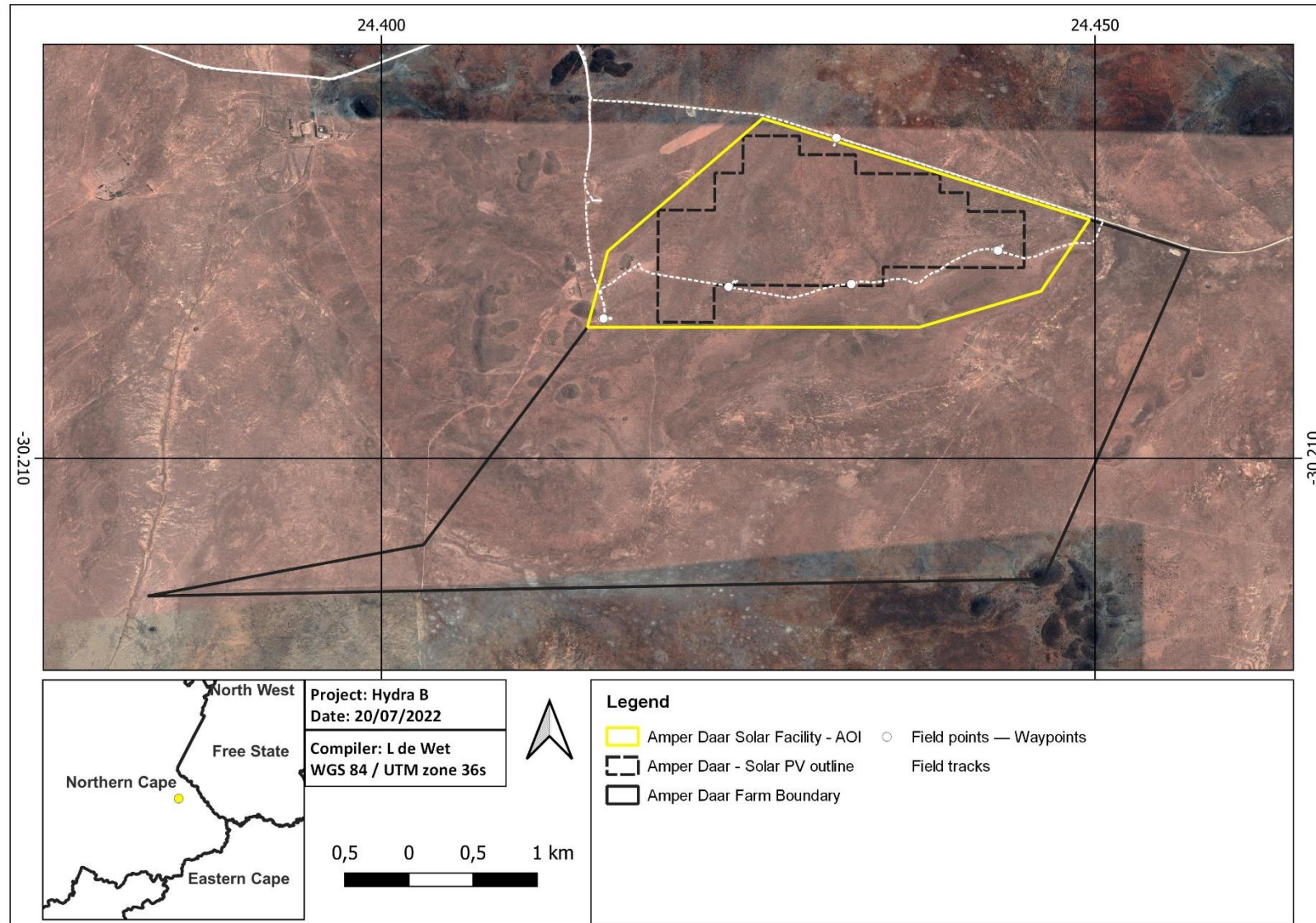
- Visual and auditory searches - This typically comprised of meandering and using binoculars to view species from a distance without them being disturbed as well as listening to species calls or locating tracks and scat;
- Active hand-searches - are used for species that shelter in or under particular micro-habitats (typically under rocks, rocky crevices, coarse woody debris, etc.); and
- Utilization of local knowledge.

Diagnostic features of the individuals that were captured were photographed at site and released. The locations of the site assessment meanders are illustrated in Figure 2-2.

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

- Field Guide to Snakes and other Reptiles of Southern Africa (Branch, 1998);
- A Complete Guide to the Snakes of Southern Africa (Marais, 2004);
- Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland (Bates *et al*, 2014);
- A Complete Guide to the Frogs of Southern Africa (du Preez and Carruthers, 2009);
- Stuarts' Field Guide to Mammals of Southern Africa including Angola, Zambia & Malawi (Stuart and Stuart, 2015); and
- A Field Guide to the Tracks and Signs of Southern and East African Wildlife (Stuart and Stuart, 2000).





**Figure 2-2** Map illustrating the location of the meanders and points utilised for the biodiversity impact assessment

## 2.3 Site Ecological Importance (SEI)

The different habitat types within the assessment area were delineated and identified based on observations during the field assessment as well as available satellite imagery. These habitat types were assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of species of conservation concern and their ecosystem processes.

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

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

**Table 2-2 Summary of Conservation Importance (CI) criteria**

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

**Table 2-3 Summary of Functional Integrity (FI) criteria**

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

BI can be derived from a simple matrix of CI and FI as provided in Table 2-4

**Table 2-4 Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI)**

| Biodiversity Importance (BI) |           | Conservation Importance (CI) |           |          |          |          |
|------------------------------|-----------|------------------------------|-----------|----------|----------|----------|
|                              |           | Very High                    | High      | Medium   | Low      | Very Low |
| Functional Integrity (FI)    | Very High | Very High                    | Very High | High     | Medium   | Low      |
|                              | High      | Very High                    | High      | Medium   | Medium   | Low      |
|                              | Medium    | High                         | Medium    | Medium   | Low      | Very Low |
|                              | Low       | Medium                       | Medium    | Low      | Low      | Very Low |
|                              | Very Low  | Medium                       | Low       | Very Low | Very Low | Very Low |

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor as summarised in Table 2-5.

**Table 2-5 Summary of Resource Resilience (RR) criteria**

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

Subsequent to the determination of the BI and RR, the SEI can be ascertained using the matrix as provided in Table 2-6.

**Table 2-6 Matrix used to derive Site Ecological Importance (SEI) from Receptor Resilience (RR) and Biodiversity Importance (BI)**

| Site Ecological Importance (SEI) |           | Biodiversity Importance (BI) |           |          |          |          |
|----------------------------------|-----------|------------------------------|-----------|----------|----------|----------|
|                                  |           | Very High                    | High      | Medium   | Low      | Very Low |
| Receptor Resilience (RR)         | Very Low  | Very High                    | Very High | High     | Medium   | Low      |
|                                  | Low       | Very High                    | Very High | High     | Medium   | Very Low |
|                                  | Medium    | Very High                    | High      | Medium   | Low      | Very Low |
|                                  | High      | High                         | Medium    | Low      | Very Low | Very Low |
|                                  | Very High | Medium                       | Low       | Very Low | Very Low | Very Low |

Interpretation of the SEI in the context of the proposed development activities is provided in Table 2-7.

**Table 2-7 Guidelines for interpreting Site Ecological Importance (SEI) in the context of the proposed development activities**

| Site Ecological Importance (SEI) | Interpretation in relation to proposed development activities  |
|----------------------------------|--|
| <b>Very High</b>                 | 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. |
| <b>High</b>                      | 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.   |
| <b>Medium</b>                    | Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.   |

| Site Ecological Importance (SEI) | Interpretation in relation to proposed development 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.



### 3 Results & Discussion

#### 3.1 Desktop Assessment

##### 3.1.1 Ecologically Important Landscape Features

The relevance of the proposed development to ecologically important landscape features are summarised in Table 3-1.

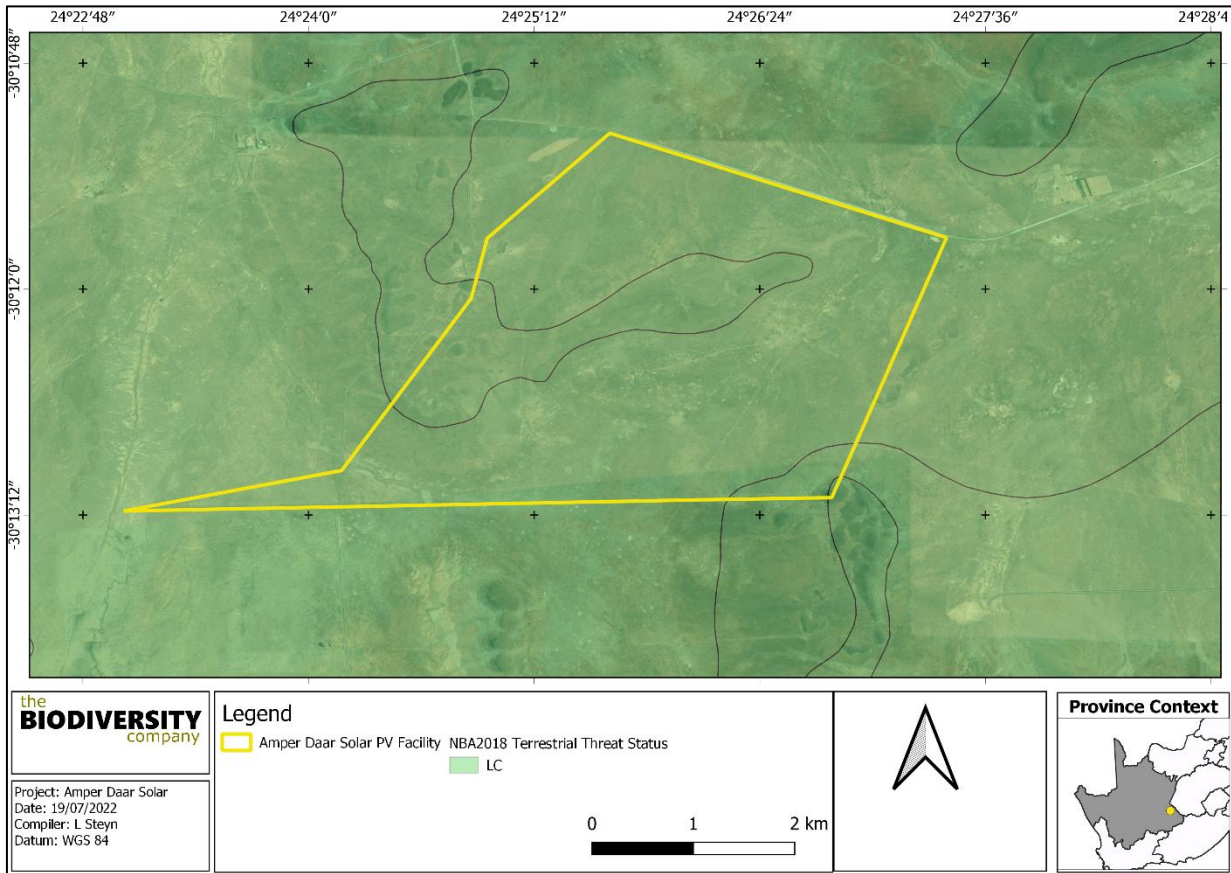
**Table 3-1** *Summary of relevance of the proposed development to ecologically important landscape features.*

| Desktop Information Considered                              | Relevant/Irrelevant  | Section |
|---|--|---------|
| <b>Ecosystem Threat Status</b>                              | Irrelevant – Located within a Least Concern ecosystem                            | 3.1.1.1 |
| <b>Ecosystem Protection Level</b>                           | Relevant – Located within a Not Protected and Poorly Protected ecosystem         | 3.1.1.2 |
| <b>Protected Areas</b>                                      | Irrelevant – The project area is over 30 km away from the nearest Protected Area | -       |
| <b>National Protected Area Expansion Strategy</b>           | Irrelevant – Is over 20 km away from the nearest Focus Area                      | -       |
| <b>Important Bird and Biodiversity Areas</b>                | Relevant – The project area is within the Platberg Karoo Conservancy IBA         | 3.1.1.4 |
| <b>Critical Biodiversity Area</b>                           | Relevant – Is located within an ESA  | 3.1.1.4 |
| <b>South African Inventory of Inland Aquatic Ecosystems</b> | Relevant - The project area overlaps with an unclassified wetland                | 3.1.1.5 |
| <b>Freshwater Ecosystem Priority Areas</b>                  | Irrelevant – no NFEPA wetlands or rivers are present on within the project area  | 3.1.1.5 |
| <b>Renewable Energy Development Zones (REDZ)</b>            | Irrelevant - The project area is ~129 km for the closest REDZ                    | -       |

##### 3.1.1.1 Ecosystem Threat Status

The Ecosystem Threat Status is an indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. According to the spatial dataset the proposed development is located within a LC ecosystem (Figure 3-2).

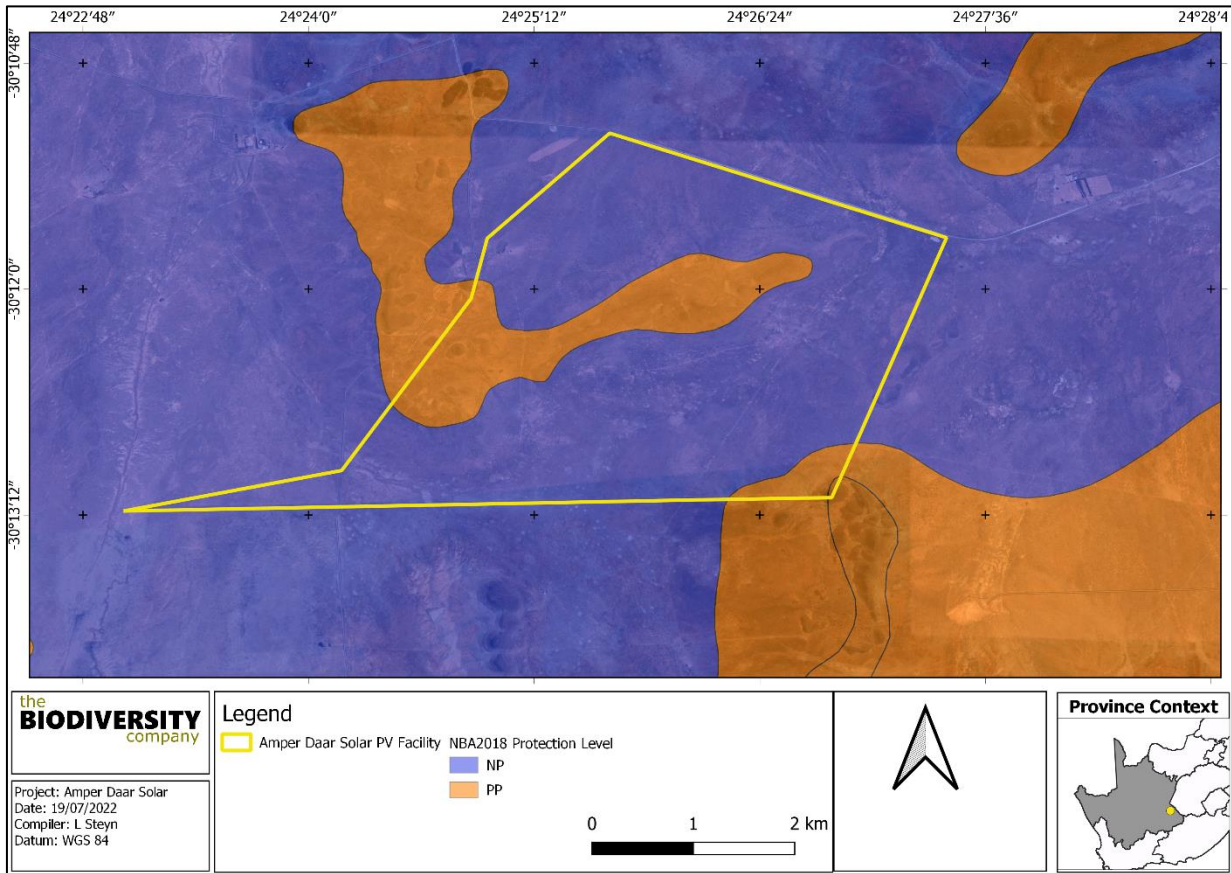




**Figure 3-1** Map illustrating the ecosystem threat status associated with the assessment area

### 3.1.1.2 Ecosystem Protection Level

Indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. Not Protected, PP or MP ecosystem types are collectively referred to as under-protected ecosystems. The proposed development is located within a NP and PP ecosystem (Figure 3-2).



**Figure 3-2** Map illustrating the ecosystem protection level associated with the assessment area

### 3.1.1.3 Important Bird and Biodiversity Areas

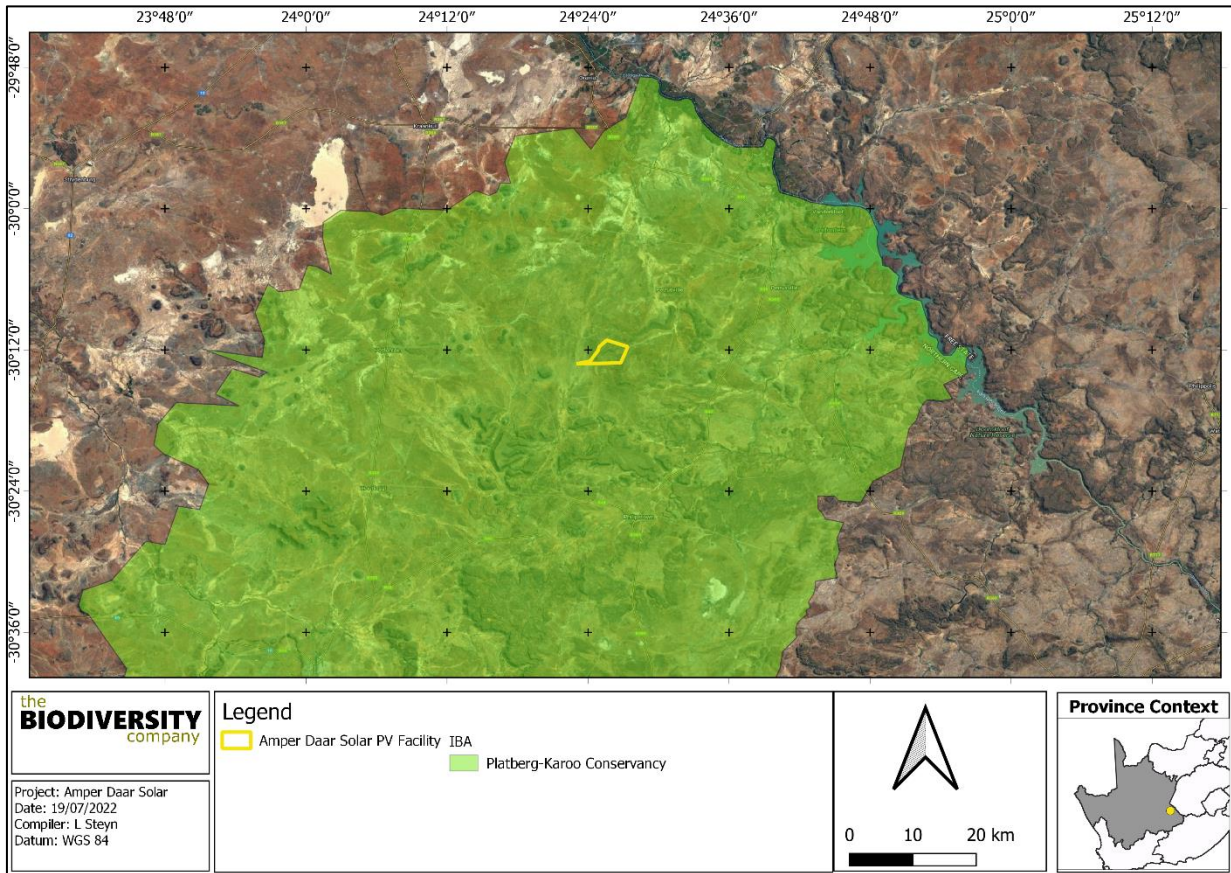
Important Bird & Biodiversity Areas (IBAs) are the sites of international significance for the conservation of the world's birds and other conservation significant species as identified by BirdLife International. These sites are also all Key Biodiversity Areas; sites that contribute significantly to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

According to Birdlife International (2017), the selection of IBAs is achieved through the application of quantitative ornithological criteria, grounded in up-to-date knowledge of the sizes and trends of bird populations. The criteria ensure that the sites selected as IBAs have true significance for the international conservation of bird populations and provide a common currency that all IBAs adhere to, thus creating consistency among, and enabling comparability between, sites at national, continental and global levels.

Platberg–Karoo Conservancy IBA can be found in the districts of De Aar, Philipstown and Hanover. This IBA falls across two biomes, the Nama Karoo and the Grassland Biome, which contributes to its diversity of species. In total 289 bird species have been recorded here. Threats in this IBA include overgrazing, erosion and encroachment by Karoo shrubs, all of which result in the loss of habitat and a decrease in available food for large terrestrial birds.

Figure 3-3 shows that the project area is within the Platberg Karoo Conservancy IBA.



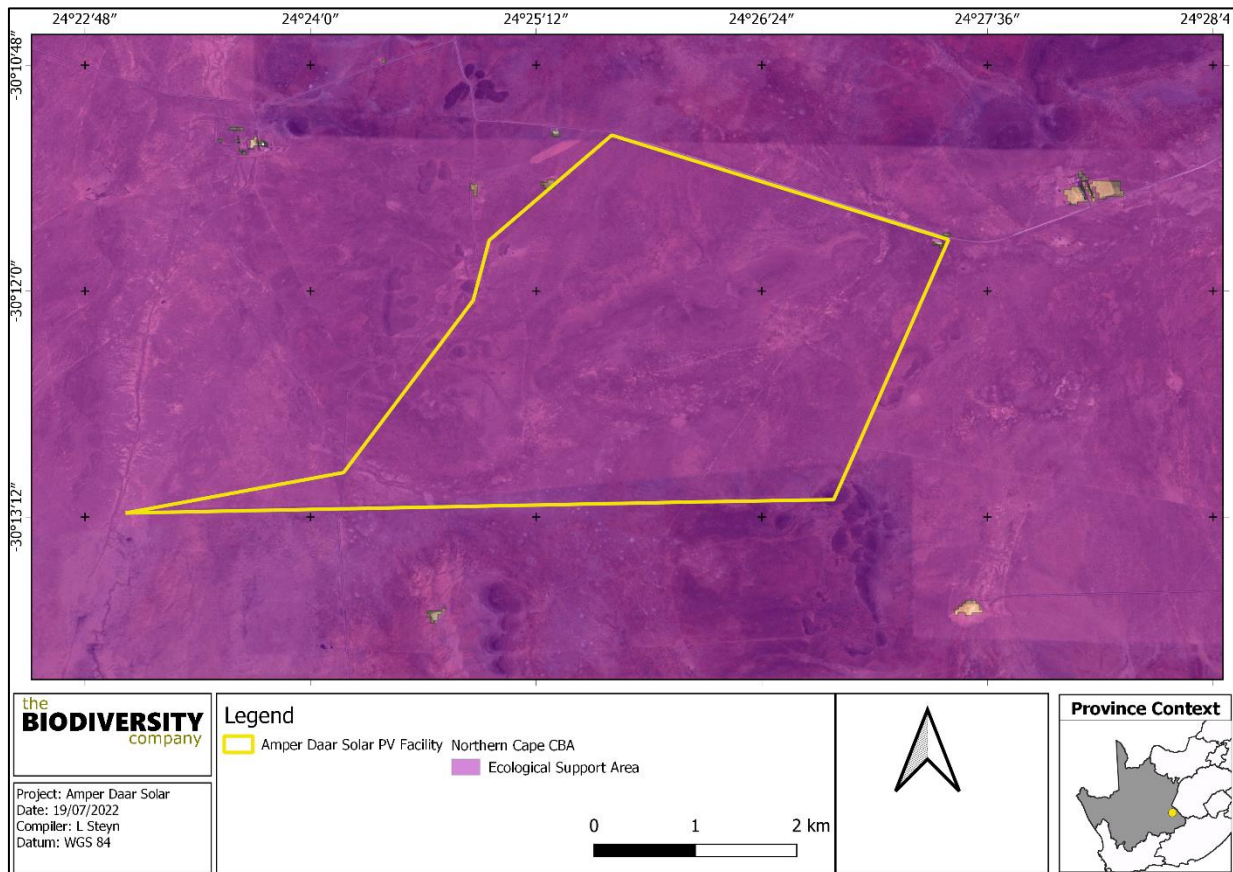


**Figure 3-3** Map illustrating the location of the IBAs proximal to the project area

### 3.1.1.4 Biodiversity Sector Plan

The Northern Cape Department of Environment and Nature Conservation has developed the Northern Cape CBA Map which identifies biodiversity priority areas for the province, called Critical Biodiversity Areas (CBAs) and 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.

The project area includes ESA (Figure 3-3). Development of this nature (ie: Solar PV facilities and associated infrastructure) may occur in an ESA area provided all mitigation measures are adhered to. It must be noted, however, when taken into consideration in conjunction with the other Solar PV facilities planned for all three phases of the overall proposed development, that the cumulative fragmentation of the ESA is very high. The associated cumulative fragmentation impacts are expected to be high for the overall development. This project should ideally not be considered in isolation but rather as a part of the full proposed development when considering impacts to the ESA.



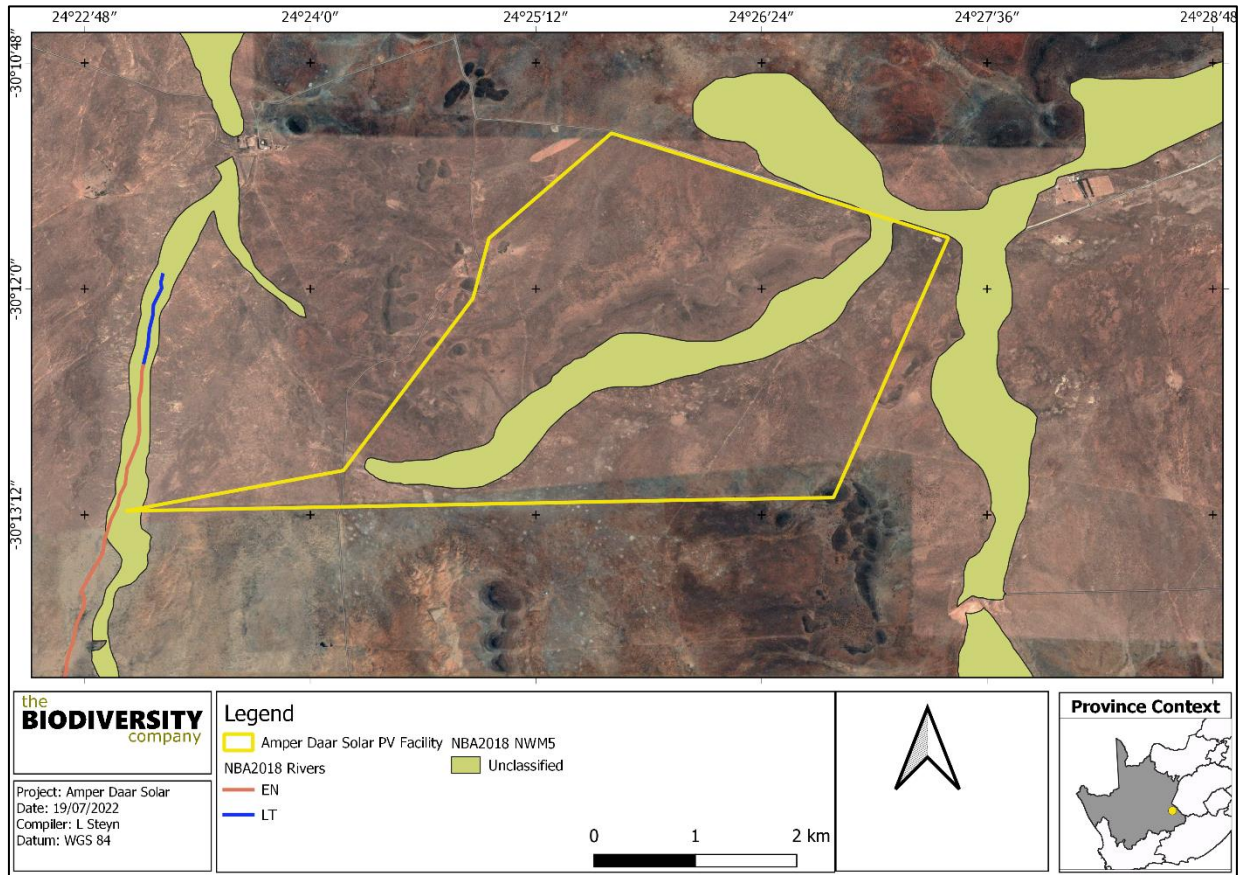
**Figure 3-4** Map illustrating the location of Critical Biodiversity Areas proximal to the project area

### 3.1.1.5 Hydrological Setting

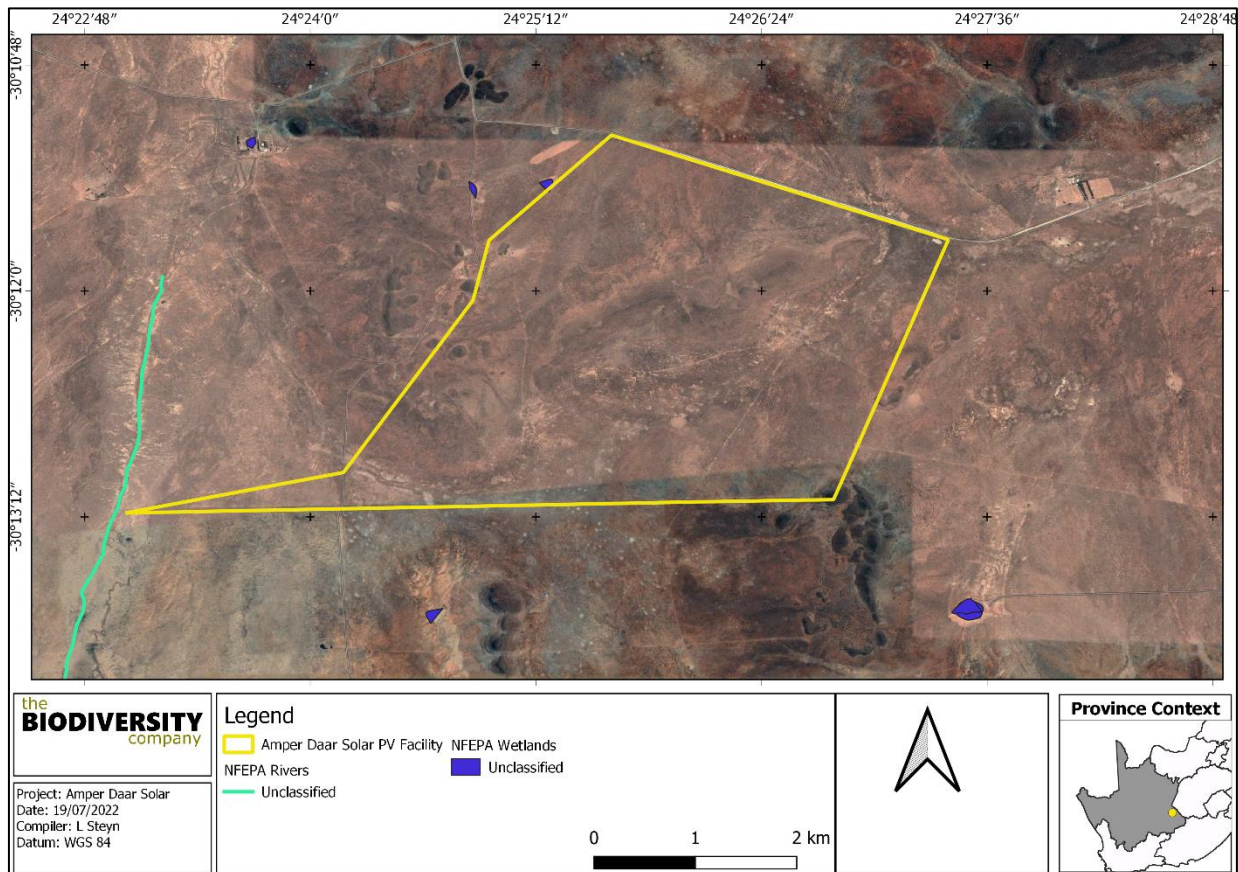
The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the National Biodiversity Assessment (NBA) 2018. Ecosystem threat status (ETS) of ecosystem types is based on the extent to which each river ecosystem type had been altered from its natural condition. Ecosystem types are categorised as CR, EN, VU or LT. Critically Endangered, EN and VU ecosystem types collectively referred to as ‘threatened’ (Van Deventer *et al.*, 2019; Skowno *et al.*, 2019). The project area overlaps with an unclassified wetland (Figure 3-5).

The National Freshwater Ecosystem Priority Areas (NFEPAs) (Driver *et al.*, 2011) spatial data has been incorporated in the above mentioned SAIIAE spatial data set. They are included here as the database is intended to be conservation support tools and are envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act (NEM:BA) biodiversity goals (Nel *et al.*, 2011). The NFEPAs spatial layer indicates that the wetlands do not intersect with a Ramsar site and are not within 500 m of an IUCN threatened frog point locality. No NFEPAs wetlands or rivers are present within the project area (Figure 3-6).





**Figure 3-5** The inland water features associated with the project area



**Figure 3-6** Map illustrating the NFEPA wetland and river systems associated with the assessment area

### 3.1.2 Flora Assessment

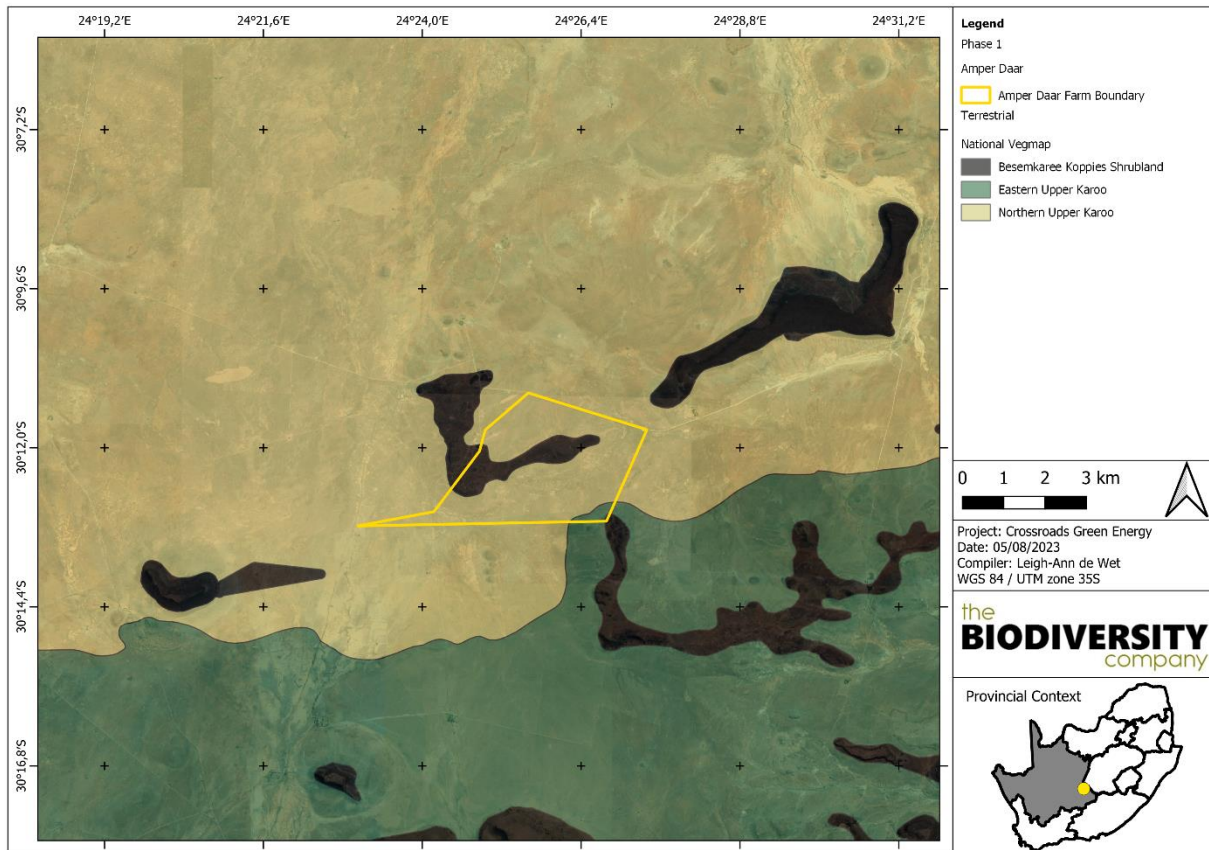
This section is divided into a description of the vegetation type expected under natural conditions and the expected flora species.

#### 3.1.2.1 Vegetation Type

The project area is situated in the Northern Upper Karoo, Eastern Upper Karoo and Besemkaree Koppies Shrubland vegetation types according to SANBI (2018) (Figure 3-7).

The project area is situated within the Nama Karoo Biome and (SANBI, 2018). The Nama Karoo Biome is found in the central plateau of the western half of South Africa. The geology underlying the biome is varied, as the distribution of this biome is determined primarily by rainfall. The rain falls in summer, and varies between 100 and 520mm per year. This also determines the predominant soil type - over 80% of the area is covered by a lime-rich, weakly developed soil over rock. Although less than 5% of rain reaches the rivers, the high erodibility of soils poses a major problem where overgrazing occurs (SANBI, 2019).





**Figure 3-7** Map illustrating the vegetation types associated with the assessment area and surrounding landscape based on the Vegetation Map of South Africa, Lesotho & Swaziland

The **Northern Upper Karoo** is described as follows:

Northern Upper Karoo occurs in the Northern Cape and Free State Provinces. It occurs on flat to gently sloping terrain with isolated hills of Upper Karoo Hardeveld in the south and Vaalbos Rocky Shrubland in the northeast with interspersed pans. It is a shrubland dominated by dwarf karoo shrubs, grasses and *Acacia mellifera* subsp. *Deti-nens* and some other low trees. It occurs at an altitude of 1 000 to 1 500 m.

### Important 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 important in the Gamka Karoo (d=dominant):

Small trees: *Acacia mellifera* subsp. *detinens*, *Boscia albitrunca*.

Tall Shrubs: *Lycium cinereum* (d), *L. horridum*, *L. oxycarpum*, *L. schizocalyx*, *Rhigozum trichotomum*.

Low Shrubs: *Chrysocoma ciliata* (d), *Gnidia polycephala* (d), *Pentzia calcarea* (d), *P. globosa* (d), *P. incana* (d), *P. spinescens* (d), *Rosenia humilis* (d), *Amphiglossa triflora*, *Aptosimum marlothii*, *A. spinescens*, *Asparagus glaucus*, *Barleria rigida*, *Berkheya annectens*, *Eriocephalus ericoides* subsp. *ericoides*, *E. glandulosus*, *E. spinescens*, *Euryops asparagoides*, *Felicia muricata*, *Helichrysum lucilioides*, *Hermannia spinosa*, *Leucas capensis*, *Limeum aethiopicum*, *Melolobium candicans*, *Microloma armatum*, *Osteospermum leptolobum*, *O. spinescens*, *Pegolettia retrofracta*, *Pentzia lanata*, *Phyllanthus maderaspatensis*, *Plinthus karoocicus*, *Pteronia glauca*, *P. sordida*, *Selago geniculata*, *S. saxatilis*, *Tetragonia arbuscula*, *Zygophyllum lichtensteinianum*.

Succulent Shrubs: *Hertia pallens*, *Salsola calluna*, *S. glabrescens*, *S. rabieana*, *S. tuberculata*, *Zygophyllum flexuosum*.

Semiparasitic Shrub: *Thesium hystrix* (d),

Herbs: *Chamaesyce inaequilatera*, *Convolvulus sagittatus*, *Dicoma capensis*, *Gazania krebsiana*, *Hermannia comosa*, *Indigofera alternans*, *Lessertia pauciflora*, *Radyera urens*, *Sesamum capense*, *Sutera pinnatifida*, *Tribulus terrestris*, *Vahlia capensis*.

Succulent Herb: *Psilocaulon coriarium*.

Geophytic Herb: *Moraea pallida*.

Graminoids: *Aristida adscensionis* (d), *A. congesta* (d), *A. diffusa* (d), *Enneapogon desvauxii* (d), *Eragrostis lehmanniana* (d), *E. obtusa* (d), *E. truncata* (d), *Sporobolus fimbriatus* (d), *Stipagrostis obtusa* (d), *Eragrostis bicolor*, *E. porosa*, *Fingerhuthia africana*, *Heteropogon contortus*, *Stipagrostis ciliata*, *Themeda triandra*, *Tragus berteronianus*, *T. koelerioides*, *T. racemosus*.

### Biogeographically Important Taxa:

Herb (western distribution limit): *Convolvulus boedeckerianus*.

Tall Shrub (southern limit of distribution): *Gymnosporia szyszylowiczii* subsp. *namibiensis*.

### Endemic Taxa

Succulent Shrubs: *Lithops hookeri*, *Stomatium pluridens*.

Low Shrubs: *Atriplex spongiosa*, *Galenia exigua*.

Herb: *Manulea deserticola*.

### Conservation Status

According to Mucina & Rutherford (2006), this vegetation type is classified as Least Threatened. The national target for conservation protection is 21% with none statutorily conserved and about 4% cleared for cultivation.

The **Eastern Upper Karoo** is described as follows:

Eastern Upper Karoo occurs in the Northern Cape, Eastern Cape and Western Cape Provinces. It occurs on flat to gently sloping plains with isolated hills of Upper Karoo Hardeveld in the west, Besemkaree Koppies Shrubland in the northeast and Tarkasstad Montane Shrubland in the southeast). It is a shrubland dominated by dwarf karoo shrubs, grasses from the genera *Eragrostis* and *Aristida* becoming grass dominated at times. It occurs at an altitude of 1 000 to 1 700 m.

### Important 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 important in the Gamka Karoo (d=dominant):

Tall Shrubs: *Lycium cinereum* (d), *L. horridum*, *L. oxycarpum*.

Low Shrubs: *Chrysocoma ciliata* (d), *Eriocephalus ericoides* subsp. *ericoides* (d), *E. spinescens* (d), *Pentzia globosa* (d), *P. incana* (d), *Phymaspermum parvifolium* (d), *Salsola calluna* (d), *Aptosimum procumbens*, *Felicia muricata*, *Gnidia polycephala*, *Helichrysum dregeanum*, *H. lucilioides*, *Limeum aethiopicum*, *Nenax microphylla*, *Osteospermum leptolobum*, *Plinthus karooicus*, *Pteronia glauca*, *Rosenia humilis*, *Selago geniculata*, *S. saxatilis*.

Succulent Shrubs: *Euphorbia hypogaea*, *Ruschia intricata*. Herbs: *Indigofera alternans*, *Pelargonium minimum*, *Tribulus terrestris*. Geophytic Herbs: *Moraea pallida* (d), *Moraea polystachya*, *Syringodea bifucata*, *S. concolor*.

Succulent Herbs: *Psilocaulon coriarium*, *Tridentea jucunda*, *T. virescens*.

Graminoids: *Aristida congesta* (d), *A. diffusa* (d), *Cynodon incompletus* (d), *Eragrostis bergiana* (d), *E. bicolor* (d), *E. lehmanniana* (d), *E. obtusa* (d), *Sporobolus fimbriatus* (d), *Stipagrostis ciliata* (d), *Tragus koelerioides* (d), *Aristida adscensionis*, *Chloris virgata*, *Cyperus usitatus*, *Digitaria eriantha*, *Enneapogon desvauxii*, *E. scoparius*, *Eragrostis curvula*, *Fingerhuthia africana*, *Heteropogon contortus*, *Sporobolus ludwigii*, *S. tenellus*, *Stipagrostis obtusa*, *Themeda triandra*, *Tragus berteronianus*.



### Endemic Taxa

Succulent Shrubs: *Chasmatophyllum rouxii*, *Hertia cluytiifolia*, *Rabiea albinota*, *Salsola tetrandra*.

Tall Shrub: *Phymaspermum scoparium*.

Low Shrubs: *Aspalathus acicularis* subsp. *planifolia*, *Selago persimilis*, *S. walpersii*.

### Conservation Status

According to Mucina & Rutherford (2006), this vegetation type is classified as Least Threatened. The national target for conservation protection is 21% with some statutorily conserved and about 2% transformed.

The **Besemkaree Koppies Shrubland** is described as follows:

Besemkaree Koppies Shrubland occurs in the Northern Cape, Free State and Eastern Cape Provinces. It occurs on koppies, butts and tefelbergs. It comprises a two-layered karroid shrubland with the lower (closed canopy) layer dominated by dwarf small leaf shrubs and grasses and the upper (loose) canopy dominated by tall shrubs such as *Seasia erosa*, *Searsia burchellii*, *Seasia ciliata*, *Euclea crispa*, *Diospyros austro-aficana* and *Olea europaea*. It occurs at an altitude of 1 120 to 1 680 m.

### Important 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 important in the Gamka Karoo (d=dominant):

Small Trees: *Cussonia paniculata*, *Ziziphus mucronata*.

Tall Shrubs: *Diospyros austro-aficana* (d), *Euclea crispa* subsp. *ovata* (d), *Olea europaea* subsp. *africana* (d), *Rhus burchellii* (d), *R. ciliata* (d), *R. erosa* (d), *Buddleja saligna*, *Diospyros lycioides* subsp. *lycioides*, *Ehretia rigida*, *Grewia occidentalis*, *Gymnosporia polyacantha*, *Tarchonanthus minor*.

Low Shrubs: *Asparagus suaveolens* (d), *Chrysocoma ciliata* (d), *Amphiglossa triflora*, *Aptosimum elongatum*, *Asparagus striatus*, *Diospyros pallens*, *Eriocephalus ericoides*, *E. spinescens*, *Euryops empetrifolius*, *Felicia filifolia* subsp. *filifolia*, *F. muricata*, *Helichrysum dregeanum*, *H. lucilioides*, *Hermannia multiflora*, *H. vestita*, *Lantana rugosa*, *Limeum aethiopicum*, *Lycium cinereum*, *Melolobium candicans*, *M. microphyllum*, *Nenax microphylla*, *Pegolettia retrofracta*, *Pentzia globosa*, *Rhigozum obovatum*, *Selago saxatilis*, *Stachys linearis*, *S. rugosa*, *Sutera halimifolia*, *Wahlenbergia albens*.

Succulent Shrubs: *Aloe broomii*, *Chasmatophyllum musculinum*, *C. verdoorniae*, *Cotyledon orbiculata* var. *dactyloopsis*, *Pachypodium succulentum*.

Graminoids: *Aristida adscensionis* (d), *A. congesta* (d), *A. diffusa* (d), *Cenchrus ciliaris* (d), *Cymbopogon caesius* (d), *Cynodon incompletus* (d), *Digitaria eriantha* (d), *Eragrostis curvula* (d), *E. lehmanniana* (d), *Heteropogon contortus* (d), *Setaria lindenbergiana* (d), *Themeda triandra* (d), *Tragus koelerioides* (d), *Cymbopogon pospischilii*, *Enneapogon scoparius*, *Eragrostis chloromelas*, *E. obtusa*, *Eustachys paspaloides*, *Fingerhuthia africana*, *Hyparrhenia hirta*, *Sporobolus fimbriatus*.

Herbs: *Convolvulus sagittatus*, *Dianthus caespitosus* subsp. *caespitosus*, *Gazania krebsiana* subsp. *krebsiana*, *Hibiscus pusillus*, *Indigofera alternans*, *I. rhytidocarpa*, *Lepidium africanum* subsp. *africanum*, *Pollichia campestris*.

Herbaceous Climber: *Argyrobolium lanceolatum*.

Geophytic Herbs: *Albuca setosa*, *Asplenium cordatum*, *Cheilanthes bergiana*, *C. eckloniana*, *Freesia andersoniae*, *Haemanthus humilis* subsp. *humilis*, *Oxalis depressa*, *Pellaea calomelanos*.

Succulent Herbs: *Aloe grandidentata*, *Crassula nudicaulis*, *Duvalia caespitosa*, *Euphorbia pulvinata*, *Huernia piersii*, *Stapelia grandiflora*, *S. olivacea*, *Tridentea gemmiflora*.

### Endemic Taxa

Small Tree: *Cussonia* sp. nov. (*P.J. du Preez 3666 BLFU*).

Succulent Shrubs: *Euphorbia crassipes*, *Neohenricia sibbettii*, *N. spiculata*.

## Conservation Status

According to Mucina & Rutherford (2006), this vegetation type is classified as Least Threatened. The national target for conservation protection is 28% with about 5% statutorily conserved and about 3% transformed.

### 3.1.2.2 Expected Flora Species

The POSA database indicates that 480 species of indigenous plants are expected to occur within the project area (The full list of species can be found in Appendix B). No SCC are expected in the project area as identified by the Screening Tool (none previously recorded as per POSA).

### 3.1.3 Faunal Assessment

No herpetofauna or mammals are identified by the Screening Tool as important for the site.

Please note that the Screening Tool report includes lists of bird, mammal, reptile, amphibian, butterfly and plant species of conservation concern known or expected to occur on the proposed development footprint. Some of these SCC are sensitive to illegal harvesting. Such species have had their names obscured and are listed as sensitive plant unique number / sensitive animal unique number. As per the best practise guideline that accompanies the protocol and screening tool, the **name of the sensitive species may not appear in the final EIA report nor any of the specialist reports released into the public domain**. It should be referred to as *sensitive plant* or *sensitive animal* and its threat status may be included, e.g. *critically endangered sensitive plant* or *endangered sensitive animal*.

#### 3.1.3.1 Herpetofauna

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the ReptileMap database provided by the Animal Demography Unit (ADU, 2019) 40 reptile species have the potential to occur in the project area (Appendix D). One of the expected species is a SCCs (IUCN, 2017). One (1) are regarded as threatened (Table 3-2).

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the AmphibianMap database provided by the Animal Demography Unit (ADU, 2020) 13 amphibian species have the potential to occur in the project area (Appendix C). One (1) are regarded as threatened (Table 3-2).

**Table 3-2 Reptile SCC expected in the project area**

| Species                       | Common Name     | Conservation Status    |             | Likelihood of occurrence |
|-------------------------------|-----------------|------------------------|-------------|--------------------------|
|                               |                 | Regional (SANBI, 2016) | IUCN (2017) |                          |
| <b>Reptile</b>                |                 |                        |             |                          |
| <i>Psammophis leightoni</i>   | Cape Sand Snake | VU                     | LC          | Moderate                 |
| <b>Amphibian</b>              |                 |                        |             |                          |
| <i>Pyxicephalus adspersus</i> | Giant Bullfrog  | NT                     | LC          | Moderate                 |

*Psammophis leightoni* (Cape Sand Snake) is categorised as vulnerable internationally and locally. Endemic to the western regions of the Western Cape, South Africa. Threatened primarily by habitat loss associated with agriculture and development of human settlements throughout its range. The likelihood of finding the species in the project area is moderate.

*Pyxicephalus adspersus* (Giant Bull Frog) is a species of conservation concern that will possibly occur in the project area. The Giant Bull Frog is listed as near threatened on a regional scale. It is a species of drier savannahs. It is fossorial for most of the year, remaining buried in cocoons. They emerge at the start of the rains, and breed in shallow, temporary waters in pools, pans and ditches (IUCN, 2017). The likelihood of finding the species in the project area is moderate.

### 3.1.3.2 Mammals

The IUCN Red List Spatial Data (IUCN, 2017) lists 58 mammal species that could be expected to occur within the project area. Species generally restricted to protected areas such as game reserves were not expected to occur in the project area and were removed from the list (Appendix E).

Of the 58 mammal species, eight (8) are listed as being of conservation concern on a regional or global basis (Table 3-3).

**Table 3-3 List of mammal Species of Conservation Concern that may occur in the project area as well as their global and regional conservation statuses.**

| Species                      | Common Name                     | Conservation Status    |             |                          |
|------------------------------|---------------------------------|------------------------|-------------|--------------------------|
|                              |                                 | Regional (SANBI, 2016) | IUCN (2021) | Likelihood of Occurrence |
| <i>Eidolon helvum</i>        | African Straw-colored Fruit Bat | LC                     | NT          | Moderate                 |
| <i>Felis nigripes</i>        | Black-footed Cat                | VU                     | VU          | High                     |
| <i>Leptailurus serval</i>    | Serval                          | NT                     | LC          | High                     |
| <i>Panthera pardus</i>       | Leopard                         | VU                     | VU          | Moderate                 |
| <i>Parahyaena brunnea</i>    | Brown Hyaena                    | NT                     | NT          | Moderate                 |
| <i>Parotomys littledalei</i> | Littledale's Whistling Rat      | NT                     | LC          | Moderate                 |
| <i>Poecilogle albinucha</i>  | African Striped Weasel          | NT                     | LC          | High                     |
| <i>Redunca fulvorufula</i>   | Mountain Reedbuck               | EN                     | EN          | Moderate                 |

*Eidolon helvum* (African Straw-coloured Fruit Bat) is listed as LC on a regional scale and NT on a global scale. This species has been recorded from a very wide range of habitats across the lowland rainforest and savanna zones of Africa (IUCN, 2017). Although considered to be widespread and abundant across its range, certain populations are decreasing due to severe deforestation, hunting for food and medicinal use (IUCN, 2017). This species is known to form large roosts and colonies numbering in the thousands to even millions of individuals (IUCN, 2017). No colonies of this species are known to occur in the Project area or in the immediate vicinity and, although individuals may occasionally be recorded, it is not expected to be resident within the Project area and therefore its 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 optimal for the species and the likelihood of occurrence is rated as high.

*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. Suitable habitat, along with sufficient food sources can be found in the project area, therefore the likelihood of occurrence is rated as high.

*Panthera pardus* (Leopard) has a wide distributional range across Africa and Asia, but populations have become reduced and isolated, and they are now extirpated from large portions of their historic range (IUCN, 2017). Impacts that have contributed to the decline in populations of this species include continued persecution by farmers, habitat fragmentation, increased illegal wildlife trade, excessive harvesting for ceremonial use of skins, prey base declines and poorly managed trophy hunting (IUCN, 2017). Although

known to occur and persist outside of formally protected areas, the densities in these areas are considered to be low. The likelihood of occurrence in the Project area, is regarded 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. The presence of moderate to large herbivores on adjacent properties increases the likelihood of occurrence of this species.

*Parotomys littledalei* (Littledale's Whistling Rat) is listed as NT on a regional scale. This diurnal species occurs in shrubland and is dependent on ground cover. Littledale's Whistling Rat is herbivorous only, feeding on fresh plant material, including annuals, succulent perennials, non-succulent perennials, and grasses. The presence of ground cover increases their likelihood of occurrence in the project area.

*Poecilogale albinucha* (African Striped Weasel) is usually associated with savanna habitats, although it probably has a wider habitat tolerance (IUCN, 2017). 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 areas and the likelihood of occurrence of this species is therefore considered to be high.

*Redunca fulvorufula* (Mountain Reedbuck) is listed as EN both regionally and globally. The South African population has undergone a decline of 61-73% in the last three generations (15 years) (IUCN, 2017). Mountain Reedbuck live on ridges and hillsides in broken rocky country and high-altitude grasslands (often with some tree or bush cover). Although there are not extensive mountainous regions in the Project area, the areas adjacent to the project area comprises of a number of mountainous areas and as such the likelihood of occurrence for this species is rated as moderate.

## 3.2 Field Assessment

The following sections provides the results from the field survey for the proposed development that was undertaken during July 2022.

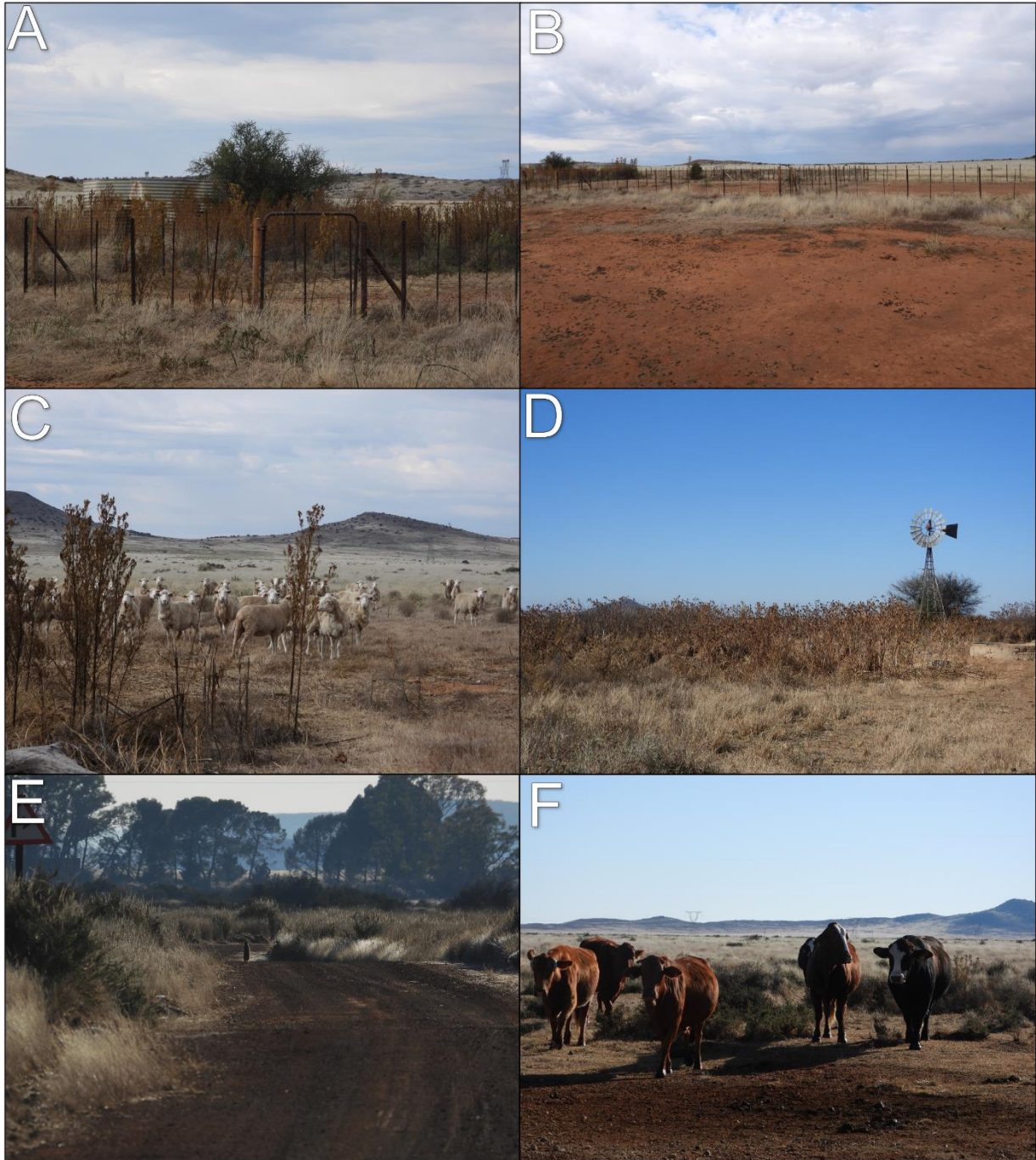
### 3.2.1 Land use and Current Impacts

The main impact to the vegetation and habitat types within and surrounding the project area is grazing (Figure 3-8). According to Jan Vlok, Richard Dean and Sue Milton many areas in the Karoo still have a high vegetation cover, but that species composition has altered significantly due to overgrazing (Skowno *et al.* 2009). It could be argued that these areas contribute little to the biodiversity of the region, and that many more habitat types are under threat (Skowno *et al.* 2009). Disturbances noted within the project area include, farm roads and fences, and alien invasive plant infestation (mainly along roads).

Van der Merwe *et al.* (2008) noted that inadequate farming practices, due to lack of infrastructure such as fencing, pose a serious threat to the vegetation. Esler *et al.* (2006) further added that "although damage can happen fast, recovery in the Karoo is very slow, as it depends mainly upon unpredictable rainfall events".

Presently about 12% of the Karoo district's ecosystems are transformed or degraded, with mining, agriculture and urbanization the main reasons of biodiversity loss (Skowno *et al.* 2009). Recently, the prospects of uranium mining and shale gas exploration have also come under the spotlight.





**Figure 3-8** Land use and current impacts of the study area in general. **A:** invasive alien plant species and fences, **B:** overgrazing and fences, **C:** Sheep grazing, **D:** invasive alien plants, **E:** roads and associated alien plant species and **F:** Cattle grazing.

### 3.2.2 Flora Assessment

This section is divided into four sections:

- Vegetation and flora;
- Species of Conservation Concern (SCC); and
- Invasive Alien Plants (IAPs).

#### 3.2.2.1 Vegetation

One vegetation community type can be found in the project area: Karoo Grassland, which approximates Northern Upper Karoo. There was no distinguishable difference between Eastern and Northern Upper Karoo and only a slight difference in an area of Besemnkaree Koppies Shrubland but not sufficient enough to define it as a vegetation community type for the site. This is most likely due to the season of the site visit, which did not allow for the accurate identification of grass species, which are used to distinguish the two. Moreover, the site is located at the ecotone between the two vegetation types, which could result in similar vegetation structure.

The project area is homogenous in terms of vegetation with a low karroid scrub grassland occurring throughout (Figure 3-9). Although the season did not allow for the identification of all grasses, dominant species could be identified. Dominant species of this vegetation community include, but are not limited to *Chrysocoma ciliata*, *Pentzia incana*, *Pentzia globosa*, *Lycium cinereum*, *Aptisimum spinescens*, *Asparagus sauvolens*, *Eriocephalus ericoides*, *Eriocephalus spinscens*, *Felicia muricata*, *Ruschia intricata*, *Roepera lichbtenteinii*, *Morae pallida*, *Heteropogon contortus*, *Aristida congesta*, *Aristida diffusa*, and *Eragrostis lehmanniana* (Figure 3-10). It must be noted that several geophytic species were recorded but could not be identified and may well be provincially protected, requiring permits to destroy or remove from the provincial authorities. These must be identified through as walk-through in the spring or summer (flowering season) prior to any construction activities.





**Figure 3-9**      *Photographs illustrating the Karoo Grassland of the Amper Daar site.*





**Figure 3-10** Photographs illustrating some of the dominant plant species A: *Asparagus sauvolens* B: *Ruschia intricata*, C: *Eriocephalus ericoides*, D: *Pteronia incana*, E *Roepera lichtenseinii* and F: *Chrysocoma ciliate*.

### 3.2.2.2 Species of Conservation Concern

No Species of Conservation Concern (SCC) were recorded from the project area, and none are expected to occur there.



### 3.2.2.3 Invasive Alien Plants

Invasive Alien Plants (IAPs) tend to dominate or replace indigenous flora, thereby transforming the structure, composition and functioning of ecosystems. Therefore, it is important that these plants are controlled by means of an eradication and monitoring programme. Some invader plants may also degrade ecosystems through superior competitive capabilities to exclude native plant species.

The National Environmental Management: Biodiversity Act (NEMBA) is the most recent legislation pertaining to alien invasive plant species. In August 2014, the list of Alien Invasive Species was published in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (Government Gazette No 78 of 2014). The Alien and Invasive Species Regulations were published in the Government Gazette No. 43726, 18 September 2020. The legislation calls for the removal and / or control of alien invasive plant species (Category 1 species). In addition, unless authorised thereto in terms of the National Water Act, 1998 (Act No. 36 of 1998), 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 National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA):

- Category 1a: Invasive species requiring compulsory control. 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.
- 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.

Note that according to the regulations, a 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 Act;
  - The relevant invasive species management programme developed in terms of regulation 4; and
  - Any directive issued in terms of section 73(3) of the Act.

Twelve (12) alien invasive species were recorded from the project area and surrounds (and therefore likely to invade as a result of disturbance) representing nine (9) families (Table 3-4 and Figure 3-11).

**Table 3-4 Alien Invasive Plants recorded from the project area**

| Family         | Scientific name                 | Common name            | NEM:BA |
|----------------|---------------------------------|------------------------|--------|
| Asparagaceae   | <i>Agave americana</i>          | American century plant | 3      |
| Asteraceae     | <i>Bidens Pilosa</i>            | Black jack             |        |
| Asteraceae     | <i>Tagetes minuta</i>           | Tall kaki weed         |        |
| Cactaceae      | <i>Cereus jamacaru</i>          | Queen-of-the-night     | 1b     |
| Cactaceae      | <i>Opuntia ficus-indica</i>     | Indian fig opuntia     | 1b     |
| Cactaceae      | <i>Opuntia robusta</i>          | nopal tapón            | 1a     |
| Chenopodiaceae | <i>Salsola kali</i>             | Tumbleweed             | 1b     |
| Fabaceae       | <i>Prosopis velutina</i>        | velvet mesquite        | 1b     |
| Malvaceae      | <i>Malva parviflora</i>         | Small mallow           |        |
| Myrtaceae      | <i>Eucalyptus camaldulensis</i> | Red river gum          | 1b     |
| Papaveraceae   | <i>Argemone ochroleuca</i>      | Mexican Poppy          | 1b     |
| Solanaceae     | <i>Datura ferox</i>             | Large thorn apple      | 1b     |

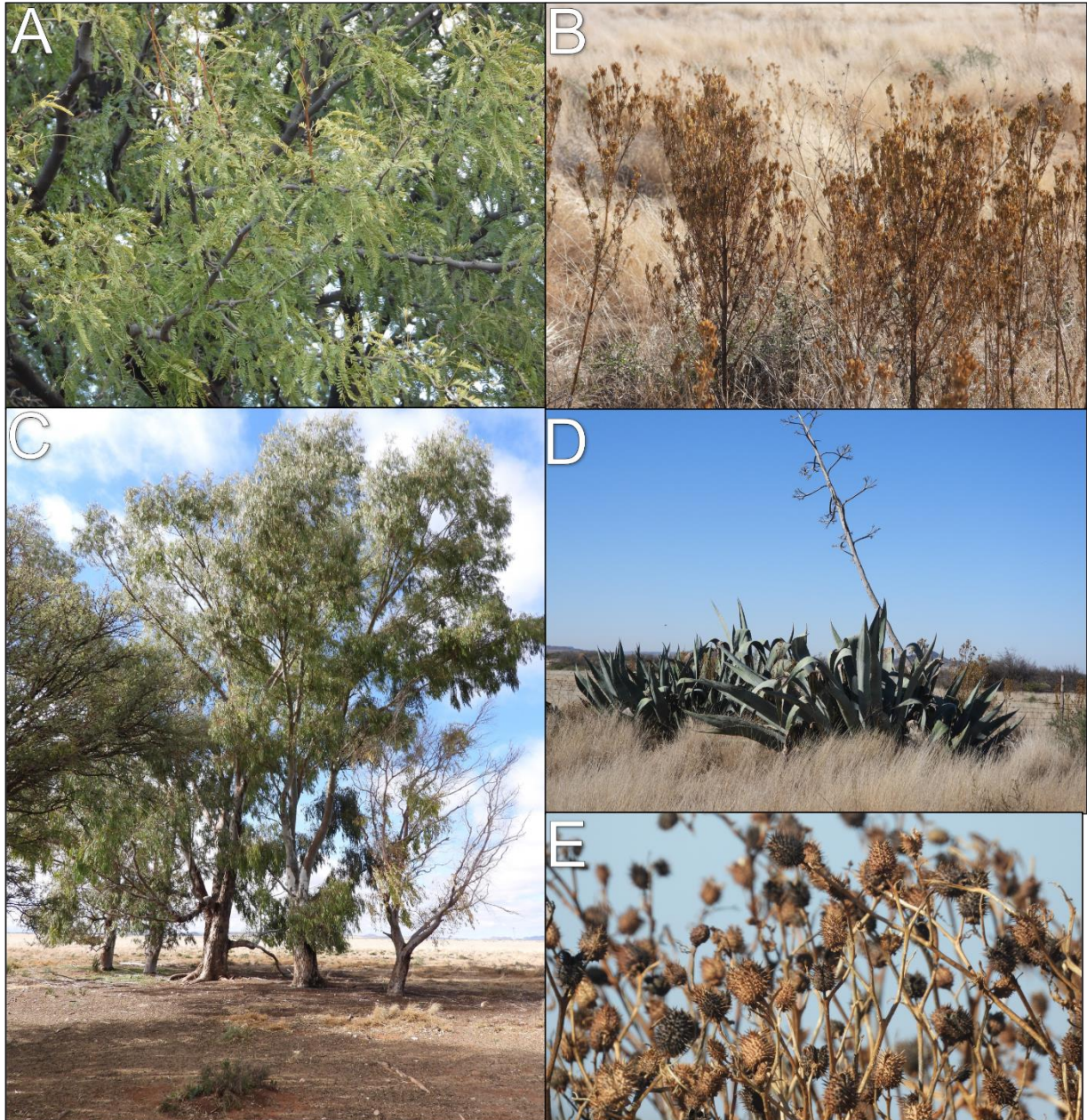
Considering that the project area is within an ESA it is recommended that any IAP species that may colonize the area in the future be controlled by implementing an Invasive Alien Plant Management Programme in compliance of section 75 of the Act as stated above. This is also pertinent to the development as invasive species are linked to enhanced fire effects and risk (Aslan & Dickson, 2020). The following monitoring framework must be implemented to ensure that IAPs are continually monitored, and progress pertaining to their control is recorded (Table 3-5). The monitoring of the project area throughout the process is crucial in order to prevent IAPs growing and spreading out of control, thereby threatening the wellbeing of indigenous flora and fauna. It is also important to note that while herbicide application has been recommended for control, herbicides should not be applied adjacent to the aquatic ecosystems within the site area and herbicide application should not be used during windy days to prevent drift.

**Table 3-5 Proposed monitoring framework for the control of invasive alien plants within the project area**

| Metric                                 | Frequency                        | Method   | Response   |
|--|----------------------------------|--|--|
| How effective are the control methods? | 4-6 months after every operation | Survey the cleared areas and look for regrowth. Before and after photographs are effective for this.<br>Observe for non-target effects of herbicide application. | If the survey reveals that the control methods are effective, e.g. low levels of re-sprouting, continue following the herbicide mixtures and control methods. If non-target plants are dying off where herbicides were applied, ensure appropriate training for herbicide applicators, demonstrate the off-target effects to herbicide applicators to ensure they are using the correct methods and herbicides. (If the results show that the control methods are not effective, adapt by e.g. cutting lower above ground or changing herbicides or timing of herbicide application. |
| Do the infestation levels decrease?    | Annually                         | Survey the cleared areas and record species, densities and size. Before and after pictures are very effective.   | If the infestation levels are not decreasing, reconsider clearing intervals and look at clearing methods. If infestation levels are decreasing, then continue current control method.  |

|   |                        |   |  |
|---|------------------------|---|--|
| <b>Quantity of herbicides used</b>                                  | During every operation | Keep track of cost and ensure no wastage. Record herbicide usage  | Track usage over time, it will reveal a certain trend in quantities for different infestation levels. Less herbicides should be used when the infestation levels are lower. Record herbicide cost. |
| <b>Does the indigenous vegetation recover in the cleared areas?</b> | Annually               | Survey the cleared areas and look out for indigenous species variety and presence. Before and after pictures are effective. | If there is recovery of indigenous vegetation, then continue current control method. If there is no recovery, consider rehabilitation with local indigenous species.                               |
| <b>How many jobs were created?</b>                                  | After every operation  | Timesheets  | Job creation figures are useful when asking for landowner assistance from WFW or to demonstrate contributions to jobs and socio-economic conditions  |
| <b>How many person days (PD) were spent per operations?</b>         | After every operation  | Timesheets  | Keep track of cost and assist with planning and budgeting. Determine cost per person per day (PD)  |





**Figure 3-11** Photographs illustrating a portion of the alien invasive species recorded from the project area A: *Prosopis velutina*, B: *Tagetes minuta*, C: *Eucalyptus camaldulensis*, D: *Agave americana*, E: *Datura ferox*.



### 3.2.3 Faunal Assessment

#### 3.2.3.1 Amphibians

One amphibian species were recorded during the survey period (Table 3-6). The lack of species richness was attributed to the dry nature of the project area with most water bodies and perennial drainage lines being dry at the time of the site visit, and no water resources being present within the PAOI. The species expected to occur within the project area are provided in Appendix C.

**Table 3-6 Summary of amphibian species recorded within the project area during the survey period. LC = Least Concern**

| Family  | Scientific Name       | Common Name     | Conservation Status |        |
|---------|-----------------------|-----------------|---------------------|--------|
|         |                       |                 | Regional            | Global |
| Pipidae | <i>Xenopus laevis</i> | Common Platanna | LC                  | LC     |

#### 3.2.3.2 Reptiles

Five reptile species, representing three families were recorded within the project area during the survey periods (Table 3-7 and Figure 3-12). The lack of species richness was likely due to the combination of the inherent secretive nature of reptile species, and limited time available for fieldwork (a true representative sample requires an extensive sampling period over several surveys). The presence of suitable habitat suggests that the project area supports a diverse reptile community but as per the screening tool, no SCC are likely to occur within the project area.

**Table 3-7 Summary of reptile species recorded within the project area during the survey period. LC = Least Concern**

| Family           | Scientific Name                            | Common Name               | Conservation Status |          |
|------------------|--|---------------------------|---------------------|----------|
|                  |  |                           | Regional            | Global   |
| Leptotyphlopidae | <i>Leptotyphlops scutifrons scutifrons</i> | Peters' Thread Snake      | LC                  | Unlisted |
| Scincidae        | <i>Acontias gracilicauda</i>               | Thin-tailed Legless Skink | LC                  | LC       |
| Scincidae        | <i>Trachylepis punctatissima</i>           | Speckled Rock Skink       | LC                  | LC       |
| Scincidae        | <i>Trachylepis variegata</i>               | Variiegated Skink         | LC                  | Unlisted |
| Testudinidae     | <i>Stigmochelys pardalis</i>               | Leopard Tortoise          | LC                  | LC       |



**Figure 3-12** Photographs illustrating a portion of the herpetofauna recorded from the project area. A: *Stigmochelys pardalis*, B: *Leptotyphlops scutifrons scutifrons*, C: *Trachylepis punctatissima*, and D: *Acontias gracilicauda*.

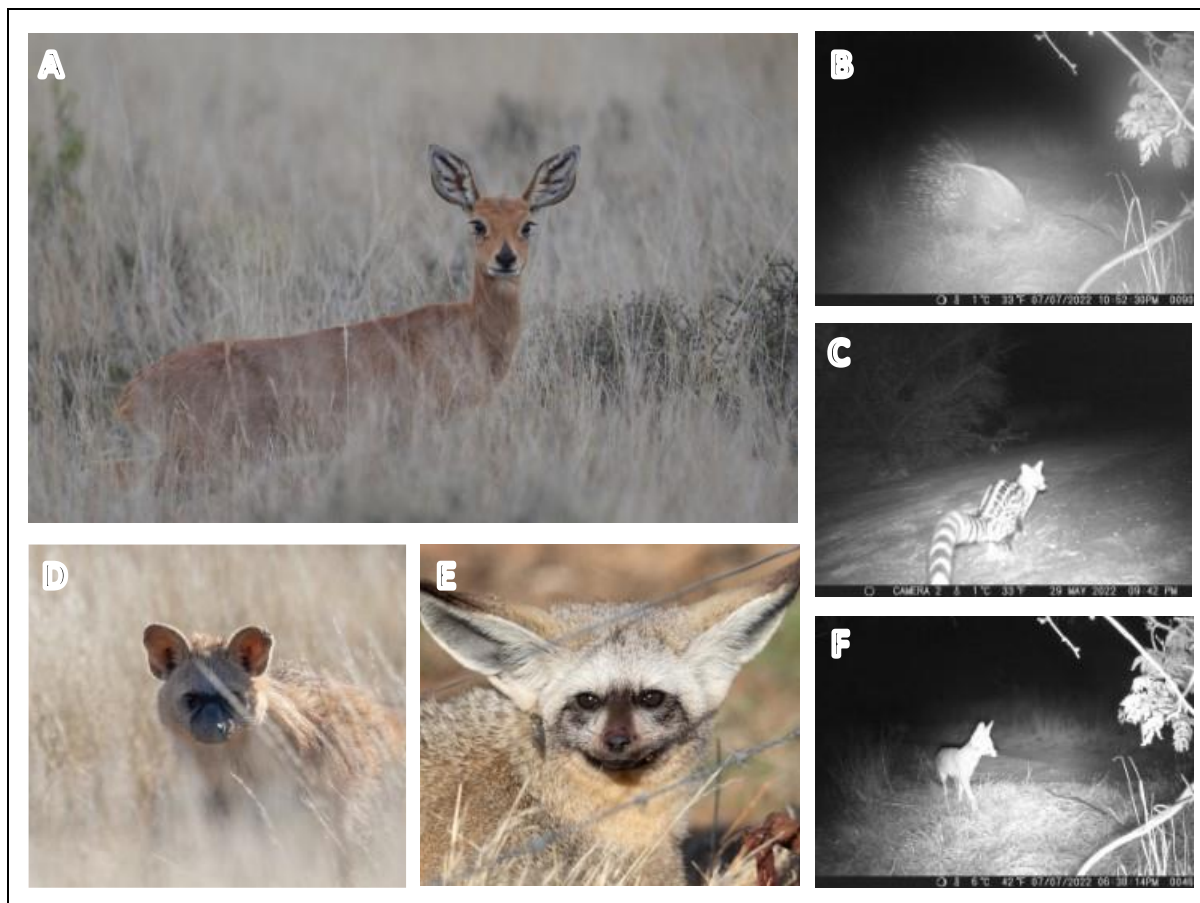
### 3.2.3.3 Mammals

A total of twenty eight (28) mammal species were recorded across the project area during the survey period (Table 3-8 and Figure 3-13), accounting for 48% of the expected mammal species. It is considered highly likely that additional small mammal species would be recorded from the project area with extensive sampling. The lack of records may have been due to hunting that was observed on site.

**Table 3-8** Mammal SCC recorded within the project area during the survey periods.

| Species                        | Common Name         | Conservation Status    |             |
|--------------------------------|---------------------|------------------------|-------------|
|                                |                     | Regional (SANBI, 2016) | IUCN (2017) |
| <i>Aepyceros melampus</i>      | Impala              | LC                     | LC          |
| <i>Antidorcas marsupialis</i>  | Springbok           | LC                     | LC          |
| <i>Canis mesomelas</i>         | Black-backed Jackal | LC                     | LC          |
| <i>Connochaetes gnou</i>       | Black Wildebeest    | LC                     | LC          |
| <i>Cryptomys hottentotus</i>   | Common Mole-rat     | LC                     | LC          |
| <i>Cynictis penicillata</i>    | Yellow Mongoose     | LC                     | LC          |
| <i>Damaliscus pygargus</i>     | Blesbok             | LC                     | LC          |
| <i>Felis nigripes</i>          | Black-footed Cat    | VU                     | VU          |
| <i>Felis silvestris</i>        | African Wildcat     | LC                     | LC          |
| <i>Genetta genetta</i>         | Small-spotted Genet | LC                     | LC          |
| <i>Herpestes pulverulentus</i> | Cape Grey Mongoose  | LC                     | LC          |
| <i>Hippotragus niger</i>       | Sable Antelope      | VU                     | LC          |

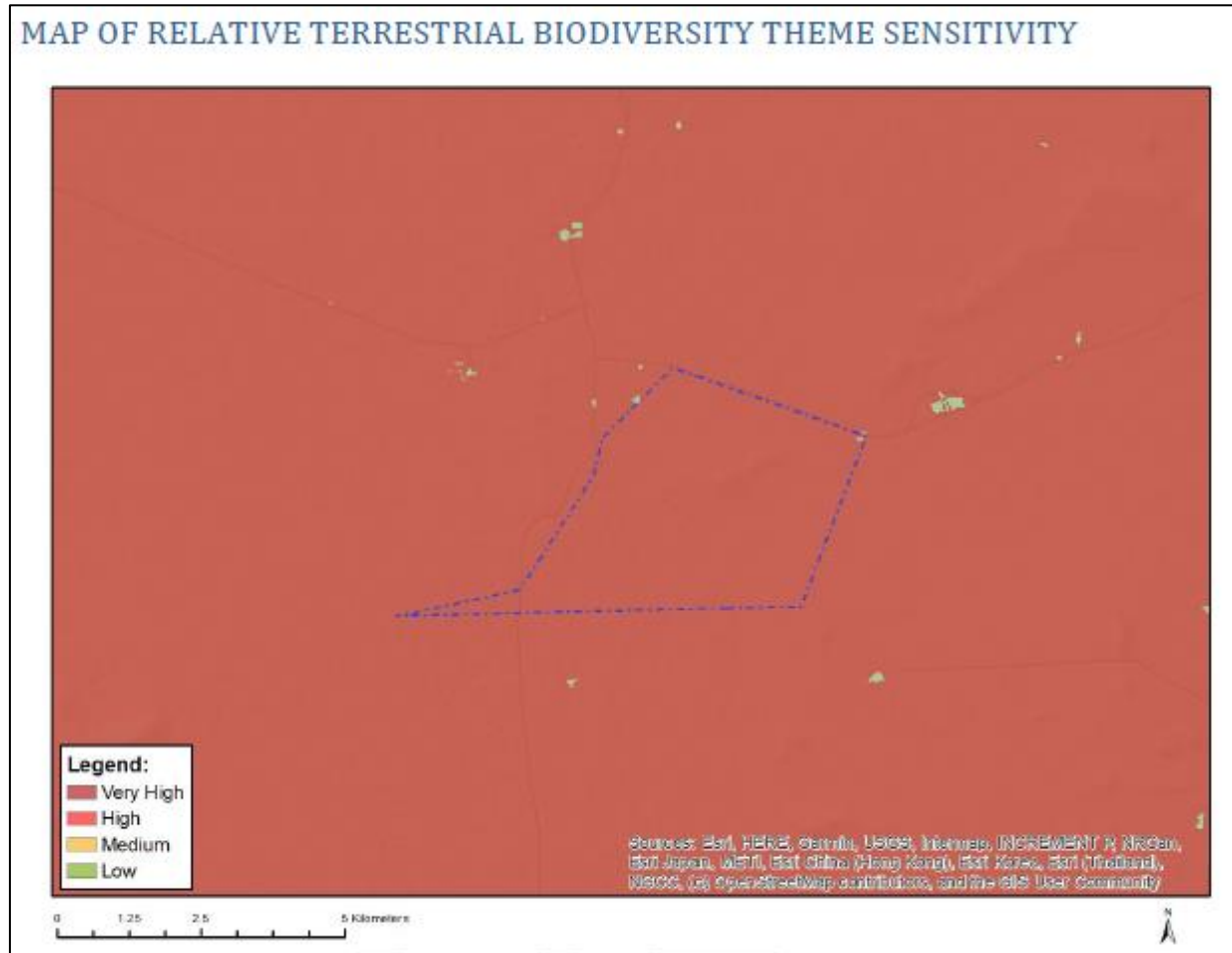
| Species                         | Common Name              | Conservation Status    |             |
|---------------------------------|--------------------------|------------------------|-------------|
|                                 |                          | Regional (SANBI, 2016) | IUCN (2017) |
| <i>Hystrix africaeaustralis</i> | Cape Porcupine           | LC                     | LC          |
| <i>Ictonyx striatus</i>         | Striped Polecat          | LC                     | LC          |
| <i>Lepus capensis</i>           | Cape Hare                | LC                     | LC          |
| <i>Orycteropus afer</i>         | Aardvark                 | LC                     | LC          |
| <i>Oryx gazella</i>             | Gemsbok                  | LC                     | LC          |
| <i>Otocyon megalotis</i>        | Bat-eared Fox            | LC                     | LC          |
| <i>Pedetes capensis</i>         | Springhare               | LC                     | LC          |
| <i>Phacochoerus africanus</i>   | Common Warthog           | LC                     | LC          |
| <i>Procavia capensis</i>        | Rock Hyrax               | LC                     | LC          |
| <i>Proteles cristata</i>        | Aardwolf                 | LC                     | LC          |
| <i>Raphicerus campestris</i>    | Steenbok                 | LC                     | LC          |
| <i>Rhabdomys pumilio</i>        | Xeric Four-striped Mouse | LC                     | LC          |
| <i>Suricata suricatta</i>       | Suricate                 | LC                     | LC          |
| <i>Tragelaphus strepsiceros</i> | Greater Kudu             | LC                     | LC          |
| <i>Vulpes chama</i>             | Cape Fox                 | LC                     | LC          |
| <i>Xerus inauris</i>            | Cape Ground Squirrel     | LC                     | LC          |



**Figure 3-13** Photographs illustrating a portion of the mammals recorded within the project area during the survey period. A: *Raphicerus campestris* (Steenbok), B: *Hystrix africaeaustralis* (Cape porcupine), C: *Genetta genetta* (Small-spotted Genet), D: *Proteles cristata* (Aardwolf), E: *Otocyon megalotis* (Bat-eared Fox) and F: *Vulpes chama* (Cape fox).

#### 4 Site Ecological Importance (SEI)

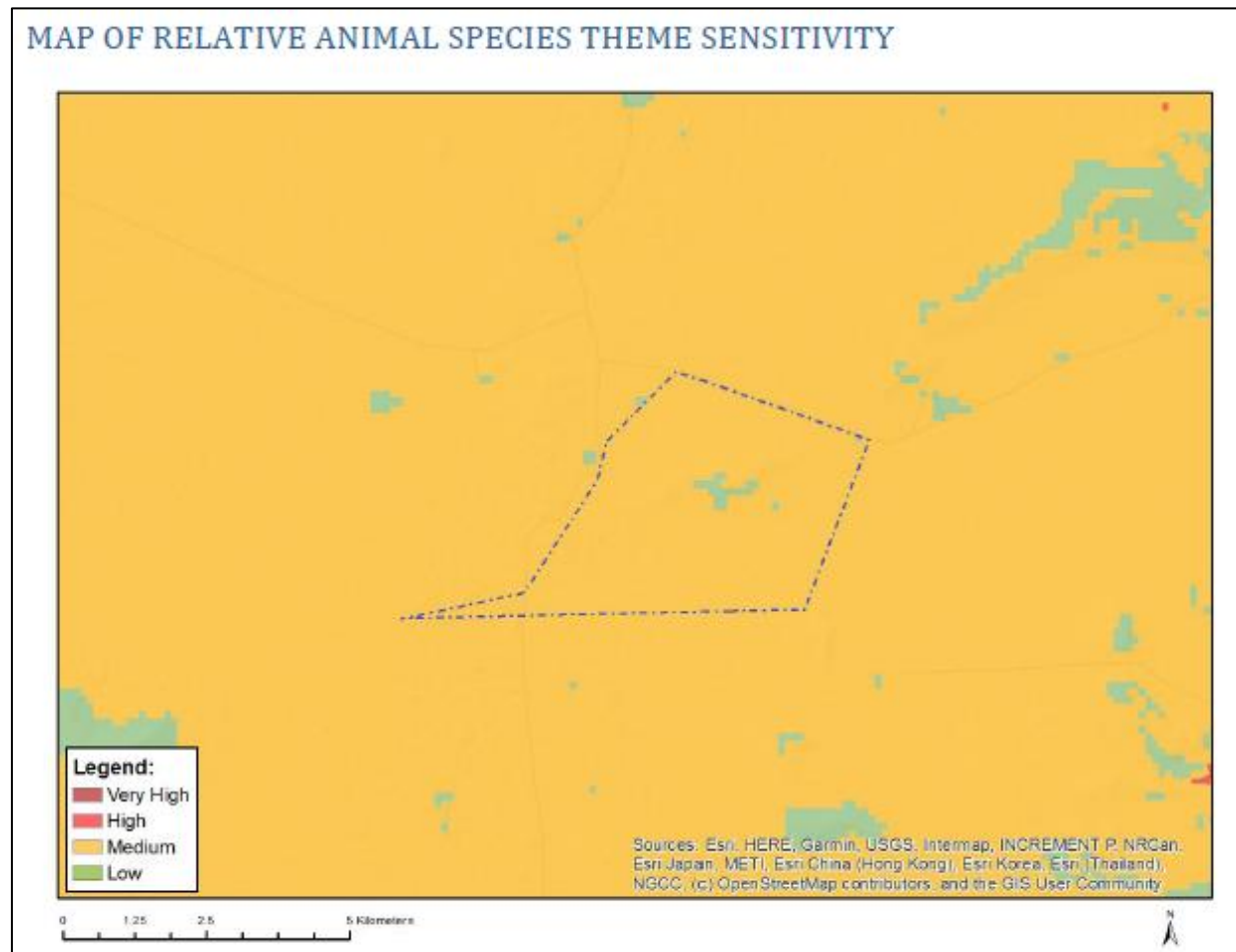
The combined Terrestrial Biodiversity Theme Sensitivity for the assessment area was derived to be Very High as indicated in the National Environmental Screening Tool due to the location within an ESA (Figure 4-1), it can be downloaded at (<https://screening.environment.gov.za/screeningtool/#/pages/welcome>).



**Figure 4-1 Combined Terrestrial Biodiversity Sensitivity of the assessment area**

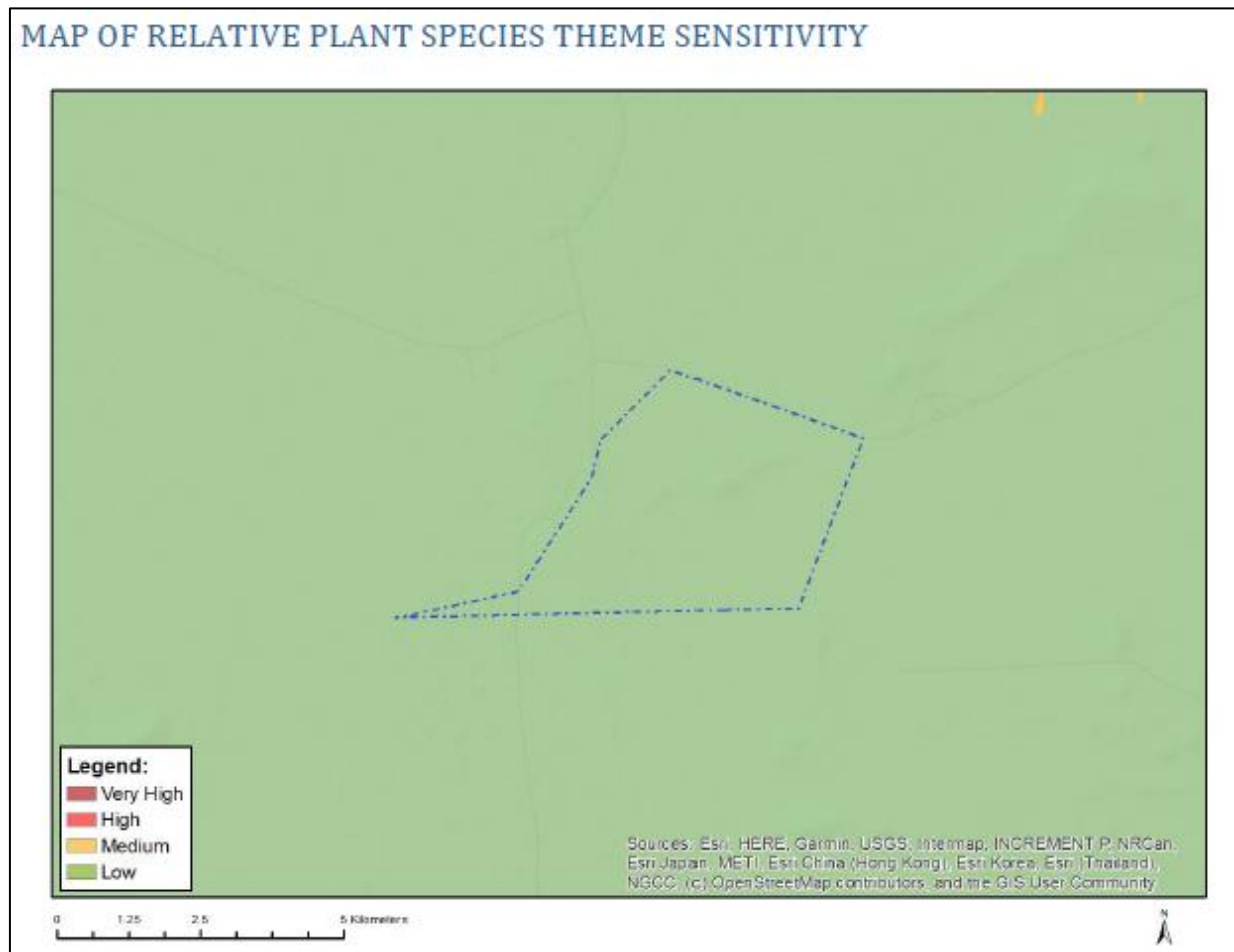
The Animal Species Theme sensitivity, as indicated in the screening report, was derived to be Medium for the PAOI (Figure 4-2). The Medium sensitivity of the project area was due to the likely presence of *Neotis ludwigii* (Ludwig’s Bustard), and *Aquila rapax* (Tawny Eagle) and is therefore applicable to the avifauna assessment.





**Figure 4-2** *Relative Animal Species Theme Sensitivity of the assessment area*

The Plant Species Theme sensitivity, as indicated in the screening report, was derived to be Low for the PAOI (Figure 4-3). No SCC are expected for the site.



**Figure 4-3** Relative Plant Species Theme Sensitivity of the assessment area

One (1) habitat type (vegetation community) was delineated within the assessment area (Table 4-1, Figure 4-4). Descriptions of the habitat types can be seen in Section 3.2.2.1. Based on the criteria provided in Section 2.3 of this report, all habitats within the project area of the proposed development were allocated a sensitivity category or SEI, which is considered a combined SEI for Terrestrial Biodiversity, Animal Species and Plant Species Themes. The sensitivities of the habitat types delineated are illustrated in Figure 4-4. The interpretations of the categories can be found in Table 2-7.

**Table 4-1** Habitat types and associated SEI delineated within the field assessment area of the proposed development

| Habitat Type           | Description  | Ecosystem Processes and Services  | Conservation Importance (CI)   | Functional Integrity (FI)  | Biodiversity Importance (BI) | Receptor Resilience (RR)   | Guidelines for interpreting SEI in the context of the proposed development activities   |
|------------------------|--|---|--|--|------------------------------|--|---|
| <b>Karoo Grassland</b> | Karroid shrubs and grasses on flat plains, homogenous in nature. | Provides foraging areas for fauna, provides landscape-level; pollination and dispersal. | <b>Medium</b><br>> 50% of receptor contains natural habitat with potential to support SCC. | <b>High</b><br>Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type. | <b>Medium</b>                | <b>Medium</b><br>Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and | <b>Medium</b><br>Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate |

| Habitat Type | Description | Ecosystem Processes and Services | Conservation Importance (CI) | Functional Integrity (FI) | Biodiversity Importance (BI) | Receptor Resilience (RR)      | Guidelines for interpreting SEI in the context of the proposed development activities |
|--------------|-------------|----------------------------------|------------------------------|---------------------------|------------------------------|-------------------------------|---|
|              |             |                                  |                              |                           |                              | functionality of the receptor | restoration activities.   |

Much of the project area comprises large areas of intact indigenous vegetation with little to no existing degradation, making these areas suitable for a wide variety of plant species (not all of which could be identified as a result of the seasonality of the site visit) as well as suitable habitat for a suite of faunal species, most notably various mammals.

In comparison to the screening tool, the themes are either confirmed or disputed as in Table 4-2.

**Table 4-2 Summary of the screening tool vs. specialist assigned sensitivities**

| Screening Tool Theme           | Screening Tool | Specialist | Tool Validated or Disputed by Specialist - Reasoning   |
|--------------------------------|----------------|------------|--|
| Terrestrial Biodiversity Theme | Very High      | Medium     | Disputed – Although the project area lies within an ESA it is relatively small in size and impacted by grazing activities with low plant species diversity and little to no SCC present.   |
| Animal Theme                   | Medium         | Medium     | Confirmed – A high diversity of mammals is expected and recorded for the site. However, this report does not deal with the triggered avifauna species for the medium sensitivity as this is the function of the avifauna report (TBC 2023) |
| Plant Theme                    | Low            | Low        | Confirmed – No SCC trigger species are located within the PAOI.  |

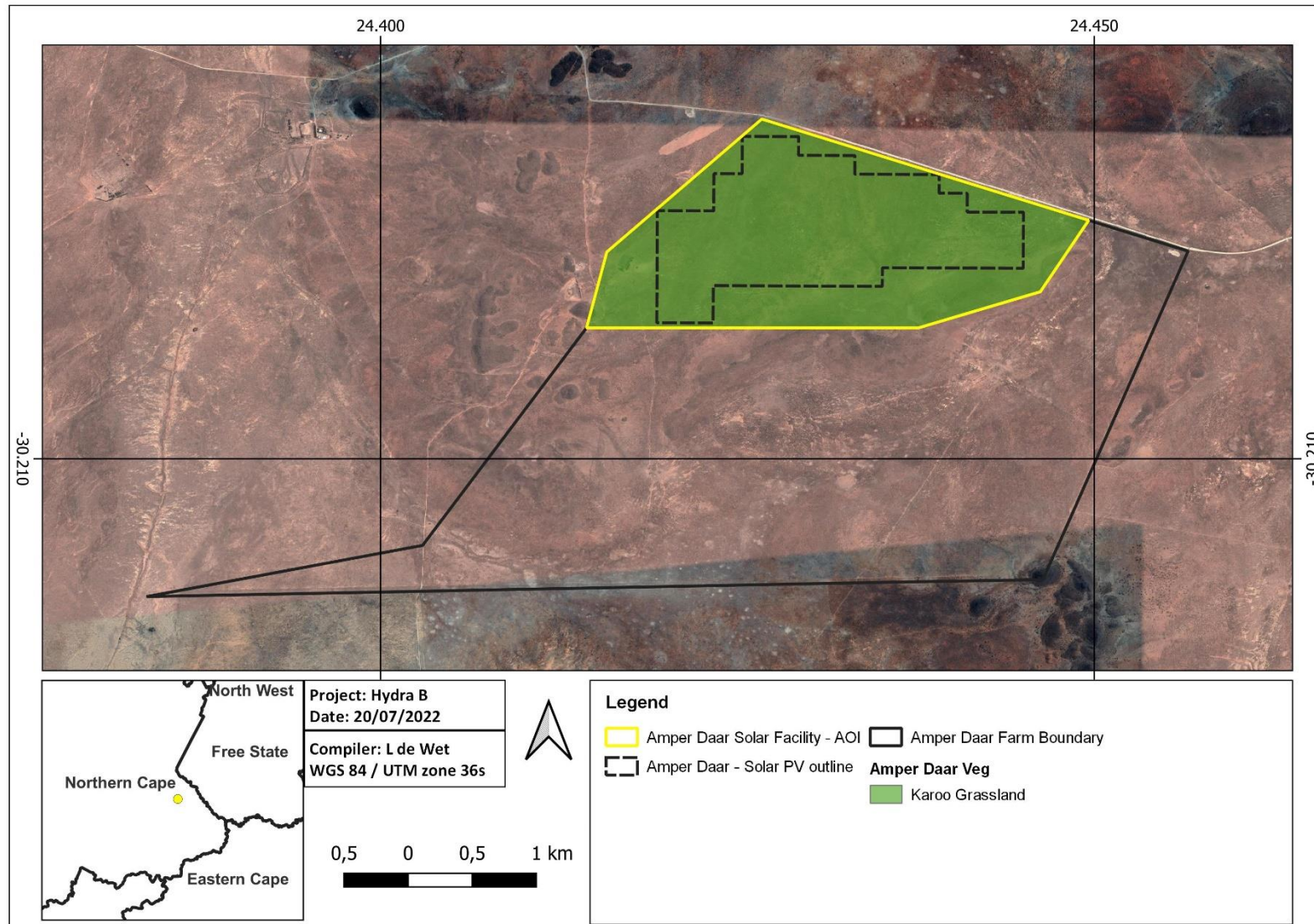


Figure 4-4 Map illustrating the habitats defined within the project area



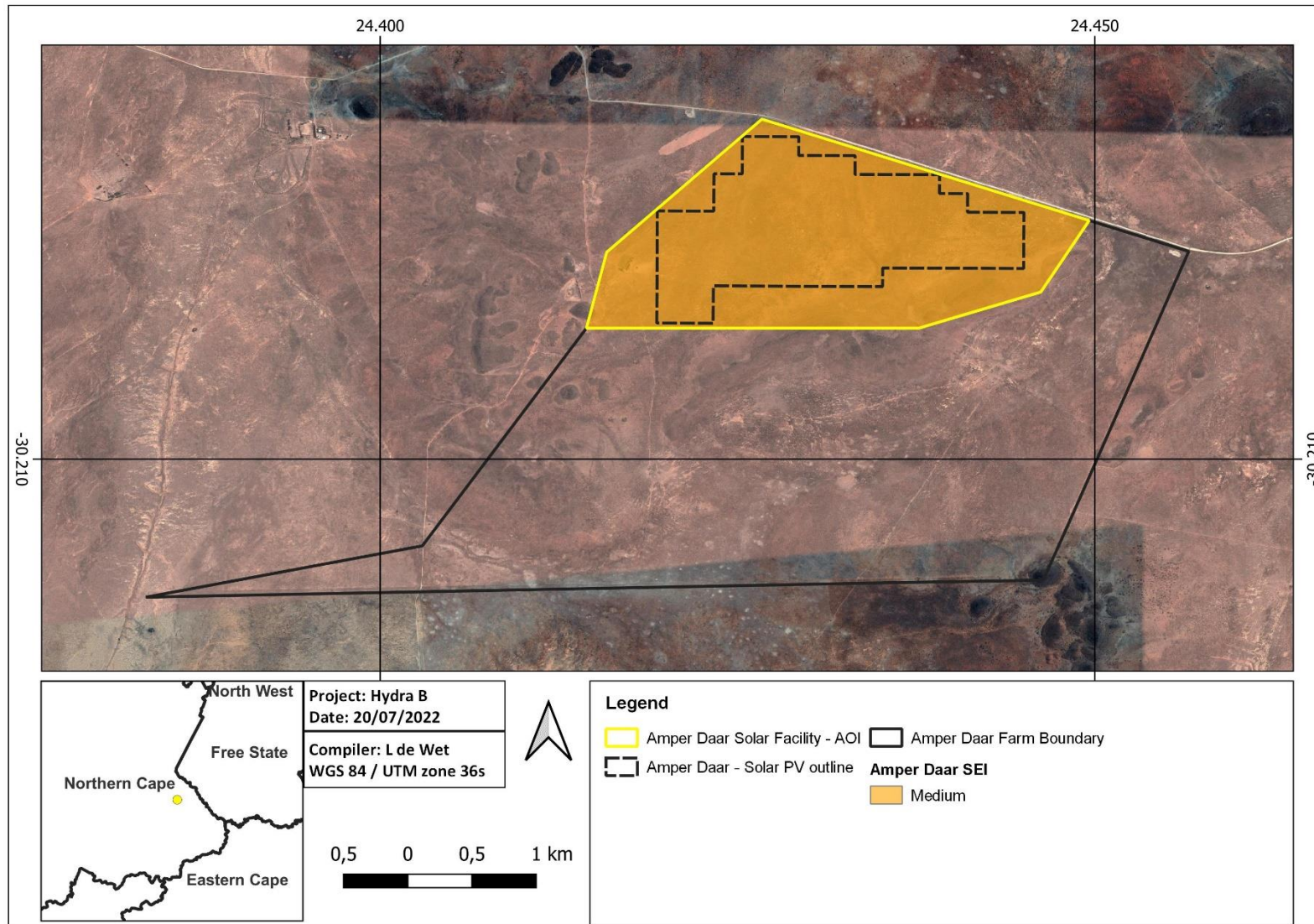


Figure 4-5 Map illustrating Site Ecological Importance (SEI) of the habitat types within the project area

## 5 Impact Risk Assessment

### 5.1 Biodiversity Risk Assessment

The assessment of the significance of direct, indirect and cumulative impacts was undertaken using the method as developed by Savannah. The assessment of the impact considers the following, the:

- Nature of the impact, which shall include a description of what causes the effect, what will be affected, and how it will be affected;
- Extent of the impact, indicating whether the impact will be local or regional;
- Duration of the impact, very short-term duration (0-1 year), short-term duration (2-5 years), medium-term (5-15 years), long-term (> 15 years) or permanent;
- Probability of the impact, describing the likelihood of the impact actually occurring, indicated as improbable, probable, highly probable or definite;
- Severity/beneficial scale, indicating whether the impact will be very severe/beneficial (a permanent change which cannot be mitigated/permanent and significant benefit with no real alternative to achieving this benefit); severe/beneficial (long-term impact that could be mitigated/long-term benefit); moderately severe/beneficial (medium- to long-term impact that could be mitigated/ medium- to long-term benefit); slight; or have no effect;
- Significance, which shall be determined through a synthesis of the characteristics described above and can be assessed as low medium or high;
- Status, which will be described as either positive, negative or neutral;
- Degree to which the impact can be reversed;
- Degree to which the impact may cause irreplaceable loss of resources; and
- Degree to which the impact can be mitigated.

#### 5.1.1 Present Impacts to Biodiversity

Considering the anthropogenic activities and influences within the landscape, limited negative impacts to biodiversity were observed within the study area. These include:

- Cattle and sheep grazing land-use and associated infrastructure;
- Roads and associated vehicle traffic and road kills; and
- Fences.

#### 5.1.2 Identification of Additional Potential Impacts

The potential impacts during the construction and operation phases of the project are presented in Table 5-1.

**Table 5-1** *Potential impacts to biodiversity associated with the proposed activity*

| Main Impact  | Project activities that can cause loss/impacts to habitat (especially with regard to the proposed infrastructure areas): | Secondary impacts anticipated                               |
|--|--|---|
| 1. Destruction, fragmentation and degradation of habitats and ecosystems | Physical removal of vegetation, including protected species.   | Displacement/loss of flora & fauna (including possible SCC) |
|  | Access roads and servitudes  | Increased potential for soil erosion                        |

|  |  |   |
|--|--|---|
|  | Soil dust precipitation  | Habitat fragmentation   |
|  | Dumping of waste products  | Increased potential for establishment of alien & invasive vegetation                          |
|  | Random events such as fire (cooking fires or cigarettes)   | Erosion   |
| <b>Main Impact</b>   | <b>Project activities that can cause the spread and/or establishment of alien and/or invasive species</b>            | <b>Secondary impacts anticipated</b>  |
| <b>2. Spread and/or establishment of alien and/or invasive species</b>   | Vegetation removal   | Habitat loss for native flora & fauna (including SCC)   |
|  | Vehicles potentially spreading seed  | Spreading of potentially dangerous diseases due to invasive and pest species                  |
|  | Unsanitary conditions surrounding infrastructure promoting the establishment of alien and/or invasive rodents        | Alteration of fauna assemblages due to habitat modification                                   |
| <b>Main Impact</b>   | <b>Project activities that can cause direct mortality of fauna</b>   | <b>Secondary impacts anticipated</b>  |
| <b>3. Direct mortality of fauna</b>  | Clearing of vegetation   | Loss of habitat   |
|  | Roadkill due to vehicle collision  | Loss of ecosystem services  |
|  | Pollution of water resources due to dust effects, chemical spills, etc.  | Increase in rodent populations and associated disease risk                                    |
|  | Intentional killing of fauna for food (hunting)  |   |
|  |  |   |
| <b>Main Impact</b>   | <b>Project activities that can cause reduced dispersal/migration of fauna</b>  | <b>Secondary impacts anticipated</b>  |
| <b>4. Reduced dispersal/migration of fauna</b>   | Loss of landscape used as corridor   | Reduced dispersal/migration of fauna  |
|  | Compacted roads  | Loss of ecosystem services  |
|  | Removal of vegetation  | Reduced plant seed dispersal  |
| <b>Main Impact</b>   | <b>Project activities that can cause pollution in watercourses and the surrounding environment</b>                   | <b>Secondary impacts anticipated</b>  |
| <b>5. Environmental pollution due to water runoff, spills from vehicles and erosion</b>  | Chemical (organic/inorganic) spills  | Pollution in watercourses and the surrounding environment                                     |
|  | Erosion  | Faunal mortality (direct and indirectly)  |
|  |  | Groundwater pollution   |
|  |  | Loss of ecosystem services  |
| <b>Main Impact</b>   | <b>Project activities that can cause disruption/alteration of ecological life cycles due to sensory disturbance.</b> | <b>Secondary impacts anticipated</b>  |
| <b>6. Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust and light pollution.</b> | Operation of machinery (Large earth moving machinery, vehicles)  | Disruption/alteration of ecological life cycles due to noise                                  |
|  | Project activities that can cause disruption/alteration of ecological life cycles due to dust                        | Loss of ecosystem services  |
|  | Vehicles   | Secondary impacts associated with disruption/alteration of ecological life cycles due to dust |
| <b>Main Impact</b>   | <b>Project activities that can cause staff to interact directly with potentially dangerous fauna</b>                 | <b>Secondary impacts anticipated</b>  |
|  |  | Loss of ecosystem services  |

---

|   |  |              |
|---|--|--------------|
| <b>8. Staff and others interacting directly with fauna (potentially dangerous) or poaching of animals</b> | All unregulated/supervised activities outdoors | Loss of SCCs |
|---|--|--------------|

---

### 5.1.3 Alternatives considered

No alternatives were considered.

## 5.2 Assessment of Impact Significance

The assessment of impact significance was undertaken in accordance with the method developed by Savannah. The various identified impacts are assessed below for the different phases of the development. The impacts assessed are considered for all alternatives as they are considered to have negligible impact significance differences.

### 5.2.1.1 Construction Phase

The following potential main impacts on the biodiversity (based on the framework above) were considered for the construction phase of the proposed development. This phase refers to the period during construction when the proposed features are constructed; and is considered to have the largest direct impact on biodiversity. The following potential impacts to terrestrial biodiversity were considered:

- Destruction, further loss and fragmentation of the of habitats, ecosystems and vegetation community (Table 5-2),
- Introduction of alien and invasive species, especially plants (Table 5-3); and
- Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and poaching) (



- Table 5-4).

**Table 5-2 Impacts to biodiversity associated with the proposed construction phase.**

| Impact Nature: Loss of vegetation within development footprint  |   |                 |
|---|---|-----------------|
| Destruction, further loss and fragmentation of the of habitats, ecosystems and vegetation community   |   |                 |
|   | Without mitigation  | With mitigation |
| Extent  | Moderate (3)  | Very low (1)    |
| Duration  | Permanent (5)   | Short term (2)  |
| Magnitude   | Moderate (6)  | Low (4)         |
| Probability   | Highly probable (4)   | Probable (3)    |
| Significance  | <b>Medium (56)</b>  | <b>Low (21)</b> |
| Status (positive or negative)   | Negative  | Negative        |
| Reversibility   | Low   | Moderate        |
| Irreplaceable loss of resources?  | No  | No              |
| Can impacts be mitigated?   | Yes, although this impact cannot be fully mitigated as the loss of vegetation is unavoidable. |                 |
| Mitigation:   |   |                 |
| <ul style="list-style-type: none"> <li>• Demarcate work areas during the construction phase to avoid affecting outside areas. Use physical barriers e.g., safety tape, not painted lines, and use signage</li> <li>• Do not clear areas of indigenous vegetation outside of the direct project footprint</li> <li>• Minimise vegetation clearing to the minimum required</li> <li>• Consult a fire expert and compile and implement a fire management plan to minimise the risk of veld fires around the project site</li> <li>• Compile and implement a rehabilitation plan from the onset of the project;</li> <li>• Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and bare (unvegetated) areas. <ul style="list-style-type: none"> <li>○ Reduce the dust generated by operational vehicles and earth moving machinery, through wetting the soil surface (with “dirty water”) and putting up signs to enforce speed limits to enforce reduced speeds.</li> <li>○ No non-environmentally friendly suppressants may be used as this could result in pollution of water sources.</li> </ul> </li> <li>• Rehabilitate areas as soon as they are no longer impacted by construction <ul style="list-style-type: none"> <li>○ The rehabilitated areas must be revegetated with indigenous vegetation</li> </ul> </li> <li>• Progressive rehabilitation will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank. Surplus rehabilitation material can be applied to other others in need of stabilisation and vegetation cover</li> <li>• Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018).</li> <li>• Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities.</li> </ul> |   |                 |
| Residual Impacts:   |   |                 |
| The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact would however be low.  |   |                 |

**Table 5-3 Impacts to biodiversity associated with the proposed construction phase.**

| Impact Nature: Introduction of alien and invasive species, especially plants  |                    |                 |
|---|--------------------|-----------------|
| Degradation and loss of surrounding natural vegetation, competition of indigenous flora and fauna persecution of indigenous fauna species |                    |                 |
|   | Without mitigation | With mitigation |
| Extent  | Moderate (3)       | Low (2)         |
| Duration  | Permanent (5)      | Short term (2)  |

| <b>Impact Nature: Introduction of alien and invasive species, especially plants</b>  |                     |                 |
|--|---------------------|-----------------|
| Degradation and loss of surrounding natural vegetation, competition of indigenous flora and fauna persecution of indigenous fauna species  |                     |                 |
| <b>Magnitude</b>   | Moderate (6)        | Minor (2)       |
| <b>Probability</b>   | Highly probable (4) | Improbable (2)  |
| <b>Significance</b>  | <b>Medium (56)</b>  | <b>Low (12)</b> |
| <b>Status (positive or negative)</b>   | Negative            | Negative        |
| <b>Reversibility</b>   | Moderate            | High            |
| <b>Irreplaceable loss of resources?</b>  | No                  | No              |
| <b>Can impacts be mitigated?</b>   | Yes                 |                 |
| <b>Mitigation:</b>   |                     |                 |
| <ul style="list-style-type: none"> <li>• Compile and implement an alien vegetation management plan from the onset of construction. The plan must identify areas for action (if any) and prescribe the necessary removal methods and frequencies to be applied. This plan must be also prescribing a monitoring plan and be updated as/when new data is collated;</li> <li>• Implementation of a waste management plan, this plan must also prescribe a monitoring plan and be updated as/when new data is collated. Waste management must be a priority and all waste must be collected, stored and disposed of adequately. It is recommended that all waste be removed from site on a weekly basis (as a minimum) to prevent rodents and pests entering the site.</li> <li>• Refuse bins will be emptied and secured.</li> <li>• Temporary storage of domestic waste shall be in covered waste skips.</li> <li>• Maximum domestic waste storage period will be 7 days.</li> <li>• A pest control plan must be put in place and implemented; it is imperative that poisons not be used.</li> </ul> |                     |                 |
| <b>Residual Impacts:</b>   |                     |                 |
| Long-term broad scale. IAP infestation if not mitigated.   |                     |                 |

**Table 5-4 Impacts to biodiversity associated with the proposed construction phase.**

| <b>Impact Nature: Displacement of faunal community due to habitat loss, direct mortalities and disturbance</b>  |  |                        |
|---|--|------------------------|
| Construction activity will likely lead to direct mortality of fauna due to earthworks, vehicle collisions, accidental hazardous chemical spills and persecution. Disturbance due to dust and noise pollution and vibration may disrupt behaviour.   |  |                        |
|   | <b>Without mitigation</b>  | <b>With mitigation</b> |
| <b>Extent</b>   | Moderate (3)   | Very low (1)           |
| <b>Duration</b>   | Moderate term (3)  | Short term (2)         |
| <b>Magnitude</b>  | Moderate (6)   | Minor (2)              |
| <b>Probability</b>  | Highly probable (4)  | Improbable (2)         |
| <b>Significance</b>   | <b>Medium (48)</b>   | <b>Low (10)</b>        |
| <b>Status (positive or negative)</b>  | Negative   | Negative               |
| <b>Reversibility</b>  | Moderate   | High                   |
| <b>Irreplaceable loss of resources?</b>   | No   | No                     |
| <b>Can impacts be mitigated?</b>  | Yes, to some extent. Noise and disturbance cannot be well mitigated, impacts on fauna due to human presence, such as vehicle collisions, poaching, and persecution can be mitigated. |                        |
| <b>Mitigation:</b>  |  |                        |
| <ul style="list-style-type: none"> <li>• Demarcate work areas during the construction phase to avoid affecting outside areas. Use physical barriers e.g., safety tape, not painted lines, and use signage.</li> <li>• Prior to vegetation clearing activities, the area to be cleared should be walked on foot by 1-2 individuals to create a disturbance in order for fauna to move off. Sites should be disturbed only prior to the area having to be cleared, not more than 1 day in advance.</li> <li>• Any fauna threatened by the construction activities should be removed safely by an appropriately qualified environmental officer or removal specialist.</li> <li>• All construction vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected.</li> <li>• 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</li> <li>• Minimise vegetation clearing to the minimum required. Areas should be cleared and disturbed on a needs-only basis, as opposed to clearing and disturbing a number of sites simultaneously.</li> <li>• All personnel and contractors must undergo Environmental Awareness Training. A signed register of attendance must be kept for proof.</li> <li>• The timing between clearing of an area and subsequent development must be minimized to avoid fauna from re-entering the site to be disturbed.</li> <li>• Any holes/deep excavations must be done in a progressive manner on a needs-only basis. No holes/excavations may be left open overnight. In the event holes/excavations are required to remain open overnight, these areas must be covered to prevent fauna falling into these areas and subsequently inspected prior to backfilling.</li> <li>• Where possible, work should be restricted to one area at a time and be systematic. This is to reduce the number and extent of on-site activities, allowing fauna to move off as the project progresses. This will give the smaller birds, mammals and reptiles a chance to weather the disturbance in an undisturbed zone close to their natural territories.</li> <li>• Considering that many of the mammal fauna recorded within the project area are nocturnal, no construction activity is to occur at night.</li> </ul> |  |                        |
| <b>Residual Impacts:</b>  |  |                        |
| It is probable that some individuals of susceptible species will be lost to construction-related activities despite mitigation. However, this is not likely to impact the viability of the local population of any fauna species.   |  |                        |

### 5.2.1.3 Operation Phase

The operational phase of the impact of daily activities is anticipated to further spread the IAP, as well as the deterioration of the habitats due to the increase of dust and edge effect impacts. Dust reduces the ability of plants to photosynthesize and thus leads to degradation/retrogression of the veld. Moving maintenance vehicles don't only cause sensory disturbances to fauna, affecting their life cycles and movement, but will lead to direct mortalities due to collisions.

The following potential impacts were considered:

- Continued fragmentation and degradation of habitats and ecosystems (Table 5-5);
- Spread of alien and/or invasive species (



- Table 5-6);
- Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, noise, light, dust, vibration) (Table 5-7).

**Table 5-5 Impacts to biodiversity associated with the proposed operational phase**

| <b>Impact Nature: Continued fragmentation and degradation of habitats and ecosystems</b>   |   |                 |
|--|---|-----------------|
| Disturbance created during the construction phase will leave the project area vulnerable to erosion and IAP encroachment.  |   |                 |
|  | Without Mitigation  | With Mitigation |
| <b>Extent</b>  | Low (2)   | Low (2)         |
| <b>Duration</b>  | Long term (4)   | Short term (2)  |
| <b>Magnitude</b>   | Moderate (6)  | Minor (2)       |
| <b>Probability</b>   | Highly probable (4)   | Improbable (2)  |
| <b>Significance</b>  | <b>Medium (48)</b>  | <b>Low (12)</b> |
| <b>Status (positive or negative)</b>   | Negative  | Negative        |
| <b>Reversibility</b>   | Moderate  | High            |
| <b>Irreplaceable loss of resources?</b>  | Yes   | No              |
| <b>Can impacts be mitigated?</b>   | Yes, with proper management and avoidance, this impact can be mitigated to a low level. |                 |
| <b>Mitigation:</b>   |   |                 |
| <ul style="list-style-type: none"> <li>• It should be made an offence for any staff to /take bring any plant species into/out of any portion of the PAOI. No plant species whether indigenous or exotic should be brought into/taken from the PAOI, to prevent the spread of exotic or invasive species or the illegal collection of plants.</li> <li>• A Rehabilitation Plan must be written for the development area and ensured that it be adhered to.</li> <li>• Access roads should have run-off control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.</li> <li>• All erosion observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.</li> <li>• There should be follow-up rehabilitation and re-vegetation of any remaining denuded areas with local indigenous perennial grass, shrubs and trees.</li> </ul> |   |                 |
| <b>Residual Impacts</b>  |   |                 |
| There is still the potential some potential for erosion and IAP encroachment even with the implementation of control measures but would have a low impact.   |   |                 |

**Table 5-6 Impacts to biodiversity associated with the proposed operational phase.**

| <b>Impact Nature: Spread of alien and/or invasive species</b>   |                           |                        |
|---|---------------------------|------------------------|
| Degradation and loss of surrounding natural vegetation, competition with indigenous faunal species.   |                           |                        |
|   | <b>Without mitigation</b> | <b>With mitigation</b> |
| <b>Extent</b>   | Moderate (3)              | Low (2)                |
| <b>Duration</b>   | Long term (4)             | Short term (2)         |
| <b>Magnitude</b>  | Moderate (6)              | Minor (2)              |
| <b>Probability</b>  | Highly probable (4)       | Improbable (2)         |
| <b>Significance</b>   | <b>Medium (52)</b>        | <b>Low (12)</b>        |
| <b>Status (positive or negative)</b>  | Negative                  | Negative               |
| <b>Reversibility</b>  | Moderate                  | High                   |
| <b>Irreplaceable loss of resources?</b>   | No                        | No                     |
| <b>Can impacts be mitigated?</b>  | Yes                       |                        |
| <b>Mitigation:</b>  |                           |                        |
| <ul style="list-style-type: none"> <li>• Implementation of an alien vegetation management plan. <ul style="list-style-type: none"> <li>○ Regular monitoring for IAP encroachment during the operation phase to ensure that no alien invasion problems have developed as result of the disturbance. This should be every 3 months during the first two years of the operation phase and every six months for the life of the project.</li> <li>○ All IAP species must be removed/controlled using the appropriate techniques as indicated in the IAP management plan</li> </ul> </li> <li>• Compile and implement a Solid Waste Management Plan. Waste management must be a priority and all waste must be collected, stored and disposed of adequately. It is recommended that all waste be removed from site on a weekly basis as a minimum.</li> <li>• A pest control plan must be implemented; it is imperative that poisons not be used.</li> </ul> |                           |                        |
| <b>Residual Impacts:</b>  |                           |                        |
| Long term broad scale IAP infestation if not mitigated.   |                           |                        |

**Table 5-7 Impacts to biodiversity associated with the proposed operational phase**

| <b>Impact Nature: Ongoing displacement and direct mortalities of faunal community (including potential SCC) due to disturbance (road collisions, noise, light, dust, vibration).</b> |                           |                        |
|--|---------------------------|------------------------|
| The operation and maintenance of the proposed development may lead to mortality, disturbance or persecution of fauna in the vicinity of the development.                             |                           |                        |
|  | <b>Without Mitigation</b> | <b>With Mitigation</b> |
| <b>Extent</b>  | Low (2)                   | Very low (1)           |
| <b>Duration</b>  | Long term (4)             | Short term (2)         |
| <b>Magnitude</b>   | Moderate (6)              | Minor (2)              |
| <b>Probability</b>   | Probable (3)              | Improbable (2)         |
| <b>Significance</b>  | <b>Medium (48)</b>        | <b>Low (10)</b>        |
| <b>Status (positive or negative)</b>   | Negative                  | Negative               |
| <b>Reversibility</b>   | Moderate                  | High                   |
| <b>Irreplaceable loss of resources?</b>  | No                        | No                     |
| <b>Can impacts be mitigated?</b>   | Yes                       |                        |
| <b>Mitigation:</b>   |                           |                        |

- No vehicle traffic nor the use of vehicle lights should be permitted during the night.
- Noise must be kept to a minimum from dusk to dawn to minimize all possible disturbances to amphibian species and nocturnal mammals
- Latest technology solar panels with an anti-reflective coating must be used. This will also improve the light transmittance and therefore increases the overall efficiency.
- If panels do not possess anti-reflective coatings, then non-polarising white tape can be used around and/or across panels to minimise reflection (Bennun *et al*, 2021).
- All personnel and contractors must undergo Environmental Awareness Training and must include awareness about not harming or collecting species.
- Any fauna threatened by the maintenance and operational activities should be removed to a safe location by an appropriate individual.
- All vehicles accessing the site should adhere to a max 40 km/h max to avoid collisions. Appropriate signs must be erected.
- If any excavations are to be dug these must not be left open for more than a few hours without ramps for trapped fauna to leave and must be filled at night.

#### Residual Impacts

Disturbance from maintenance activities will occur albeit at a low and infrequent level.

### 5.2.1.4 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.

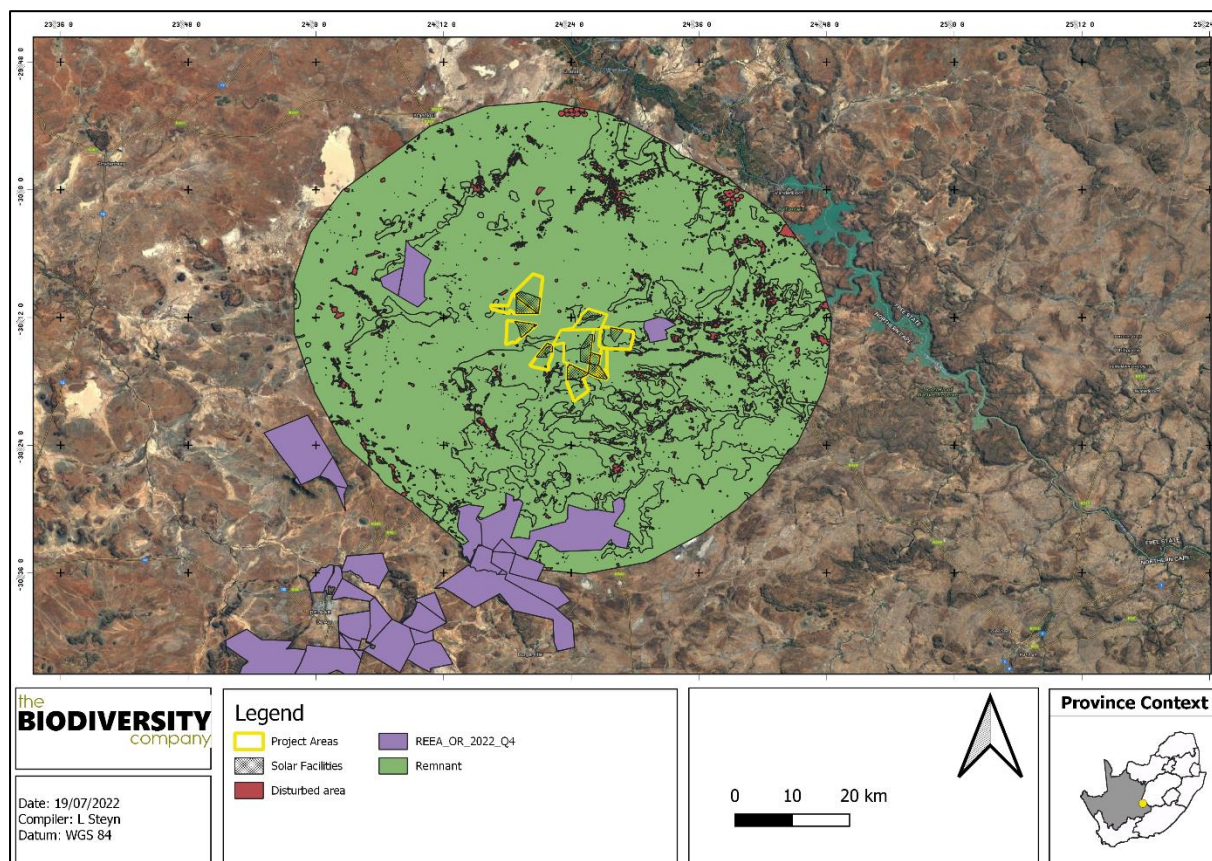
Cumulative impacts are assessed within the context of the extent of the proposed project area, other similar developments and activities in the area (existing and in-process), and general habitat loss and transformation resulting from any other activities in the area. Localised cumulative impacts include 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, and power infrastructure). Relevant impacts include the overall reduction of foraging and habitat where reproduction takes place, dust deposition, noise and vibration, disruption of functional corridors of habitat important for movement and migration, disruption of waterways, groundwater drawdown, increase risk of collisions; 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 the adjacent game parks and reserves. In order to spatially quantify the cumulative effects of the proposed development, the project in isolation 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).

A total area of 30 km surrounding the PAOI was used to assess the total habitat loss in the area and subsequently the cumulative impact. To determine the intact remnant habitat the NBA (2018) remnant spatial data was utilised. The future renewable energy projects were also considered by utilising the REEA Q4 (2022) spatial dataset. In order to remove any duplication, only the areas that overlap with the remnant areas were considered. The total cumulative loss was found to be 16.8% (Table 5-8), a visual representation of this is shown in Figure 5-1. Table 5-9 rates the cumulative impact as High.

**Table 5-8 The cumulative impacts considered for avifauna**

| Total Area of 30 km <sup>2</sup> | Intact Remnant Habitat | REEA area that does not overlap with disturbed areas | Total Disturbed/Transformed habitat | Percentage area lost |
|----------------------------------|------------------------|--|-------------------------------------|----------------------|
| 494454.44 Ha                     | 460532.1 Ha            | 49369 Ha   | 83291.31 Ha                         | 16.8%                |



**Figure 5-1 Map illustrating the additional renewable energy developments within the landscape overlaid onto the remnant vegetation types**

**Table 5-9 Cumulative Impacts to biodiversity associated with the proposed project.**

| Impact Nature: Cumulative habitat loss within the region   |  |   |
|--|--|---|
| The development of the proposed infrastructure will contribute to cumulative habitat loss within ESAs and thereby impact the ecological processes in the region. |  |   |
|  | Overall impact of the proposed development considered in isolation | Cumulative impact of the project and other projects in the area |
| <b>Extent</b>  | Very low (1)   | High (4)  |
| <b>Duration</b>  | Moderate term (3)  | Long term (4)   |
| <b>Magnitude</b>   | Low (4)  | Moderate (6)  |
| <b>Probability</b>   | Probable (3)   | Definite (5)  |
| <b>Significance</b>  | Low (24)   | High (70)   |
| <b>Status (positive or negative)</b>   | Negative   | Negative  |
| <b>Reversibility</b>   | Moderate   | Low   |



|  |  |     |
|--|--|-----|
| <b>Irreplaceable loss of resources?</b>  | No   | Yes |
| <b>Can impacts be mitigated</b>  | To some degree, but most of the impact results from the presence of the various facilities which cannot be well mitigated. |     |
| <b>Mitigation:</b>   |  |     |
| <ul style="list-style-type: none"> <li>Over and above all provided mitigation measures; ensure that a rehabilitation plan and IAP management plan be compiled for each development and are effectively implemented.</li> </ul> |  |     |

## 6 Management Objectives: Biodiversity

The aim of the management outcomes is to present the mitigations in such a way that they can be incorporated into the Environmental Management Programme (EMPr), allowing for more successful implementation and auditing of the mitigations and monitoring guidelines. Table 6-1 presents the recommended mitigation measures and the respective timeframes, targets and performance indicators for the terrestrial study.

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

- Prevent the further loss and fragmentation of vegetation communities and the CBA areas in the vicinity of the project area;
- Prevent the direct and indirect loss and disturbance of faunal species and community (including potentially occurring species of conservation concern); and
- Follow the guidelines for interpreting Site Ecological Importance (SEI).

**Table 6-1 Mitigation measures including requirements for timeframes, roles and responsibilities for this report**

OBJECTIVE: Prevent the further loss and fragmentation of vegetation communities and the CBA areas in the vicinity of the project area;

|                                     |   |
|-------------------------------------|---|
| <b>Project component/s</b>          | PV Footprint, laydown areas and road creation   |
| <b>Potential Impact</b>             | Destruction, further loss and fragmentation of the of habitats, ecosystems and vegetation community |
| <b>Activity/risk source</b>         | Land clearing, fire and dust.   |
| <b>Mitigation: Target/Objective</b> | Avoidance / minimisation of the disturbance and degradation of vegetation and ecosystems            |

| <b>Mitigation: Action/control</b>   | <b>Responsibility</b>                  | <b>Timeframe</b>                |
|---|--|---------------------------------|
| <ul style="list-style-type: none"> <li>• Demarcate work areas during the construction phase to avoid affecting outside areas. Use physical barriers e.g., safety tape, not painted lines, and use signage</li> <li>• Where possible, existing access routes and walking paths must be made use of.</li> <li>• Do not clear areas of indigenous vegetation outside of the direct project footprint</li> <li>• Minimise vegetation clearing to the minimum required</li> <li>• Consult a fire expert and compile and implement a fire management plan to minimise the risk of veld fires around the project site</li> <li>• Compile and implement a rehabilitation plan from the onset of the project;</li> <li>• Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and bare (unvegetated) areas.                         <ul style="list-style-type: none"> <li>○ Reduce the dust generated by operational vehicles and earth moving machinery, through wetting the soil surface (with “dirty water”) and putting up signs to enforce speed limits to enforce reduced speeds.</li> <li>○ No non-environmentally friendly suppressants may be used as this could result in pollution of water sources.</li> </ul> </li> <li>• Rehabilitate areas as soon as they are no longer impacted by construction                         <ul style="list-style-type: none"> <li>○ The rehabilitated areas must be revegetated with indigenous vegetation</li> </ul> </li> <li>• Progressive rehabilitation will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank. Surplus rehabilitation material can be applied to other others in need of stabilisation and vegetation cover</li> <li>• Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018). Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities.</li> </ul> | Project manager, Environmental Officer | Planning and Construction phase |

|                              |  |
|------------------------------|--|
| <b>Performance Indicator</b> | Clearing restricted to 'allowable' areas, dust generated, limited unplanned fires, rehabilitation. |
| <b>Monitoring</b>            | Daily during the construction phase  |

OBJECTIVE: Prevent the further loss and fragmentation of vegetation communities in the vicinity of the project area.

|                                     |   |
|-------------------------------------|---|
| <b>Project component/s</b>          | <b>Project Area</b>   |
| <b>Potential Impact</b>             | <b>Introduction of alien and invasive species, especially plants</b>                            |
| <b>Activity/risk source</b>         | <b>Land clearing, fire and dust.</b>  |
| <b>Mitigation: Target/Objective</b> | <b>Avoidance / minimisation of the disturbance and degradation of vegetation and ecosystems</b> |

| <b>Mitigation: Action/control</b>  | <b>Responsibility</b>                  | <b>Timeframe</b>                |
|--|--|---------------------------------|
| <ul style="list-style-type: none"> <li>• Do not clear areas of indigenous vegetation outside of the direct project footprint</li> <li>• Minimise vegetation clearing to the minimum required</li> <li>• Consult a fire expert and compile and implement a fire management plan to minimise the risk of veld fires around the project site</li> <li>• Compile and implement a rehabilitation plan from the onset of the project;</li> <li>• Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and bare (unvegetated) areas.                             <ul style="list-style-type: none"> <li>○ Reduce the dust generated by operational vehicles and earth moving machinery, through wetting the soil surface (with "dirty water") and putting up signs to enforce speed limits to enforce reduced speeds.</li> <li>○ No non-environmentally friendly suppressants may be used as this could result in pollution of water sources.</li> </ul> </li> <li>• Rehabilitate areas as soon as they are no longer impacted by construction                             <ul style="list-style-type: none"> <li>○ The rehabilitated areas must be revegetated with indigenous vegetation</li> </ul> </li> <li>• Progressive rehabilitation will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank. Surplus rehabilitation material can be applied to other others in need of stabilisation and vegetation cover</li> </ul> | Project manager, Environmental Officer | Planning and Construction phase |



|  |  |  |
|--|--|--|
| <ul style="list-style-type: none"> <li>Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018). Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities.</li> </ul> |  |  |
| <b>Performance Indicator</b>   | Clearing restricted to 'allowable' areas, dust generated, limited unplanned fires, rehabilitation. |  |
| <b>Monitoring</b>  | Daily during the construction phase for all mitigation   |  |

OBJECTIVE: Prevent the direct and indirect loss and disturbance of faunal species and community (including potential SCCs)

|                                     |  |
|-------------------------------------|--|
| <b>Project component/s</b>          | <b>PV Footprint, laydown areas and road creation</b>   |
| <b>Potential Impact</b>             | <b>Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and poaching)</b> |
| <b>Activity/risk source</b>         | <b>Land clearing, Fire and human presence as well as roads.</b>  |
| <b>Mitigation: Target/Objective</b> | <b>Avoidance / minimisation of the disturbance and mortality of fauna</b>  |

| <b>Mitigation: Action/control</b>  | <b>Responsibility</b>                  | <b>Timeframe</b>                |
|--|--|---------------------------------|
| <ul style="list-style-type: none"> <li>Demarcate work areas during the construction phase to avoid affecting outside areas. Use physical barriers e.g., safety tape, not painted lines, and use signage.</li> <li>Prior to vegetation clearing activities, the area to be cleared should be walked on foot by 1-2 individuals to create a disturbance in order for fauna to move off. Sites should be disturbed only prior to the area having to be cleared, not more than 1 day in advance.</li> <li>Any fauna threatened by the construction activities should be removed safely by an appropriately qualified environmental officer or removal specialist.</li> <li>All construction vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected.</li> </ul> | Project manager, Environmental Officer | Planning and Construction phase |

|  |   |  |
|--|---|--|
| <ul style="list-style-type: none"> <li>• 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</li> <li>• Minimise vegetation clearing to the minimum required. Areas should be cleared and disturbed on a needs-only basis, as opposed to clearing and disturbing a number of sites simultaneously.</li> <li>• Provide All personnel and contractors with Environmental Awareness Training. A signed register of attendance must be kept for proof.</li> <li>• The timing between clearing of an area and subsequent development must be minimized to avoid fauna from re-entering the site to be disturbed.</li> <li>• Any holes/deep excavations must be done in a progressive manner on a needs-only basis. No holes/excavations may be left open overnight. In the event holes/excavations are required to remain open overnight, these areas must be covered to prevent fauna falling into these areas and subsequently inspected prior to backfilling</li> <li>• Where possible, work should be restricted to one area at a time and be systematic. This is to reduce the number and extent of on-site activities, allowing fauna to move off as the Project progresses. This will give the smaller birds, mammals and reptiles a chance to weather the disturbance in an undisturbed zone close to their natural territories.</li> <li>• Considering that many of the mammal fauna recorded within the project area are nocturnal, no construction activity is to occur at night.</li> </ul> |   |  |
| <p><b>Performance Indicator</b></p>  | <p>Amount of observable fauna mortalities,<br/>Sequence, direction and timing of land clearing.<br/>Speed limits adhered to</p> |  |
| <p><b>Monitoring</b></p>   | <p>Daily during the construction phase for all mitigation</p>   |  |

OBJECTIVE: Prevent the further loss and fragmentation of vegetation communities and the CBA areas in the vicinity of the project area;

|                                    |  |
|------------------------------------|--|
| <p><b>Project component/s</b></p>  | <p><b>Operational Area, PV as well as roads.</b></p>                               |
| <p><b>Potential Impact</b></p>     | <p><b>Continued fragmentation and degradation of habitats and ecosystems</b></p>   |
| <p><b>Activity/risk source</b></p> | <p><b>Dust, unregulated clearing, IAP plant proliferation and edge effects</b></p> |

|  |  |                   |
|--|--|-------------------|
| <b>Mitigation: Target/Objective</b>  | <b>Avoidance / minimisation of the disturbance and degradation of vegetation and ecosystems</b>    |                   |
| <b>Mitigation: Action/control</b>  | <b>Responsibility</b>  | <b>Timeframe</b>  |
| <ul style="list-style-type: none"> <li>It should be made an offence for any staff to /take bring any plant species into/out of any portion of the PAOI. No plant species whether indigenous or exotic should be brought into/taken from the PAOI, to prevent the spread of exotic or invasive species or the illegal collection of plants.</li> <li>A Rehabilitation Plan must be written for the development area and ensured that it be adhered to.</li> <li>Access roads should have run-off control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.</li> <li>All erosion observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.</li> <li>There should be follow-up rehabilitation and re-vegetation of any remaining denuded areas with local indigenous perennial grass, shrubs and trees.</li> </ul> | Project manager, Environmental Officer   | Operational phase |
| <b>Performance Indicator</b>   | Clearing restricted to 'allowable' areas, dust generated, limited unplanned fires, rehabilitation. |                   |
| <b>Monitoring</b>  | Daily during the operational phase for all mitigation  |                   |

OBJECTIVE: Prevent the further loss and fragmentation of vegetation communities and the CBA areas in the vicinity of the project area;

|                                     |   |
|-------------------------------------|---|
| <b>Project component/s</b>          | <b>Project Area</b>   |
| <b>Potential Impact</b>             | <b>Spread of alien and/or invasive species</b>  |
| <b>Activity/risk source</b>         | <b>Cleared Areas, laydown areas, fire and dust.</b>   |
| <b>Mitigation: Target/Objective</b> | <b>Avoidance / minimisation of the disturbance and degradation of vegetation and ecosystems</b> |

| Mitigation: Action/control   | Responsibility   | Timeframe         |
|--|--|-------------------|
| <ul style="list-style-type: none"> <li>• Implementation of an alien vegetation management plan.                             <ul style="list-style-type: none"> <li>○ Regular monitoring for IAP encroachment during the operation phase to ensure that no alien invasion problems have developed as result of the disturbance. This should be every 3 months during the first two years of the operation phase and every six months for the life of the project.</li> <li>○ All IAP species must be removed/controlled using the appropriate techniques as indicated in the IAP management plan</li> <li>○ Compile and implement a Solid Waste Management Plan. Waste management must be a priority and all waste must be collected, stored and disposed of adequately. It is recommended that all waste be removed from site on a weekly basis as a minimum.</li> </ul> </li> </ul> | Project manager, Environmental Officer   | Operational phase |
| <b>Performance Indicator</b>   | Clearing restricted to 'allowable' areas, dust generated, limited unplanned fires, rehabilitation. |                   |
| <b>Monitoring</b>  | Daily during the construction phase for all mitigation   |                   |

OBJECTIVE: Prevent the direct and indirect loss and disturbance of faunal species and community (including potentially/occurring SCCs)

|                                     |  |
|-------------------------------------|--|
| <b>Project component/s</b>          | <b>Operations Area (PV Footprint, laydown areas and roads)</b>   |
| <b>Potential Impact</b>             | <b>Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, noise, light, dust, vibration)</b> |
| <b>Activity/risk source</b>         | <b>Moving vehicles, Fire and human presence and activities</b>   |
| <b>Mitigation: Target/Objective</b> | <b>Avoidance / minimisation of the disturbance and degradation of vegetation.</b>  |

| Mitigation: Action/control  | Responsibility                         | Timeframe         |
|---|--|-------------------|
| <ul style="list-style-type: none"> <li>• Outside lighting should be designed and limited to minimize impacts on fauna. Lighting fixtures should be fitted with baffles, hoods or louvres and directed downward. Outside lighting should be directed away from highly sensitive areas such as wetlands. Fluorescent and mercury vapor lighting should be avoided and sodium vapor (yellow) lights should be used wherever possible;</li> <li>• Where feasible, motion detection lighting must be used to minimise the unnecessary illumination of areas</li> </ul> | Project manager, Environmental Officer | Operational phase |



|  |  |  |
|--|--|--|
| <ul style="list-style-type: none"> <li>• Minimise traffic and the use of vehicle lights of the road during the night.</li> <li>• Noise must be kept to a minimum from dusk to dawn to minimize all possible disturbances to amphibian species and nocturnal mammals</li> <li>• Latest technology solar panels with an anti-reflective coating must be used. This will also improve the light transmittance and therefore increases the overall efficiency.</li> <li>• If panels do not possess anti-reflective coatings, then non-polarising white tape can be used around and/or across panels to minimise reflection (Bennun <i>et al</i>, 2021).</li> <li>• All personnel and contractors must undergo Environmental Awareness Training and must include awareness about not harming or collecting species.</li> <li>• Any fauna threatened by the maintenance and operational activities should be removed to a safe location by an appropriate individual.</li> <li>• All vehicles accessing the site should adhere to a max 40 km/h max to avoid collisions. Appropriate signs must be erected.</li> <li>• If any excavations are to be dug these must not be left open for more than a few hours without ramps for trapped fauna to leave and must be filled at night.</li> </ul> |  |  |
| <p><b>Performance Indicator</b></p>  | <p>Amount of observable fauna mortalities,<br/>Speed limits adhered to</p> |  |
| <p><b>Monitoring</b></p>   | <p>Daily during the construction phase for all mitigation</p>              |  |

## 7 Conclusion and Impact Statement

### 7.1 Conclusion

The PAOI has been altered, albeit limited, both currently and historically. Grazing from livestock and sheep and associated mismanagement has led to (limited) deterioration of the area. Most areas can be regarded as important, not only within the local landscape, but also regionally; as they are used for habitat, foraging and movement corridors for fauna within a landscape fragmented by farming activities. The habitat sensitivity of these habitats is regarded as Medium, and the following aspects support this classification:

- Functions as an ESA as per the Northern Cape Critical Biodiversity Areas spatial database; and
- Supports various organisms and may play an important role in the ecosystem, if left to recover from the superficial impacts.

The ecological integrity, importance and functioning of these terrestrial biodiversity areas provide a variety of ecological services considered beneficial, with one key service being the maintenance of biodiversity. The preservation of these systems is the most important aspect to consider for the proposed project.

The habitat physiognomy within the PAOI is largely heterogenous and, based on the fauna components recorded within the PAOI and proximal landscape, the area provides important ecosystem services, particularly with regards to the maintenance of dynamic soil properties and pollination services. The combined SEI (sensitivity) of the PAOI was determined to be Medium, due to the extent of the area considered and its connectivity to natural areas within the landscape, and the low resilience of the habitat/vegetation type.

### 7.2 Impact Statement

The main expected impacts of the proposed infrastructure will include the following:

- Habitat loss and fragmentation as well as degradation of surrounding habitat;
- Disturbance and displacement caused during the construction and maintenance phases; and
- Direct mortality during the construction phase.

The primary expected impacts of the proposed project will be the loss of habitat and emigration of fauna. Based on the outcomes of the SEI determination, the PAOI is considered to have a Medium SEI which indicated that minimisation mitigation must be applied to the site.

It must be noted, when taken into consideration in conjunction with the other Solar PV facilities planned for all three phases of the overall proposed development, that the cumulative fragmentation of the ESA is very high. The associated cumulative fragmentation impacts are expected to be high for the overall development. This project should ideally not be considered in isolation but rather as a part of the full proposed development when considering impacts to the ESA.

Considering that this area has been identified as being of significance for biodiversity maintenance and ecological processes (ESA), development may proceed but with caution and only with the implementation of mitigation measures. Considering the above-mentioned information, 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 and supporting recommendations are implemented.

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## 9 Appendix Items

### 9.1 Appendix A – Protocol Checklist

“Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity” gazetted 20 March 2020, published in Government Notice No. 320

| Paragraph | Item  | Pages | Comment   |
|-----------|---|-------|---|
| 2.1       | The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with expertise in the field of terrestrial biodiversity.   | i     |   |
| 2.2       | The assessment must be undertaken on the preferred site and within the proposed development footprint.  | 5     |   |
| 2.3.1     | A description of the ecological drivers or processes of the system and how the proposed development will impact these.  | 39-63 |   |
| 2.3.2     | Ecological functioning and ecological processes (e.g. fire, migration, pollination, etc.) that operate within the preferred site  | 39-45 |   |
| 2.3.3     | The ecological corridors that the proposed development would impede including migration and movement of flora and fauna.  | 17-28 |   |
| 2.3.4     | The description of any significant terrestrial landscape features (including rare or important flora-faunal associations, presence of strategic water source areas (SWSAs) or freshwater ecosystem priority area (FEPA) sub catchments.   | 17-28 |   |
| 2.3.5     | A description of terrestrial biodiversity and ecosystems on the preferred site, including:<br>(a) main vegetation types;<br>(b) threatened ecosystems, including listed ecosystems as well as locally important habitat types identified. | 17-36 |   |
| 2.3.6     | The assessment must identify any alternative development footprints within the preferred site which would be of a “low” sensitivity as identified by the screening tool and verified through the site sensitivity verification.           | -     | No “low” sensitivity areas were identified due to the ecological condition of the site. |

|                |   |                           |  |
|----------------|---|---------------------------|--|
| <p>2.3.7.1</p> | <p>Terrestrial Critical Biodiversity Areas (CBAs), including:</p> <p>(a) the reasons why an area has been identified as a CBA;</p> <p>(b) an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation;</p> <p>(c) the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to the remaining extent of the ecosystem type(s);</p> <p>(d) the impact on ecosystem threat status;</p> <p>(e) the impact on explicit subtypes in the vegetation;</p> <p>(f) the impact on overall species and ecosystem diversity of the site; and</p> <p>(g) the impact on any changes to threat status of populations of species of conservation concern in the CBA.</p> | <p>17-23</p> <p>45-55</p> |  |
| <p>2.3.7.2</p> | <p>Terrestrial ecological support areas (ESAs), including:</p> <p>(a) the impact on the ecological processes that operate within or across the site;</p> <p>(b) the extent the proposed development will impact on the functionality of the ESA; and</p> <p>(c) loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration and movement of flora and fauna.</p>  | <p>17-23</p> <p>45-55</p> |  |
| <p>2.3.7.3</p> | <p>Protected areas as defined by the National Environmental Management: Protected Areas Act, 2004 including-</p> <p>(a) an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan.</p>  | <p>17-23</p>              |  |
| <p>2.3.7.4</p> | <p>Priority areas for protected area expansion, including-</p> <p>(a) the way in which in which the proposed development will</p>   | <p>17-23</p>              |  |

|         |   |                |                                    |
|---------|---|----------------|------------------------------------|
|         | compromise or contribute to the expansion of the protected area network.  |                |                                    |
| 2.3.7.5 | <p>SWSAs including:</p> <p>(a) the impact(s) on the terrestrial habitat of a SWSA; and</p> <p>(b) the impacts of the proposed development on the SWSA water quality and quantity (e.g. describing potential increased runoff leading to increased sediment load in water courses)</p> | 17-23          |                                    |
| 2.3.7.6 | <p>FEPA sub catchments, including-</p> <p>(a) the impacts of the proposed development on habitat condition and species in the FEPA sub catchment</p>  | 17-23          |                                    |
| 2.3.7.7 | <p>indigenous forests, including:</p> <p>(a) impact on the ecological integrity of the forest; and</p> <p>(b) percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.</p>                           | -              | No forest habitats within the area |
| 3.1.1.  | Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae.  | i<br>85 to end |                                    |
| 3.1.2   | A signed statement of independence by the specialist.   | 89-90          |                                    |
| 3.1.3   | A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment.   | 3<br>9-10      |                                    |
| 3.1.4   | A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant.   | 7-17           |                                    |
| 3.1.5   | A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations.  | 3              |                                    |
| 3.1.6   | A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant).   | 46-50          |                                    |



|        |  |             |   |
|--------|--|-------------|---|
| 3.1.7  | Additional environmental impacts expected from the proposed development.   | 51-60       |   |
| 3.1.8  | Any direct, indirect and cumulative impacts of the proposed development.   | 60-61       |   |
| 3.1.9  | The degree to which impacts and risks can be mitigated.  | 51-60       |   |
| 3.1.10 | The degree to which the impacts and risks can be reversed.   | -           | None  |
| 3.1.11 | The degree to which the impacts and risks can cause loss of irreplaceable resources.   | 52<br>51-61 |   |
| 3.1.12 | Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr).   | 62-64       |   |
| 3.1.13 | A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a "low" terrestrial biodiversity sensitivity and that were not considered appropriate. | -           | None  |
| 3.1.14 | A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not;   | -           | Not provided yet as this is a guidance document |
| 3.1.15 | any conditions to which this statement is subjected  | 65          |   |

## 9.2 Appendix B – Flora species expected to occur in the project area

| Family         | Scientific name                                     | Author                          | IU<br>CN | Ecology                                  |
|----------------|---|---------------------------------|----------|--|
| Acanthaceae    | <i>Barleria rigida</i>                              | Willd. ex Nees                  | LC       | Indigenous                               |
| Acanthaceae    | <i>Barleria rigida</i> var. <i>rigida</i>           | Willd. ex Nees                  | LC       | Indigenous                               |
| Acanthaceae    | <i>Blepharis capensis</i>                           | (L.f.) Pers.                    | LC       | Indigenous; Endemic                      |
| Acanthaceae    | <i>Blepharis mitrata</i>                            | C.B.Clarke                      | LC       | Indigenous                               |
| Acanthaceae    | <i>Dicliptera clinopodia</i>                        | Nees                            | LC       | Indigenous                               |
| Acanthaceae    | <i>Justicia incana</i>                              | (Nees) T.Anderson               | LC       | Indigenous                               |
| Aizoaceae      | <i>Chasmatophyllum maninum</i>                      | L.Bolus                         | DD       | Indigenous; Endemic                      |
| Aizoaceae      | <i>Galenia africana</i>                             | L.                              | LC       | Indigenous                               |
| Aizoaceae      | <i>Galenia papulosa</i>                             | (Eckl. & Zeyh.) Sond.           | LC       | Indigenous                               |
| Aizoaceae      | <i>Galenia pubescens</i>                            | (Eckl. & Zeyh.) Druce           | LC       | Indigenous; Endemic                      |
| Aizoaceae      | <i>Galenia sarcophylla</i>                          | Fenzl ex Sond.                  | LC       | Indigenous                               |
| Aizoaceae      | <i>Galenia secunda</i>                              | (L.f.) Sond.                    | LC       | Indigenous                               |
| Aizoaceae      | <i>Malephora smithii</i>                            | (L.Bolus) H.E.K.Hartmann        | LC       | Indigenous; Endemic                      |
| Aizoaceae      | <i>Mesembryanthemum coriarium</i>                   | Burch. ex N.E.Br.               |          | Indigenous                               |
| Aizoaceae      | <i>Oscularia deltooides</i>                         | (L.) Schwantes                  | LC       | Indigenous; Endemic                      |
| Aizoaceae      | <i>Tetragonia acanthocarpa</i>                      | Adamson                         | LC       | Indigenous; Endemic                      |
| Aizoaceae      | <i>Tetragonia calycina</i>                          | Fenzl                           | LC       | Indigenous                               |
| Aizoaceae      | <i>Tetragonia fruticosa</i>                         | L.                              | LC       | Indigenous                               |
| Aizoaceae      | <i>Trianthema parvifolia</i> var. <i>parvifolia</i> | E.Mey. ex Sond.                 | LC       | Indigenous                               |
| Amaranthaceae  | <i>Alternanthera pungens</i>                        | Kunth                           | NE       | Not indigenous; Naturalised              |
| Amaranthaceae  | <i>Amaranthus dinteri</i> subsp. <i>dinteri</i>     | Schinz                          | NE       | Indigenous                               |
| Amaranthaceae  | <i>Amaranthus schinzianus</i>                       | Thell.                          | LC       | Indigenous                               |
| Amaranthaceae  | <i>Atriplex eardleyae</i>                           | Aellen                          |          | Not indigenous; Naturalised              |
| Amaranthaceae  | <i>Atriplex semibaccata</i>                         | R.Br.                           |          | Not indigenous; Naturalised;<br>Invasive |
| Amaranthaceae  | <i>Atriplex suberecta</i>                           | I.Verd.                         | LC       | Not indigenous; Naturalised;<br>Invasive |
| Amaranthaceae  | <i>Atriplex vestita</i> var. <i>appendiculata</i>   | (Thunb.) Aellen                 | LC       | Indigenous                               |
| Amaranthaceae  | <i>Bassia salsoloides</i>                           | (Fenzl) A.J.Scott               | LC       | Indigenous                               |
| Amaranthaceae  | <i>Chenopodiastrum murale</i>                       | (L.) S.Fuentes, Uotila & Borsch |          | Not indigenous; Naturalised;<br>Invasive |
| Amaranthaceae  | <i>Chenopodium mucronatum</i>                       | Thunb.                          | LC       | Indigenous                               |
| Amaranthaceae  | <i>Chenopodium phillipsianum</i>                    | Aellen                          | NE       | Indigenous                               |
| Amaranthaceae  | <i>Dysphania schraderiana</i>                       | (Schult.) Mosyakin & Clemants   |          | Indigenous                               |
| Amaranthaceae  | <i>Pupalia lappacea</i> var. <i>lappacea</i>        | (L.) A.Juss.                    | LC       | Indigenous                               |
| Amaranthaceae  | <i>Salsola calluna</i>                              | Drege ex C.H.Wright             | LC       | Indigenous; Endemic                      |
| Amaranthaceae  | <i>Salsola denudata</i>                             | Botsch.                         | LC       | Indigenous                               |
| Amaranthaceae  | <i>Salsola glabrescens</i>                          | Burt Davy                       | LC       | Indigenous                               |
| Amaranthaceae  | <i>Salsola humifusa</i>                             | A.Bruckn.                       | LC       | Indigenous; Endemic                      |
| Amaranthaceae  | <i>Salsola kali</i>                                 | L.                              |          | Not indigenous; Naturalised;<br>Invasive |
| Amaranthaceae  | <i>Sericocoma avolans</i>                           | Fenzl                           | LC       | Indigenous                               |
| Amaranthaceae  | <i>Sericocoma pungens</i>                           | Fenzl                           | LC       | Indigenous                               |
| Amaryllidaceae | <i>Brunsvigia radulosa</i>                          | Herb.                           | LC       | Indigenous                               |

| Family         | Scientific name   | Author                            | IUCN | Ecology                               |
|----------------|---|-----------------------------------|------|---------------------------------------|
| Amaryllidaceae | <i>Crinum bulbispermum</i>                              | (Burm.f.) Milne-Redh. & Schweick. | LC   | Indigenous                            |
| Amaryllidaceae | <i>Cyrtanthus huttonii</i>                              | Baker                             | LC   | Indigenous; Endemic                   |
| Amaryllidaceae | <i>Nerine laticoma</i>                                  | (Ker Gawl.) T.Durand & Schinz     | LC   | Indigenous                            |
| Anacardiaceae  | <i>Searsia burchellii</i>                               | (Sond. ex Engl.) Moffett          | LC   | Indigenous                            |
| Anacardiaceae  | <i>Searsia ciliata</i>                                  | (Licht. ex Schult.) A.J.Mill.     | LC   | Indigenous                            |
| Anacardiaceae  | <i>Searsia erosa</i>                                    | (Thunb.) Moffett                  | LC   | Indigenous                            |
| Anacardiaceae  | <i>Searsia lancea</i>                                   | (L.f.) F.A.Barkley                | LC   | Indigenous                            |
| Anacardiaceae  | <i>Searsia pendulina</i>                                | (Jacq.) Moffett                   | LC   | Indigenous                            |
| Anacardiaceae  | <i>Searsia pyroides</i> var. <i>pyroides</i>            | (Burch.) Moffett                  | LC   | Indigenous                            |
| Apiaceae       | <i>Apium graveolens</i>                                 | L.                                |      | Not indigenous; Naturalised; Invasive |
| Apocynaceae    | <i>Ceropegia multiflora</i> subsp. <i>multiflora</i>    | Baker                             | LC   | Indigenous; Endemic                   |
| Apocynaceae    | <i>Ceropegia rubella</i>                                | (E.Mey.) Bruyns                   |      | Indigenous                            |
| Apocynaceae    | <i>Fockea sinuata</i>                                   | (E.Mey.) Druce                    | LC   | Indigenous                            |
| Apocynaceae    | <i>Gomphocarpus fruticosus</i> subsp. <i>fruticosus</i> | (L.) W.T.Aiton                    | LC   | Indigenous                            |
| Apocynaceae    | <i>Gomphocarpus tomentosus</i> subsp. <i>tomentosus</i> | Burch.                            | LC   | Indigenous                            |
| Apocynaceae    | <i>Marsdenia dregea</i>                                 | (Harv.) Schltr.                   | LC   | Indigenous                            |
| Apocynaceae    | <i>Microlooma armatum</i> var. <i>armatum</i>           | (Thunb.) Schltr.                  | LC   | Indigenous                            |
| Apocynaceae    | <i>Pachypodium succulentum</i>                          | (L.f.) Sweet                      | LC   | Indigenous; Endemic                   |
| Apocynaceae    | <i>Piarranthus cornutus</i>                             | N.E.Br.                           |      | Indigenous                            |
| Apocynaceae    | <i>Stapelia grandiflora</i> var. <i>grandiflora</i>     | Masson                            | LC   | Indigenous                            |
| Apocynaceae    | <i>Tridentea jucunda</i>                                | (N.E.Br.) L.C.Leach               | LC   | Indigenous                            |
| Asparagaceae   | <i>Asparagus striatus</i>                               | (L.f.) Thunb.                     | LC   | Indigenous; Endemic                   |
| Asparagaceae   | <i>Asparagus suaveolens</i>                             | Burch.                            | LC   | Indigenous                            |
| Asphodelaceae  | <i>Haworthiopsis tessellata</i>                         | (Haw.) G.D.Rowley                 | LC   | Indigenous                            |
| Asphodelaceae  | <i>Haworthiopsis tessellata</i> var. <i>tessellata</i>  | (Haw.) G.D.Rowley                 | LC   | Indigenous                            |
| Asphodelaceae  | <i>Kniphofia ensifolia</i> subsp. <i>ensifolia</i>      | Baker                             | LC   | Indigenous                            |
| Asphodelaceae  | <i>Trachyandra acocksii</i>                             | Oberm.                            | LC   | Indigenous; Endemic                   |
| Asphodelaceae  | <i>Trachyandra laxa</i> var. <i>laxa</i>                | (N.E.Br.) Oberm.                  | LC   | Indigenous                            |
| Asphodelaceae  | <i>Trachyandra saltii</i> var. <i>oatesii</i>           | (Baker) Oberm.                    | LC   | Indigenous; Endemic                   |
| Aspleniaceae   | <i>Asplenium cordatum</i>                               | (Thunb.) Sw.                      | LC   | Indigenous                            |
| Asteraceae     | <i>Amphiglossa triflora</i>                             | DC.                               | LC   | Indigenous                            |
| Asteraceae     | <i>Arctotis leiocarpa</i>                               | Harv.                             | LC   | Indigenous                            |
| Asteraceae     | <i>Athanasia minuta</i> subsp. <i>minuta</i>            | (L.f.) Kallersjo                  | LC   | Indigenous                            |
| Asteraceae     | <i>Berkheya eriobasis</i>                               | (DC.) Roessler                    | LC   | Indigenous; Endemic                   |
| Asteraceae     | <i>Berkheya pinnatifida</i> subsp. <i>pinnatifida</i>   | (Thunb.) Thell.                   | LC   | Indigenous; Endemic                   |
| Asteraceae     | <i>Brachylaena glabra</i>                               | (L.f.) Druce                      | LC   | Indigenous; Endemic                   |
| Asteraceae     | <i>Chrysocoma ciliata</i>                               | L.                                | LC   | Indigenous                            |
| Asteraceae     | <i>Cirsium vulgare</i>                                  | (Savi) Ten.                       |      | Not indigenous; Naturalised; Invasive |
| Asteraceae     | <i>Crassothonna cacalioides</i>                         | (L.f.) B.Nord.                    | LC   | Indigenous; Endemic                   |
| Asteraceae     | <i>Dicoma capensis</i>                                  | Less.                             | LC   | Indigenous                            |

| Family     | Scientific name  | Author                         | IU<br>CN | Ecology             |
|------------|--|--------------------------------|----------|---------------------|
| Asteraceae | <i>Dimorphotheca cuneata</i>                           | (Thunb.) Less.                 | LC       | Indigenous          |
| Asteraceae | <i>Dimorphotheca pluvialis</i>                         | (L.) Moench                    | LC       | Indigenous          |
| Asteraceae | <i>Dimorphotheca sinuata</i>                           | DC.                            | LC       | Indigenous          |
| Asteraceae | <i>Dimorphotheca zeyheri</i>                           | Sond.                          | LC       | Indigenous          |
| Asteraceae | <i>Eriocephalus ericoides</i> subsp. <i>ericoides</i>  | (L.f.) Druce                   | LC       | Indigenous          |
| Asteraceae | <i>Eriocephalus karooicus</i>                          | M.A.N.Mull.                    | LC       | Indigenous; Endemic |
| Asteraceae | <i>Eriocephalus spinescens</i>                         | Burch.                         | LC       | Indigenous; Endemic |
| Asteraceae | <i>Euryops subcarnosus</i> subsp. <i>vulgaris</i>      | DC.                            | LC       | Indigenous          |
| Asteraceae | <i>Felicia burkei</i>                                  | (Harv.) L.Bolus                | LC       | Indigenous          |
| Asteraceae | <i>Felicia fascicularis</i>                            | DC.                            | LC       | Indigenous          |
| Asteraceae | <i>Felicia filifolia</i> subsp. <i>filifolia</i>       | (Vent.) Burt Davy              | LC       | Indigenous          |
| Asteraceae | <i>Felicia hirsuta</i>                                 | DC.                            | LC       | Indigenous          |
| Asteraceae | <i>Felicia muricata</i> subsp. <i>cinerascens</i>      | (Thunb.) Nees                  | LC       | Indigenous          |
| Asteraceae | <i>Felicia muricata</i> subsp. <i>muricata</i>         | (Thunb.) Nees                  | LC       | Indigenous          |
| Asteraceae | <i>Gazania jurineifolia</i> subsp. <i>jurineifolia</i> | DC.                            | LC       | Indigenous; Endemic |
| Asteraceae | <i>Gazania krebsiana</i> subsp. <i>arctotoides</i>     | Less.                          | LC       | Indigenous          |
| Asteraceae | <i>Geigeria filifolia</i>                              | Mattf.                         | LC       | Indigenous          |
| Asteraceae | <i>Geigeria ornativa</i> subsp. <i>ornativa</i>        | O.Hoffm.                       | LC       | Indigenous          |
| Asteraceae | <i>Gnaphalium filagopsis</i>                           | Hilliard & B.L.Burt            | LC       | Indigenous          |
| Asteraceae | <i>Helichrysum asperum</i> var. <i>asperum</i>         | (Thunb.) Hilliard & B.L.Burt   | LC       | Indigenous; Endemic |
| Asteraceae | <i>Helichrysum dregeanum</i>                           | Sond. & Harv.                  | LC       | Indigenous          |
| Asteraceae | <i>Helichrysum lineare</i>                             | DC.                            | LC       | Indigenous          |
| Asteraceae | <i>Helichrysum lucilioides</i>                         | Less.                          | LC       | Indigenous          |
| Asteraceae | <i>Helichrysum micropoides</i>                         | DC.                            | LC       | Indigenous          |
| Asteraceae | <i>Helichrysum pentzioides</i>                         | Less.                          | LC       | Indigenous; Endemic |
| Asteraceae | <i>Helichrysum pumilio</i> subsp. <i>pumilio</i>       | (O.Hoffm.) Hilliard & B.L.Burt | LC       | Indigenous; Endemic |
| Asteraceae | <i>Helichrysum zeyheri</i>                             | Less.                          | LC       | Indigenous          |
| Asteraceae | <i>Hertia kraussii</i>                                 | (Sch.Bip.) Fourc.              | LC       | Indigenous; Endemic |
| Asteraceae | <i>Hertia pallens</i>                                  | (DC.) Kuntze                   | LC       | Indigenous          |
| Asteraceae | <i>Hirpicium echinus</i>                               | Less.                          | LC       | Indigenous          |
| Asteraceae | <i>Ifloga glomerata</i>                                | (Harv.) Schltr.                | LC       | Indigenous          |
| Asteraceae | <i>Leysera tenella</i>                                 | DC.                            | LC       | Indigenous          |
| Asteraceae | <i>Nidorella resedifolia</i> subsp. <i>resedifolia</i> | DC.                            | LC       | Indigenous          |
| Asteraceae | <i>Oedera humilis</i>                                  | (Less.) N.G.Bergh              |          | Indigenous          |
| Asteraceae | <i>Oedera oppositifolia</i>                            | (DC.) N.G.Bergh                |          | Indigenous; Endemic |
| Asteraceae | <i>Oncosiphon pilulifer</i>                            | (L.f.) Kallersjo               | LC       | Indigenous          |
| Asteraceae | <i>Osteospermum calendulaceum</i>                      | L.f.                           | LC       | Indigenous; Endemic |
| Asteraceae | <i>Osteospermum leptolobum</i>                         | (Harv.) Norl.                  | LC       | Indigenous; Endemic |
| Asteraceae | <i>Osteospermum scariosum</i> var. <i>scariosum</i>    | DC.                            | NE       | Indigenous          |
| Asteraceae | <i>Osteospermum sinuatum</i> var. <i>sinuatum</i>      | (DC.) Norl.                    | LC       | Indigenous          |
| Asteraceae | <i>Osteospermum spinescens</i>                         | Thunb.                         | LC       | Indigenous          |

| Family          | Scientific name                             | Author   | IU<br>CN | Ecology                     |
|-----------------|---|--|----------|-----------------------------|
| Asteraceae      | <i>Othonna pavonia</i>                      | E.Mey.   | LC       | Indigenous; Endemic         |
| Asteraceae      | <i>Pegolettia retrofracta</i>               | (Thunb.) Kies                                    | LC       | Indigenous                  |
| Asteraceae      | <i>Pentzia calcarea</i>                     | Kies   | LC       | Indigenous                  |
| Asteraceae      | <i>Pentzia calva</i>                        | S.Moore  | LC       | Indigenous                  |
| Asteraceae      | <i>Pentzia elegans</i>                      | DC.  | LC       | Indigenous; Endemic         |
| Asteraceae      | <i>Pentzia globosa</i>                      | Less.  | LC       | Indigenous                  |
| Asteraceae      | <i>Pentzia incana</i>                       | (Thunb.) Kuntze                                  | LC       | Indigenous                  |
| Asteraceae      | <i>Pentzia lanata</i>                       | Hutch.   | LC       | Indigenous                  |
| Asteraceae      | <i>Pentzia quinquefida</i>                  | (Thunb.) Less.                                   | LC       | Indigenous; Endemic         |
| Asteraceae      | <i>Pentzia spinescens</i>                   | Less.  | LC       | Indigenous                  |
| Asteraceae      | <i>Phymaspermum parvifolium</i>             | (DC.) Benth. & Hook. ex<br>B.D.Jacks.            | LC       | Indigenous; Endemic         |
| Asteraceae      | <i>Pseudognaphalium luteoalbum</i>          | (L.) Hilliard & B.L.Burt                         | LC       | Cryptogenic                 |
| Asteraceae      | <i>Pteronia erythrochaeta</i>               | DC.  | LC       | Indigenous; Endemic         |
| Asteraceae      | <i>Pteronia glauca</i>                      | Thunb.   | LC       | Indigenous                  |
| Asteraceae      | <i>Pteronia glaucescens</i>                 | DC.  | LC       | Indigenous; Endemic         |
| Asteraceae      | <i>Pteronia sordida</i>                     | N.E.Br.  | LC       | Indigenous                  |
| Asteraceae      | <i>Rhaponticum repens</i>                   | (L.) Hildago                                     |          | Not indigenous; Naturalised |
| Asteraceae      | <i>Senecio consanguineus</i>                | DC.  | LC       | Indigenous                  |
| Asteraceae      | <i>Senecio niveus</i>                       | (Thunb.) Willd.                                  | LC       | Indigenous                  |
| Asteraceae      | <i>Tarchonanthus camphoratus</i>            | L.   | LC       | Indigenous                  |
| Asteraceae      | <i>Ursinia nana subsp. leptophylla</i>      | DC.  | LC       | Indigenous                  |
| Asteraceae      | <i>Ursinia nana subsp. nana</i>             | DC.  | LC       | Indigenous                  |
| Aytoniaceae     | <i>Plagiochasma rupestre var. rupestre</i>  | (J.R.Forst. & G.Forst.)<br>Steph.                |          | Indigenous                  |
| Boraginaceae    | <i>Anchusa riparia</i>                      | A.DC.  | LC       | Indigenous                  |
| Boraginaceae    | <i>Heliotropium ciliatum</i>                | Kaplan   | LC       | Indigenous                  |
| Boraginaceae    | <i>Heliotropium curassavicum</i>            | L.   |          | Not indigenous; Naturalised |
| Boraginaceae    | <i>Heliotropium lineare</i>                 | (A.DC.) Gurke                                    | LC       | Indigenous                  |
| Boraginaceae    | <i>Lithospermum papillosum</i>              | Thunb.   | LC       | Indigenous                  |
| Brassicaceae    | <i>Erucastrum strigosum</i>                 | (Thunb.) O.E.Schulz                              | LC       | Indigenous                  |
| Brassicaceae    | <i>Heliphila minima</i>                     | (Stephens) Marais                                | LC       | Indigenous                  |
| Brassicaceae    | <i>Lepidium africanum subsp. africanum</i>  | (Burm.f.) DC.                                    | LC       | Indigenous                  |
| Brassicaceae    | <i>Lepidium schinzii</i>                    | Thell.   | LC       | Indigenous                  |
| Brassicaceae    | <i>Rorippa fluviatilis var. fluviatilis</i> | (E.Mey. ex Sond.)<br>R.A.Dyer                    | LC       | Indigenous                  |
| Brassicaceae    | <i>Sisymbrium turczaninowii</i>             | Sond.  | LC       | Indigenous                  |
| Bryaceae        | <i>Bryum argenteum</i>                      | Hedw.  |          | Indigenous                  |
| Campanulaceae   | <i>Wahlenbergia nodosa</i>                  | (H.Buek) Lammers                                 | LC       | Indigenous; Endemic         |
| Caryophyllaceae | <i>Dianthus micropetalus</i>                | Ser.   | LC       | Indigenous                  |
| Caryophyllaceae | <i>Spergularia bocconeii</i>                | (Scheele) Graebn.                                | LC       | Not indigenous; Naturalised |
| Cleomaceae      | <i>Cleome gynandra</i>                      | L.   | LC       | Indigenous                  |
| Cleomaceae      | <i>Cleome monophylla</i>                    | L.   | LC       | Indigenous                  |
| Colchicaceae    | <i>Colchicum asteroides</i>                 | (J.C.Manning & Goldblatt)<br>J.C.Manning & Vinn. | LC       | Indigenous; Endemic         |
| Colchicaceae    | <i>Ornithoglossum vulgare</i>               | B.Nord.  | LC       | Indigenous                  |



| Family         | Scientific name                                      | Author                          | IUCN | Ecology             |
|----------------|--|---------------------------------|------|---------------------|
| Commelinaceae  | <i>Commelina africana</i> var. <i>africana</i>       | L.                              | LC   | Indigenous          |
| Commelinaceae  | <i>Commelina africana</i> var. <i>barberae</i>       | L.                              | LC   | Indigenous          |
| Convolvulaceae | <i>Convolvulus sagittatus</i>                        | Thunb.                          | LC   | Indigenous          |
| Crassulaceae   | <i>Adromischus caryophyllaceus</i>                   | (Burm.f.) Lem.                  | LC   | Indigenous; Endemic |
| Crassulaceae   | <i>Adromischus trigynus</i>                          | (Burch.) Poelln.                | LC   | Indigenous          |
| Crassulaceae   | <i>Crassula corallina</i> subsp. <i>corallina</i>    | Thunb.                          | LC   | Indigenous          |
| Crassulaceae   | <i>Tylecodon ventricosus</i>                         | (Burm.f.) Toelken               | LC   | Indigenous; Endemic |
| Cucurbitaceae  | <i>Cucumis africanus</i>                             | L.f.                            | LC   | Indigenous          |
| Cucurbitaceae  | <i>Cucumis heptadactylus</i>                         | Naudin                          | LC   | Indigenous; Endemic |
| Cucurbitaceae  | <i>Cucumis myriocarpus</i> subsp. <i>leptodermis</i> | Naudin                          | LC   | Indigenous          |
| Cucurbitaceae  | <i>Cucumis myriocarpus</i> subsp. <i>myriocarpus</i> | Naudin                          | LC   | Indigenous          |
| Cucurbitaceae  | <i>Cucumis zeyheri</i>                               | Sond.                           | LC   | Indigenous          |
| Cucurbitaceae  | <i>Kedrostis africana</i>                            | (L.) Cogn.                      | LC   | Indigenous          |
| Cucurbitaceae  | <i>Momordica balsamina</i>                           | L.                              | LC   | Indigenous          |
| Cyperaceae     | <i>Afroscleroides dioeca</i>                         | (Kunth) Garcia-Madr.            |      | Indigenous          |
| Cyperaceae     | <i>Bulbostylis humilis</i>                           | (Kunth) C.B.Clarke              | LC   | Indigenous          |
| Cyperaceae     | <i>Cyperus bellus</i>                                | Kunth                           | LC   | Indigenous          |
| Cyperaceae     | <i>Cyperus capensis</i>                              | (Steud.) Endl.                  | LC   | Indigenous; Endemic |
| Cyperaceae     | <i>Cyperus congestus</i>                             | Vahl                            | LC   | Indigenous          |
| Cyperaceae     | <i>Cyperus decurvatus</i>                            | (C.B.Clarke) C.Archer & Goetgh. | LC   | Indigenous          |
| Cyperaceae     | <i>Cyperus indecorus</i> var. <i>namaquensis</i>     | Kunth                           | NE   | Indigenous          |
| Cyperaceae     | <i>Cyperus laevigatus</i>                            | L.                              | LC   | Indigenous          |
| Cyperaceae     | <i>Cyperus longus</i> var. <i>tenuiflorus</i>        | L.                              | NE   | Indigenous          |
| Cyperaceae     | <i>Cyperus marginatus</i>                            | Thunb.                          | LC   | Indigenous          |
| Cyperaceae     | <i>Cyperus marlothii</i>                             | Boeckeler                       | LC   | Indigenous          |
| Cyperaceae     | <i>Cyperus usitatus</i>                              | Burch.                          | LC   | Indigenous          |
| Cyperaceae     | <i>Eleocharis dregeana</i>                           | Steud.                          | LC   | Indigenous          |
| Cyperaceae     | <i>Schoenoplectus leucanthus</i>                     | (Boeckeler) J.Raynal            | LC   | Indigenous          |
| Cyperaceae     | <i>Schoenoplectus muricinux</i>                      | (C.B.Clarke) J.Raynal           | LC   | Indigenous          |
| Ebenaceae      | <i>Diospyros lycioides</i> subsp. <i>lycioides</i>   | Desf.                           | LC   | Indigenous          |
| Ebenaceae      | <i>Euclea crispa</i> subsp. <i>ovata</i>             | (Thunb.) Gurke                  | LC   | Indigenous          |
| Elatinaceae    | <i>Bergia anagaloides</i>                            | (E.Mey. ex Fenzl) Walp.         | LC   | Indigenous          |
| Euphorbiaceae  | <i>Euphorbia arida</i>                               | N.E.Br.                         | LC   | Indigenous; Endemic |
| Euphorbiaceae  | <i>Euphorbia crassipes</i>                           | Marloth                         | LC   | Indigenous          |
| Euphorbiaceae  | <i>Euphorbia inaequilatera</i>                       | Sond.                           | LC   | Indigenous          |
| Euphorbiaceae  | <i>Euphorbia juttiae</i>                             | Dinter                          | LC   | Indigenous          |
| Euphorbiaceae  | <i>Euphorbia mauritanica</i>                         | L.                              | LC   | Indigenous          |
| Euphorbiaceae  | <i>Euphorbia rhombifolia</i>                         | Boiss.                          | LC   | Indigenous          |
| Fabaceae       | <i>Amphithalea muraltioides</i>                      | (Benth.) A.L.Schutte            | LC   | Indigenous; Endemic |
| Fabaceae       | <i>Argyrolobium transvaalense</i>                    | Schinz                          | LC   | Indigenous          |
| Fabaceae       | <i>Calobota spinescens</i>                           | (Harv.) Boatwr. & B.-E.van Wyk  | LC   | Indigenous          |

| Family        | Scientific name   | Author  | IU<br>CN | Ecology   |
|---------------|---|---|----------|---|
| Fabaceae      | <i>Crotalaria sphaerocarpa</i> subsp. <i>sphaerocarpa</i> | Perr. ex DC.                                      | LC       | Indigenous  |
| Fabaceae      | <i>Cullen tomentosum</i>                                  | (Thunb.) J.W.Grimes                               | LC       | Indigenous  |
| Fabaceae      | <i>Indigostrum niveum</i>                                 | (Willd. ex Spreng.) Schrire & Callm.              |          | Indigenous  |
| Fabaceae      | <i>Indigofera alternans</i> var. <i>alternans</i>         | DC.   | LC       | Indigenous  |
| Fabaceae      | <i>Indigofera hedyantha</i>                               | Eckl. & Zeyh.                                     | LC       | Indigenous  |
| Fabaceae      | <i>Indigofera hololeuca</i>                               | Benth. ex Harv.                                   | LC       | Indigenous  |
| Fabaceae      | <i>Indigofera sessilifolia</i>                            | DC.   | LC       | Indigenous  |
| Fabaceae      | <i>Leobordea platycarpa</i>                               | (Viv.) B.-E.van Wyk & Boatwr.                     | LC       | Indigenous  |
| Fabaceae      | <i>Lessertia annularis</i>                                | Burch.  | LC       | Indigenous  |
| Fabaceae      | <i>Lessertia inflata</i>                                  | Harv.   | LC       | Indigenous; Endemic                               |
| Fabaceae      | <i>Lotononis laxa</i>                                     | Eckl. & Zeyh.                                     | LC       | Indigenous  |
| Fabaceae      | <i>Lotononis pungens</i>                                  | Eckl. & Zeyh.                                     | LC       | Indigenous; Endemic                               |
| Fabaceae      | <i>Lotononis tenella</i>                                  | (E.Mey.) Eckl. & Zeyh.                            | LC       | Indigenous; Endemic                               |
| Fabaceae      | <i>Medicago sativa</i>                                    | L.  | NE       | Not indigenous; Cultivated; Naturalised; Invasive |
| Fabaceae      | <i>Melilotus indicus</i>                                  | (L.) All.   | NE       | Not indigenous; Naturalised; Invasive             |
| Fabaceae      | <i>Melolobium candicans</i>                               | (E.Mey.) Eckl. & Zeyh.                            | LC       | Indigenous  |
| Fabaceae      | <i>Melolobium microphyllum</i>                            | (L.f.) Eckl. & Zeyh.                              | LC       | Indigenous  |
| Fabaceae      | <i>Prosopis glandulosa</i> var. <i>torreyana</i>          | Torr.   | NE       | Not indigenous; Naturalised; Invasive             |
| Fabaceae      | <i>Prosopis velutina</i>                                  | Wooton  | NE       | Not indigenous; Naturalised; Invasive             |
| Fabaceae      | <i>Rhynchosia adenodes</i>                                | Eckl. & Zeyh.                                     | LC       | Indigenous  |
| Fabaceae      | <i>Senegalia mellifera</i> subsp. <i>detinens</i>         | (Vahl) Seigler & Ebinger                          | LC       | Indigenous  |
| Fabaceae      | <i>Senna italica</i> subsp. <i>arachoides</i>             | Mill.   | LC       | Indigenous  |
| Fabaceae      | <i>Trigonella anguina</i>                                 | Delile  | LC       | Indigenous  |
| Funariaceae   | <i>Goniomitrium africanum</i>                             | (Mull.Hal.) Broth.                                |          | Indigenous  |
| Gentianaceae  | <i>Sebaea pentandra</i> var. <i>pentandra</i>             | E.Mey.  | LC       | Indigenous  |
| Geraniaceae   | <i>Erodium cicutarium</i>                                 | (L.) L'Her.                                       |          | Not indigenous; Naturalised; Invasive             |
| Geraniaceae   | <i>Monsonia angustifolia</i>                              | E.Mey. ex A.Rich.                                 | LC       | Indigenous  |
| Geraniaceae   | <i>Monsonia salmoniflora</i>                              | (Moffett) F.Albers                                | LC       | Indigenous  |
| Geraniaceae   | <i>Pelargonium tragacanthoides</i>                        | Burch.  | LC       | Indigenous  |
| Gisekiaceae   | <i>Gisekia pharaceoides</i> var. <i>pharaceoides</i>      | L.  | LC       | Indigenous  |
| Grimmiaceae   | <i>Grimmia pulvinata</i>                                  | (Hedw.) Sm.                                       |          | Indigenous  |
| Hyacinthaceae | <i>Albuca prasina</i>                                     | (Ker Gawl.) J.C.Manning & Goldblatt               |          | Indigenous  |
| Hyacinthaceae | <i>Albuca virens</i> subsp. <i>arida</i>                  | (Ker Gawl.) J.C.Manning & Goldblatt               | LC       | Indigenous  |
| Hyacinthaceae | <i>Daubenya comata</i>                                    | (Burch. ex Baker) J.C.Manning & A.M.van der Merwe | LC       | Indigenous; Endemic                               |
| Hyacinthaceae | <i>Dipcadi bakerianum</i>                                 | Bolus   | LC       | Indigenous  |
| Hyacinthaceae | <i>Dipcadi brevifolium</i>                                | (Thunb.) Fourc.                                   | LC       | Indigenous  |
| Hyacinthaceae | <i>Dipcadi crispum</i>                                    | Baker   | LC       | Indigenous  |
| Hyacinthaceae | <i>Dipcadi gracillimum</i>                                | Baker   | LC       | Indigenous  |

| Family        | Scientific name   | Author                           | IU<br>CN | Ecology                               |
|---------------|---|----------------------------------|----------|---------------------------------------|
| Hyacinthaceae | <i>Dipcadi longifolium</i>                                  | (Ker Gawl.) Baker                | LC       | Indigenous                            |
| Hyacinthaceae | <i>Dipcadi papillatum</i>                                   | Oberm.                           | LC       | Indigenous                            |
| Hyacinthaceae | <i>Dipcadi viride</i>                                       | (L.) Moench                      | LC       | Indigenous                            |
| Hyacinthaceae | <i>Lachenalia ensifolia</i>                                 | (Thunb.) J.C.Manning & Goldblatt | LC       | Indigenous; Endemic                   |
| Hyacinthaceae | <i>Ledebouria apertiflora</i>                               | (Baker) Jessop                   | LC       | Indigenous                            |
| Hyacinthaceae | <i>Ledebouria revoluta</i>                                  | (L.f.) Jessop                    | LC       | Indigenous                            |
| Hyacinthaceae | <i>Ornithogalum nanodes</i>                                 | F.M.Leight.                      | LC       | Indigenous                            |
| Hypoxidaceae  | <i>Hypoxis rigidula</i> var. <i>rigidula</i>                | Baker                            | LC       | Indigenous                            |
| Iridaceae     | <i>Ferraria variabilis</i>                                  | Goldblatt & J.C.Manning          | LC       | Indigenous; Endemic                   |
| Iridaceae     | <i>Freesia andersoniae</i>                                  | L.Bolus                          | LC       | Indigenous; Endemic                   |
| Iridaceae     | <i>Gladiolus permeabilis</i> subsp. <i>edulis</i>           | D.Delaroche                      | LC       | Indigenous                            |
| Iridaceae     | <i>Moraea falcifolia</i>                                    | Klatt                            | LC       | Indigenous                            |
| Iridaceae     | <i>Moraea miniata</i>                                       | Andrews                          | LC       | Indigenous; Endemic                   |
| Iridaceae     | <i>Moraea pallida</i>                                       | (Baker) Goldblatt                | LC       | Indigenous                            |
| Iridaceae     | <i>Moraea polystachya</i>                                   | (Thunb.) Ker Gawl.               | LC       | Indigenous                            |
| Iridaceae     | <i>Syringodea concolor</i>                                  | (Baker) M.P.de Vos               | LC       | Indigenous; Endemic                   |
| Juncaceae     | <i>Juncus exsertus</i>                                      | Buchenau                         | LC       | Indigenous                            |
| Kewaceae      | <i>Kewa salsoloides</i>                                     | (Burch.) Christenh.              | LC       | Indigenous                            |
| Lamiaceae     | <i>Leonotis ocymifolia</i>                                  | (Burm.f.) Iwarsson               | LC       | Indigenous                            |
| Lamiaceae     | <i>Salvia stenophylla</i>                                   | Burch. ex Benth.                 |          | Indigenous                            |
| Lamiaceae     | <i>Salvia verbenaca</i>                                     | L.                               | LC       | Not indigenous; Naturalised; Invasive |
| Lamiaceae     | <i>Stachys cuneata</i>                                      | Banks ex Benth.                  | LC       | Indigenous; Endemic                   |
| Lamiaceae     | <i>Stachys linearis</i>                                     | Burch. ex Benth.                 | LC       | Indigenous                            |
| Leucobryaceae | <i>Campylopus robillardaei</i>                              | Besch.                           |          | Indigenous                            |
| Limeaceae     | <i>Limeum aethiopicum</i>                                   | Burm.f.                          | LC       | Indigenous                            |
| Limeaceae     | <i>Limeum aethiopicum</i> var. <i>aethiopicum</i>           | Burm.f.                          | NE       | Indigenous; Endemic                   |
| Limeaceae     | <i>Limeum aethiopicum</i> var. <i>intermedium</i>           | Burm.f.                          | NE       | Indigenous; Endemic                   |
| Limeaceae     | <i>Limeum aethiopicum</i> var. <i>lanceolatum</i>           | Burm.f.                          | NE       | Indigenous                            |
| Limeaceae     | <i>Limeum argute-carinatum</i> var. <i>argute-carinatum</i> | Wawra ex Wawra & Peyr.           | LC       | Indigenous                            |
| Limeaceae     | <i>Limeum argute-carinatum</i> var. <i>kwebense</i>         | Wawra ex Wawra & Peyr.           |          | Indigenous                            |
| Limeaceae     | <i>Limeum myosotis</i> var. <i>myosotis</i>                 | H.Walter                         | LC       | Indigenous                            |
| Limeaceae     | <i>Limeum sulcatum</i> var. <i>sulcatum</i>                 | (Klotzsch) Hutch.                | LC       | Indigenous                            |
| Lobeliaceae   | <i>Lobelia thermalis</i>                                    | Thunb.                           | LC       | Indigenous                            |
| Malvaceae     | <i>Corchorus schimperi</i>                                  | Cufod.                           | LC       | Indigenous                            |
| Malvaceae     | <i>Hermannia auricoma</i>                                   | (Szyszl.) K.Schum.               | LC       | Indigenous                            |
| Malvaceae     | <i>Hermannia bicolor</i>                                    | Engl. & Dinter                   | LC       | Indigenous                            |
| Malvaceae     | <i>Hermannia burkei</i>                                     | Burt Davy                        | LC       | Indigenous                            |
| Malvaceae     | <i>Hermannia comosa</i>                                     | Burch. ex DC.                    | LC       | Indigenous                            |
| Malvaceae     | <i>Hermannia cuneifolia</i> var. <i>cuneifolia</i>          | Jacq.                            | LC       | Indigenous                            |
| Malvaceae     | <i>Hermannia erodioides</i>                                 | (Burch. ex DC.) Kuntze           | LC       | Indigenous                            |
| Malvaceae     | <i>Hermannia linearifolia</i>                               | Harv.                            | LC       | Indigenous; Endemic                   |

| Family          | Scientific name                                  | Author                  | IUCN | Ecology                               |
|-----------------|--|-------------------------|------|---------------------------------------|
| Malvaceae       | <i>Hermannia modesta</i>                         | (Ehrenb.) Mast.         | LC   | Indigenous                            |
| Malvaceae       | <i>Hermannia pulchella</i>                       | L.f.                    | LC   | Indigenous                            |
| Malvaceae       | <i>Hermannia spinosa</i>                         | E.Mey. ex Harv.         | LC   | Indigenous                            |
| Malvaceae       | <i>Hibiscus pusillus</i>                         | Thunb.                  | LC   | Indigenous                            |
| Malvaceae       | <i>Radyera urens</i>                             | (L.f.) Bullock          | LC   | Indigenous                            |
| Melianthaceae   | <i>Melianthus comosus</i>                        | Vahl                    | LC   | Indigenous                            |
| Molluginaceae   | <i>Hypertelis cerviana</i>                       | (L.) Thulin             |      | Indigenous                            |
| Molluginaceae   | <i>Pharnaceum lineare</i>                        | L.f.                    | LC   | Indigenous; Endemic                   |
| Neuradaceae     | <i>Grielum humifusum var. humifusum</i>          | Thunb.                  | LC   | Indigenous                            |
| Nyctaginaceae   | <i>Boerhavia cordobensis</i>                     | Kuntze                  |      | Not indigenous; Naturalised           |
| Onagraceae      | <i>Oenothera rosea</i>                           | L'Her. ex Aiton         |      | Not indigenous; Naturalised; Invasive |
| Ophioglossaceae | <i>Ophioglossum polyphyllum var. polyphyllum</i> | A.Braun                 | LC   | Indigenous                            |
| Oxalidaceae     | <i>Oxalis depressa</i>                           | Eckl. & Zeyh.           | LC   | Indigenous                            |
| Papaveraceae    | <i>Argemone ochroleuca subsp. ochroleuca</i>     | Sweet                   |      | Not indigenous; Naturalised; Invasive |
| Pedaliaceae     | <i>Pterodiscus luridus</i>                       | Hook.f.                 | LC   | Indigenous; Endemic                   |
| Pedaliaceae     | <i>Pterodiscus speciosus</i>                     | Hook.                   | LC   | Indigenous                            |
| Pedaliaceae     | <i>Sesamum capense</i>                           | Burm.f.                 | LC   | Indigenous                            |
| Peraceae        | <i>Clutia thunbergii</i>                         | Sond.                   | LC   | Indigenous                            |
| Phyllanthaceae  | <i>Flueggea virosa subsp. virosa</i>             | (Roxb. ex Willd.) Royle | LC   | Indigenous                            |
| Phyllanthaceae  | <i>Phyllanthus maderaspatensis</i>               | L.                      | LC   | Indigenous                            |
| Phyllanthaceae  | <i>Phyllanthus parvulus var. parvulus</i>        | Sond.                   | LC   | Indigenous                            |
| Pittosporaceae  | <i>Pittosporum viridiflorum</i>                  | Sims                    | LC   | Indigenous                            |
| Plantaginaceae  | <i>Plantago major</i>                            | L.                      |      | Not indigenous; Naturalised           |
| Plumbaginaceae  | <i>Limonium dregeanum</i>                        | (C.Presl) Kuntze        | LC   | Indigenous                            |
| Poaceae         | <i>Alloteropsis semialata subsp. eckloniana</i>  | (R.Br.) Hitchc.         | LC   | Indigenous                            |
| Poaceae         | <i>Aristida adscensionis</i>                     | L.                      | LC   | Indigenous                            |
| Poaceae         | <i>Aristida congesta subsp. barbicollis</i>      | Roem. & Schult.         | LC   | Indigenous                            |
| Poaceae         | <i>Aristida congesta subsp. congesta</i>         | Roem. & Schult.         | LC   | Indigenous                            |
| Poaceae         | <i>Aristida diffusa subsp. burkei</i>            | Trin.                   | LC   | Indigenous                            |
| Poaceae         | <i>Aristida diffusa subsp. diffusa</i>           | Trin.                   | LC   | Indigenous; Endemic                   |
| Poaceae         | <i>Aristida vestita</i>                          | Thunb.                  | LC   | Indigenous                            |
| Poaceae         | <i>Brachiaria eruciformis</i>                    | (Sm.) Griseb.           | LC   | Indigenous                            |
| Poaceae         | <i>Bromus catharticus</i>                        | Vahl                    | NE   | Not indigenous; Naturalised; Invasive |
| Poaceae         | <i>Cenchrus ciliaris</i>                         | L.                      | LC   | Indigenous                            |
| Poaceae         | <i>Chloris truncata</i>                          | R.Br.                   | NE   | Not indigenous; Naturalised           |
| Poaceae         | <i>Chloris virgata</i>                           | Sw.                     | LC   | Indigenous                            |
| Poaceae         | <i>Cymbopogon pospischilii</i>                   | (K.Schum.) C.E.Hubb.    | NE   | Indigenous                            |
| Poaceae         | <i>Cynodon dactylon</i>                          | (L.) Pers.              | LC   | Indigenous                            |
| Poaceae         | <i>Cynodon incompletus</i>                       | Nees                    | LC   | Indigenous; Endemic                   |
| Poaceae         | <i>Cynodon polevansii</i>                        | Stent                   | LC   | Indigenous; Endemic                   |
| Poaceae         | <i>Digitaria eriantha</i>                        | Steud.                  | LC   | Indigenous                            |

| Family  | Scientific name  | Author                                   | IU<br>CN | Ecology                     |
|---------|--|--|----------|-----------------------------|
| Poaceae | <i>Digitaria ternata</i>                                 | (A.Rich.) Stapf                          | LC       | Indigenous                  |
| Poaceae | <i>Echinochloa crus-galli</i>                            | (L.) P.Beauv.                            | LC       | Indigenous                  |
| Poaceae | <i>Elionurus muticus</i>                                 | (Spreng.) Kunth                          | LC       | Indigenous                  |
| Poaceae | <i>Enneapogon cenchroides</i>                            | (Licht. ex Roem. & Schult.)<br>C.E.Hubb. | LC       | Indigenous                  |
| Poaceae | <i>Enneapogon desvauxii</i>                              | P.Beauv.                                 | LC       | Indigenous                  |
| Poaceae | <i>Enneapogon scaber</i>                                 | Lehm.                                    | LC       | Indigenous                  |
| Poaceae | <i>Enneapogon scoparius</i>                              | Stapf                                    | LC       | Indigenous                  |
| Poaceae | <i>Eragrostis annulata</i>                               | Rendle ex Scott-Elliot                   | LC       | Indigenous                  |
| Poaceae | <i>Eragrostis barrelieri</i>                             | Daveau                                   | NE       | Not indigenous; Naturalised |
| Poaceae | <i>Eragrostis bergiana</i>                               | (Kunth) Trin.                            | LC       | Indigenous                  |
| Poaceae | <i>Eragrostis bicolor</i>                                | Nees                                     | LC       | Indigenous                  |
| Poaceae | <i>Eragrostis chloromelas</i>                            | Steud.                                   | LC       | Indigenous                  |
| Poaceae | <i>Eragrostis cilianensis</i>                            | (All.) Vignolo ex Janch.                 | LC       | Indigenous                  |
| Poaceae | <i>Eragrostis curvula</i>                                | (Schrad.) Nees                           | LC       | Indigenous                  |
| Poaceae | <i>Eragrostis cylindriflora</i>                          | Hochst.                                  | LC       | Indigenous                  |
| Poaceae | <i>Eragrostis echinochloidea</i>                         | Stapf                                    | LC       | Indigenous                  |
| Poaceae | <i>Eragrostis homomalla</i>                              | Nees                                     | LC       | Indigenous                  |
| Poaceae | <i>Eragrostis lehmanniana</i> var.<br><i>lehmanniana</i> | Nees                                     | LC       | Indigenous                  |
| Poaceae | <i>Eragrostis mexicana</i> subsp.<br><i>virescens</i>    | (Hornem.) Link                           | NE       | Not indigenous; Naturalised |
| Poaceae | <i>Eragrostis nindensis</i>                              | Ficalho & Hiern                          | LC       | Indigenous                  |
| Poaceae | <i>Eragrostis obtusa</i>                                 | Munro ex Ficalho & Hiern                 | LC       | Indigenous                  |
| Poaceae | <i>Eragrostis pallens</i>                                | Hack.                                    | LC       | Indigenous                  |
| Poaceae | <i>Eragrostis pilosa</i>                                 | (L.) P.Beauv.                            | LC       | Indigenous                  |
| Poaceae | <i>Eragrostis porosa</i>                                 | Nees                                     | LC       | Indigenous                  |
| Poaceae | <i>Eragrostis procumbens</i>                             | Nees                                     | LC       | Indigenous                  |
| Poaceae | <i>Eragrostis pseudobtusa</i>                            | De Winter                                | NE       | Indigenous; Endemic         |
| Poaceae | <i>Eragrostis rotifer</i>                                | Rendle                                   | LC       | Indigenous                  |
| Poaceae | <i>Eragrostis superba</i>                                | Peyr.                                    | LC       | Indigenous                  |
| Poaceae | <i>Eragrostis tef</i>                                    | (Zuccagni) Trotter                       | NE       | Not indigenous; Naturalised |
| Poaceae | <i>Eragrostis truncata</i>                               | Hack.                                    | LC       | Indigenous                  |
| Poaceae | <i>Eustachys paspaloides</i>                             | (Vahl) Lanza & Mattei                    | LC       | Indigenous                  |
| Poaceae | <i>Festuca costata</i>                                   | Nees                                     | LC       | Indigenous                  |
| Poaceae | <i>Fingerhuthia africana</i>                             | Lehm.                                    | LC       | Indigenous                  |
| Poaceae | <i>Heteropogon contortus</i>                             | (L.) Roem. & Schult.                     | LC       | Indigenous                  |
| Poaceae | <i>Hordeum capense</i>                                   | Thunb.                                   | LC       | Indigenous                  |
| Poaceae | <i>Hyparrhenia hirta</i>                                 | (L.) Stapf                               | LC       | Indigenous                  |
| Poaceae | <i>Leptochloa fusca</i>                                  | (L.) Kunth                               | LC       | Indigenous                  |
| Poaceae | <i>Melica decumbens</i>                                  | Thunb.                                   | LC       | Indigenous                  |
| Poaceae | <i>Melinis repens</i> subsp. <i>grandiflora</i>          | (Willd.) Zizka                           | LC       | Indigenous                  |
| Poaceae | <i>Oropetium capense</i>                                 | Stapf                                    | LC       | Indigenous                  |
| Poaceae | <i>Panicum coloratum</i>                                 | L.                                       | LC       | Indigenous                  |
| Poaceae | <i>Panicum impeditum</i>                                 | Launert                                  | LC       | Indigenous                  |



| Family        | Scientific name                                     | Author                 | IU<br>CN | Ecology                                  |
|---------------|---|------------------------|----------|--|
| Poaceae       | <i>Panicum lanipes</i>                              | Mez                    | LC       | Indigenous                               |
| Poaceae       | <i>Panicum stapfianum</i>                           | Fourc.                 | LC       | Indigenous                               |
| Poaceae       | <i>Paspalum dilatatum</i>                           | Poir.                  | NE       | Not indigenous; Naturalised;<br>Invasive |
| Poaceae       | <i>Pennisetum villosum</i>                          | R.Br. ex Fresen.       | NE       | Not indigenous; Naturalised;<br>Invasive |
| Poaceae       | <i>Pentameris airoides</i> subsp. <i>airoides</i>   | Nees                   | LC       | Indigenous                               |
| Poaceae       | <i>Polypogon monspeliensis</i>                      | (L.) Desf.             | NE       | Not indigenous; Naturalised              |
| Poaceae       | <i>Puccinellia acroxantha</i>                       | C.A.Sm. & C.E.Hubb.    | LC       | Indigenous                               |
| Poaceae       | <i>Puccinellia distans</i>                          | (L.) Parl.             | NE       | Not indigenous; Naturalised;<br>Invasive |
| Poaceae       | <i>Schmidtia kalahariensis</i>                      | Stent                  | LC       | Indigenous                               |
| Poaceae       | <i>Setaria lindenbergiana</i>                       | (Nees) Stapf           | LC       | Indigenous                               |
| Poaceae       | <i>Setaria verticillata</i>                         | (L.) P.Beauv.          | LC       | Indigenous                               |
| Poaceae       | <i>Sorghum halepense</i>                            | (L.) Pers.             | NE       | Not indigenous; Naturalised;<br>Invasive |
| Poaceae       | <i>Sporobolus albicans</i>                          | (Nees ex Trin.) Nees   | LC       | Indigenous                               |
| Poaceae       | <i>Sporobolus coromandelianus</i>                   | (Retz.) Kunth          | LC       | Indigenous                               |
| Poaceae       | <i>Sporobolus fimbriatus</i>                        | (Trin.) Nees           | LC       | Indigenous                               |
| Poaceae       | <i>Sporobolus ioclados</i>                          | (Trin.) Nees           | LC       | Indigenous                               |
| Poaceae       | <i>Sporobolus nervosus</i>                          | Hochst.                | LC       | Indigenous                               |
| Poaceae       | <i>Sporobolus oxyphyllus</i>                        | Fish                   | LC       | Indigenous; Endemic                      |
| Poaceae       | <i>Sporobolus tenellus</i>                          | (Spreng.) Kunth        | LC       | Indigenous                               |
| Poaceae       | <i>Stipagrostis anomala</i>                         | De Winter              | LC       | Indigenous                               |
| Poaceae       | <i>Stipagrostis ciliata</i> var. <i>capensis</i>    | (Desf.) De Winter      | LC       | Indigenous                               |
| Poaceae       | <i>Stipagrostis namaquensis</i>                     | (Nees) De Winter       | LC       | Indigenous                               |
| Poaceae       | <i>Stipagrostis obtusa</i>                          | (Delile) Nees          | LC       | Indigenous                               |
| Poaceae       | <i>Stipagrostis uniplumis</i> var. <i>uniplumis</i> | (Licht.) De Winter     | LC       | Indigenous                               |
| Poaceae       | <i>Themeda triandra</i>                             | Forssk.                | LC       | Indigenous                               |
| Poaceae       | <i>Tragus berteronianus</i>                         | Schult.                | LC       | Indigenous                               |
| Poaceae       | <i>Tragus koelerioides</i>                          | Asch.                  | LC       | Indigenous                               |
| Poaceae       | <i>Tragus racemosus</i>                             | (L.) All.              | LC       | Indigenous                               |
| Poaceae       | <i>Urochloa panicoides</i>                          | P.Beauv.               | LC       | Indigenous                               |
| Polygalaceae  | <i>Polygala ephedroides</i>                         | Burch.                 | LC       | Indigenous                               |
| Polygalaceae  | <i>Polygala hispida</i>                             | Burch. ex DC.          | LC       | Indigenous                               |
| Polygalaceae  | <i>Polygala leptophylla</i> var. <i>leptophylla</i> | Burch.                 | LC       | Indigenous                               |
| Polygalaceae  | <i>Polygala seminuda</i>                            | Harv.                  | LC       | Indigenous                               |
| Polygonaceae  | <i>Rumex crispus</i>                                | L.                     |          | Not indigenous; Naturalised;<br>Invasive |
| Polygonaceae  | <i>Rumex lanceolatus</i>                            | Thunb.                 | LC       | Indigenous                               |
| Portulacaceae | <i>Portulaca oleracea</i>                           | L.                     |          | Not indigenous; Naturalised              |
| Pottiaceae    | <i>Didymodon tophaceopsis</i>                       | R.H.Zander             |          | Indigenous                               |
| Pottiaceae    | <i>Didymodon tophaceus</i>                          | (Brid.) Lisa           |          | Indigenous                               |
| Pottiaceae    | <i>Didymodon umbrosus</i>                           | (Mull.Hal.) R.H.Zander |          | Indigenous                               |
| Pottiaceae    | <i>Gymnostomum aeruginosum</i>                      | Sm.                    |          | Indigenous                               |
| Pottiaceae    | <i>Hymenostylium recurvirostrum</i>                 | (Hedw.) Dixon          |          | Indigenous                               |

| Family           | Scientific name   | Author                  | IUCN | Ecology             |
|------------------|---|-------------------------|------|---------------------|
| Pottiaceae       | <i>Pseudocrossidium crinitum</i>                              | (Schultz) R.H.Zander    |      | Indigenous          |
| Pottiaceae       | <i>Pterygoneurum macleeanum</i>                               | Warnst.                 |      | Indigenous          |
| Pottiaceae       | <i>Tortula atrovirens</i>                                     | (Sm.) Lindb.            |      | Indigenous          |
| Pottiaceae       | <i>Trichostomum brachydontium</i>                             | Bruch                   |      | Indigenous          |
| Pteridaceae      | <i>Cheilanthes eckloniana</i>                                 | (Kunze) Mett.           | LC   | Indigenous          |
| Pteridaceae      | <i>Cheilanthes hirta</i> var. <i>hirta</i>                    | Sw.                     | LC   | Indigenous          |
| Pteridaceae      | <i>Pellaea calomelanos</i> var. <i>calomelanos</i>            | (Sw.) Link              | LC   | Indigenous          |
| Ptychomitriaceae | <i>Ptychomitrium cucullatifolium</i>                          | (Mull.Hal.) A.Jaeger    |      | Indigenous          |
| Ranunculaceae    | <i>Anemone tenuifolia</i>                                     | (L.f.) DC.              | LC   | Indigenous; Endemic |
| Ranunculaceae    | <i>Ranunculus multifidus</i>                                  | Forssk.                 | LC   | Indigenous          |
| Ranunculaceae    | <i>Ranunculus trichophyllus</i>                               | Chaix                   | LC   | Indigenous          |
| Resedaceae       | <i>Oligomeris dipetala</i> var. <i>dipetala</i>               | (Aiton) Turcz.          | LC   | Indigenous          |
| Rhamnaceae       | <i>Rhamnus prinoides</i>                                      | L'Her.                  | LC   | Indigenous          |
| Rhamnaceae       | <i>Ziziphus mucronata</i> subsp. <i>mucronata</i>             | Willd.                  | LC   | Indigenous          |
| Ricciaceae       | <i>Riccia albolimbata</i>                                     | S.W.Arnell              |      | Indigenous          |
| Ricciaceae       | <i>Riccia albomata</i>  | O.H.Volk & Perold       |      | Indigenous; Endemic |
| Ricciaceae       | <i>Riccia cavernosa</i>                                       | Hoffm.                  |      | Indigenous          |
| Ricciaceae       | <i>Riccia nigrella</i>  | DC.                     |      | Indigenous          |
| Ricciaceae       | <i>Riccia okahandjana</i>                                     | S.W.Arnell              |      | Indigenous          |
| Rubiaceae        | <i>Anthospermum rigidum</i> subsp. <i>rigidum</i>             | Eckl. & Zeyh.           | LC   | Indigenous          |
| Rubiaceae        | <i>Kohautia caespitosa</i> subsp. <i>brachyloba</i>           | Schnizl.                | LC   | Indigenous          |
| Rubiaceae        | <i>Kohautia cynanchica</i>                                    | DC.                     | LC   | Indigenous          |
| Rubiaceae        | <i>Nenax microphylla</i>                                      | (Sond.) T.M.Salter      | LC   | Indigenous          |
| Ruscaceae        | <i>Sansevieria aethiopica</i>                                 | Thunb.                  | LC   | Indigenous          |
| Ruscaceae        | <i>Sansevieria hyacinthoides</i>                              | (L.) Druce              | LC   | Indigenous          |
| Santalaceae      | <i>Osyris lanceolata</i>                                      | Hochst. & Steud.        | LC   | Indigenous          |
| Santalaceae      | <i>Thesium namaquense</i>                                     | Schltr.                 | LC   | Indigenous; Endemic |
| Santalaceae      | <i>Viscum hoolei</i>  | (Wiens) Polhill & Wiens | LC   | Indigenous          |
| Santalaceae      | <i>Viscum rotundifolium</i>                                   | L.f.                    | LC   | Indigenous          |
| Scrophulariaceae | <i>Aptosimum marlothii</i>                                    | (Engl.) Hiern           | LC   | Indigenous          |
| Scrophulariaceae | <i>Aptosimum procumbens</i>                                   | (Lehm.) Steud.          | LC   | Indigenous          |
| Scrophulariaceae | <i>Aptosimum spinescens</i>                                   | (Thunb.) Emil Weber     | LC   | Indigenous          |
| Scrophulariaceae | <i>Buddleja saligna</i>                                       | Willd.                  | LC   | Indigenous          |
| Scrophulariaceae | <i>Chaenostoma halimifolium</i>                               | Benth.                  | LC   | Indigenous          |
| Scrophulariaceae | <i>Jamesbrittenia albiflora</i>                               | (I.Verd.) Hilliard      | LC   | Indigenous; Endemic |
| Scrophulariaceae | <i>Jamesbrittenia atropurpurea</i> subsp. <i>atropurpurea</i> | (Benth.) Hilliard       | LC   | Indigenous          |
| Scrophulariaceae | <i>Jamesbrittenia aurantiaca</i>                              | (Burch.) Hilliard       | LC   | Indigenous          |
| Scrophulariaceae | <i>Jamesbrittenia filicaulis</i>                              | (Benth.) Hilliard       | LC   | Indigenous          |

| Family           | Scientific name   | Author                              | IU<br>CN | Ecology                               |
|------------------|---|-------------------------------------|----------|---------------------------------------|
| Scrophulariaceae | <i>Jamesbrittenia</i> sp.                                 |                                     |          |                                       |
| Scrophulariaceae | <i>Jamesbrittenia tysonii</i>                             | (Hiem) Hilliard                     | LC       | Indigenous; Endemic                   |
| Scrophulariaceae | <i>Manulea fragrans</i>                                   | Schltr.                             | LC       | Indigenous; Endemic                   |
| Scrophulariaceae | <i>Nemesia linearis</i>                                   | Vent.                               | LC       | Indigenous                            |
| Scrophulariaceae | <i>Peliostomum leucorrhizum</i>                           | E.Mey. ex Benth.                    | LC       | Indigenous                            |
| Scrophulariaceae | <i>Peliostomum origanoides</i>                            | E.Mey. ex Benth.                    | LC       | Indigenous; Endemic                   |
| Scrophulariaceae | <i>Selago albida</i>                                      | Choisy                              | LC       | Indigenous                            |
| Scrophulariaceae | <i>Selago geniculata</i>                                  | L.f.                                | LC       | Indigenous; Endemic                   |
| Scrophulariaceae | <i>Selago paniculata</i>                                  | Thunb.                              | LC       | Indigenous; Endemic                   |
| Scrophulariaceae | <i>Selago saxatilis</i>                                   | E.Mey.                              | LC       | Indigenous                            |
| Scrophulariaceae | <i>Zaluzianskya karrooica</i>                             | Hilliard                            | LC       | Indigenous; Endemic                   |
| Solanaceae       | <i>Lycium bosciifolium</i>                                | Schinz                              | LC       | Indigenous                            |
| Solanaceae       | <i>Lycium cinereum</i>                                    | Thunb.                              | LC       | Indigenous                            |
| Solanaceae       | <i>Lycium horridum</i>                                    | Thunb.                              | LC       | Indigenous                            |
| Solanaceae       | <i>Lycium oxycarpum</i>                                   | Dunal                               | LC       | Indigenous; Endemic                   |
| Solanaceae       | <i>Lycium pumilum</i>                                     | Dammer                              | LC       | Indigenous                            |
| Solanaceae       | <i>Lycium schizocalyx</i>                                 | C.H.Wright                          | LC       | Indigenous                            |
| Solanaceae       | <i>Nicotiana glauca</i>                                   | Graham                              |          | Not indigenous; Naturalised; Invasive |
| Solanaceae       | <i>Solanum capense</i>                                    | L.                                  | LC       | Indigenous                            |
| Solanaceae       | <i>Solanum humile</i>                                     | Lam.                                |          | Indigenous                            |
| Solanaceae       | <i>Solanum retroflexum</i>                                | Dunal                               | LC       | Indigenous                            |
| Talinaceae       | <i>Talinum caffrum</i>                                    | (Thunb.) Eckl. & Zeyh.              | LC       | Indigenous                            |
| Tamaricaceae     | <i>Tamarix ramosissima</i>                                | Ledeb.                              |          | Not indigenous; Naturalised; Invasive |
| Targioniaceae    | <i>Targionia hypophylla</i>                               | L.                                  |          | Indigenous                            |
| Tecophilaeaceae  | <i>Cyanella lutea</i>                                     | L.f.                                |          | Indigenous                            |
| Thymelaeaceae    | <i>Lasiosiphon polycephalus</i>                           | (E.Mey. ex Meisn.)<br>H.Pearson     | LC       | Indigenous                            |
| Verbenaceae      | <i>Chascanum cuneifolium</i>                              | (L.f.) E.Mey.                       | LC       | Indigenous; Endemic                   |
| Verbenaceae      | <i>Chascanum pinnatifidum</i>                             | (L.f.) E.Mey.                       |          | Indigenous                            |
| Verbenaceae      | <i>Chascanum pinnatifidum</i> var.<br><i>pinnatifidum</i> | (L.f.) E.Mey.                       | LC       | Indigenous                            |
| Zygophyllaceae   | <i>Roepera incrustata</i>                                 | (Sond.) Beier & Thulin              |          | Indigenous                            |
| Zygophyllaceae   | <i>Roepera lichtensteiniana</i>                           | (Cham.) Beier & Thulin              |          | Indigenous                            |
| Zygophyllaceae   | <i>Tetraena microcarpa</i>                                | (Licht. ex Cham.) Beier &<br>Thulin |          | Indigenous                            |
| Zygophyllaceae   | <i>Tetraena simplex</i>                                   | (L.) Beier & Thulin                 |          | Indigenous                            |
| Zygophyllaceae   | <i>Tribulus terrestris</i>                                | L.                                  | LC       | Indigenous                            |
| Zygophyllaceae   | <i>Zygophyllum dregeanum</i>                              | Sond.                               | LC       | Indigenous                            |

### 9.3 Appendix C – Amphibian species expected to occur in the project area

| Species                                    | Common Name            | Conservation Status    |             |
|--|------------------------|------------------------|-------------|
|  |                        | Regional (SANBI, 2016) | IUCN (2017) |
| <i>Amietia delalandii</i>                  | Delalande's River Frog | LC                     | Unlisted    |
| <i>Amietia fuscigula</i>                   | Cape River Frog        | LC                     | LC          |
| <i>Amietia poyntoni</i>                    | Poynton's River Frog   | LC                     | LC          |
| <i>Breviceps adspersus</i>                 | Bushveld Rain Frog     | LC                     | LC          |
| <i>Cacosternum boettgeri</i>               | Common Caco            | LC                     | LC          |
| <i>Kassina senegalensis</i>                | Bubbling Kassina       | LC                     | LC          |
| <i>Poyntonophrynus vertebralis</i>         | Southern Pygmy Toad    | LC                     | LC          |
| <i>Pyxicephalus adspersus</i>              | Giant Bullfrog         | NT                     | LC          |
| <i>Sclerophrys gutturalis</i>              | Guttural Toad          | LC                     | LC          |
| <i>Tomopterna cryptotis</i>                | Tremelo Sand Frog      | LC                     | LC          |
| <i>Tomopterna tandyi</i>                   | Tandy's Sand Frog      | LC                     | LC          |
| <i>Vandijkophrynus gariensis gariensis</i> | Karoo Toad             | Not listed             | Not listed  |
| <i>Xenopus laevis</i>                      | Common Platanna        | LC                     | LC          |

## 9.4 Appendix D – Reptile species expected to occur in the project area

| Species                                      | Common Name                    | Conservation Status    |             |
|--|--------------------------------|------------------------|-------------|
|  |                                | Regional (SANBI, 2016) | IUCN (2017) |
| <i>Acontias gracilicauda</i>                 | Thin-tailed Legless Skink      | LC                     | LC          |
| <i>Acontias lineatus</i>                     | Striped Dwarf Legless Skink    | LC                     | LC          |
| <i>Afrotyphlops schlegelii</i>               | Schlegel's Beaked Blind Snake  | LC                     | Unlisted    |
| <i>Agama aculeata aculeata</i>               | Western Ground Agama           | LC                     | Unlisted    |
| <i>Agama atra</i>                            | Southern Rock Agama            | LC                     | LC          |
| <i>Aspidelaps lubricus lubricus</i>          | Coral Shield Snake             | LC                     | LC          |
| <i>Bitis arietans arietans</i>               | Puff Adder                     | LC                     | Unlisted    |
| <i>Boaedon capensis</i>                      | Brown House Snake              | LC                     | LC          |
| <i>Chondrodactylus angulifer</i>             | Common Giant Gecko             | LC                     | LC          |
| <i>Chondrodactylus bibronii</i>              | Bibron's Gecko                 | LC                     | Unlisted    |
| <i>Dasypeltis scabra</i>                     | Rhombic Egg-eater              | LC                     | LC          |
| <i>Hemachatus haemachatus</i>                | Rinkhals                       | LC                     | LC          |
| <i>Homopus femoralis</i>                     | Greater Dwarf Tortoise         | LC                     | LC          |
| <i>Karusasaurus polyzonus</i>                | Southern Karusa Lizard         | LC                     | LC          |
| <i>Lamprophis aurora</i>                     | Aurora House Snake             | LC                     | LC          |
| <i>Leptotyphlops scutifrons scutifrons</i>   | Peters' Thread Snake           | LC                     | Unlisted    |
| <i>Lycophidion capense capense</i>           | Cape Wolf Snake                | LC                     | Unlisted    |
| <i>Monopeltis capensis</i>                   | Cape Worm Lizard               | LC                     | LC          |
| <i>Naja nivea</i>                            | Cape Cobra                     | LC                     | Unlisted    |
| <i>Pachydactylus capensis</i>                | Cape Gecko                     | LC                     | Unlisted    |
| <i>Pachydactylus mariquensis</i>             | Common Banded Gecko            | LC                     | LC          |
| <i>Pedioplanis laticeps</i>                  | Karoo Sand Lizard              | LC                     | LC          |
| <i>Pedioplanis lineocellata lineocellata</i> | Spotted Sand Lizard            | LC                     | Unlisted    |
| <i>Pedioplanis namaquensis</i>               | Namaqua Sand Lizard            | LC                     | Unlisted    |
| <i>Pelomedusa galeata</i>                    | South African Marsh Terrapin   | Not evaluated          | Unlisted    |
| <i>Psammobates tentorius</i>                 | Tent Tortoise                  | LC                     | LC          |
| <i>Psammophis leightoni</i>                  | Cape Sand Snake                | VU                     | LC          |
| <i>Psammophis notostictus</i>                | Karoo Sand Snake               | LC                     | Unlisted    |
| <i>Psammophylax rhombeatus</i>               | Spotted Grass Snake            | LC                     | Unlisted    |
| <i>Pseudaspis cana</i>                       | Mole Snake                     | LC                     | Unlisted    |
| <i>Ptenopus garrulus garrulus</i>            | Common Barking Gecko           | LC                     | Unlisted    |
| <i>Rhinotyphlops lalandei</i>                | Delalande's Beaked Blind Snake | LC                     | Unlisted    |
| <i>Stigmochelys pardalis</i>                 | Leopard Tortoise               | LC                     | LC          |
| <i>Trachylepis capensis</i>                  | Cape Skink                     | LC                     | Unlisted    |
| <i>Trachylepis occidentalis</i>              | Western Three-striped Skink    | LC                     | Unlisted    |
| <i>Trachylepis punctatissima</i>             | Speckled Rock Skink            | LC                     | LC          |



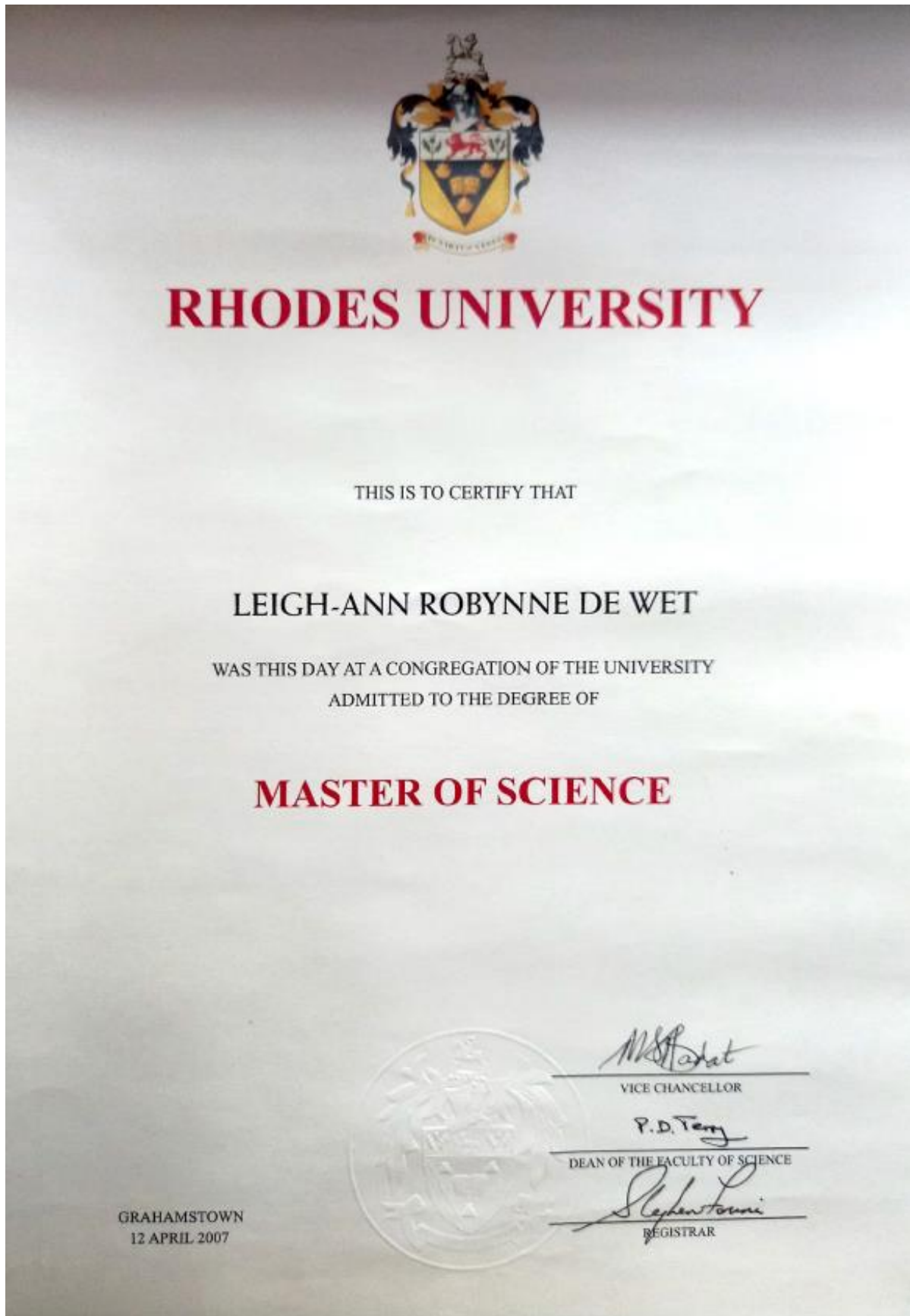
|  |                       |    |          |
|--|-----------------------|----|----------|
| <i>Trachylepis sulcata sulcata</i>     | Westren Rock Skink    | LC | Unlisted |
| <i>Trachylepis variegata</i>           | Variigated Skink      | LC | Unlisted |
| <i>Varanus albigularis albigularis</i> | Southern Rock Monitor | LC | Unlisted |
| <i>Varanus niloticus</i>               | Water Monitor         | LC | Unlisted |

## 9.5 Appendix E – Mammal species expected to occur within the project area

| Species                           | Common Name                     | Conservation Status    |             |
|-----------------------------------|---------------------------------|------------------------|-------------|
|                                   |                                 | Regional (SANBI, 2016) | IUCN (2017) |
| <i>Aethomys ineptus</i>           | Tete Veld Rat                   | LC                     | LC          |
| <i>Aethomys namaquensis</i>       | Namaqua rock rat                | LC                     | LC          |
| <i>Antidorcas marsupialis</i>     | Sclater's Shrew                 | LC                     | LC          |
| <i>Atilax paludinosus</i>         | Water Mongoose                  | LC                     | LC          |
| <i>Canis mesomelas</i>            | Black-backed Jackal             | LC                     | LC          |
| <i>Caracal caracal</i>            | Caracal                         | LC                     | LC          |
| <i>Chlorocebus pygerythrus</i>    | Vervet Monkey                   | LC                     | LC          |
| <i>Cryptomys hottentotus</i>      | Common Mole-rat                 | LC                     | LC          |
| <i>Cynictis penicillata</i>       | Yellow Mongoose                 | LC                     | LC          |
| <i>Desmodillus auricularis</i>    | Short-tailed Gerbil             | LC                     | LC          |
| <i>Eidolon helvum</i>             | African Straw-colored Fruit Bat | LC                     | NT          |
| <i>Elephantulus myurus</i>        | Eastern Rock Sengi              | LC                     | LC          |
| <i>Eptesicus hottentotus</i>      | Long-tailed Serotine Bat        | LC                     | LC          |
| <i>Felis nigripes</i>             | Black-footed Cat                | VU                     | VU          |
| <i>Felis silvestris</i>           | African Wildcat                 | LC                     | LC          |
| <i>Genetta genetta</i>            | Small-spotted Genet             | LC                     | LC          |
| <i>Gerbilliscus brantsii</i>      | Highveld Gerbil                 | LC                     | LC          |
| <i>Gerbilliscus leucogaster</i>   | Bushveld Gerbil                 | LC                     | LC          |
| <i>Gerbillurus paeba</i>          | Hairy-footed Gerbil             | LC                     | LC          |
| <i>Herpestes pulverulentus</i>    | Cape Grey Mongoose              | LC                     | LC          |
| <i>Hystrix africaeaustralis</i>   | Cape Porcupine                  | LC                     | LC          |
| <i>Ictonyx striatus</i>           | Striped Polecat                 | LC                     | LC          |
| <i>Leptailurus serval</i>         | Serval                          | NT                     | LC          |
| <i>Lepus capensis</i>             | Cape Hare                       | LC                     | LC          |
| <i>Lepus saxatilis</i>            | Scrub Hare                      | LC                     | LC          |
| <i>Macroscelides proboscideus</i> | Round Eared Elephant Shrew      | LC                     | LC          |
| <i>Malacothrix typica</i>         | Gerbil Mouse                    | LC                     | LC          |
| <i>Mastomys coucha</i>            | Multimammate Mouse              | LC                     | LC          |
| <i>Mellivora capensis</i>         | Honey Badger                    | LC                     | LC          |
| <i>Mus musculus</i>               | House Mouse                     | Unlisted               | LC          |
| <i>Neoromicia capensis</i>        | Cape Serotine Bat               | LC                     | LC          |
| <i>Neoromicia zuluensis</i>       | Aloe Bat                        | LC                     | LC          |
| <i>Orycteropus afer</i>           | Aardvark                        | LC                     | LC          |
| <i>Otocyon megalotis</i>          | Bat-eared Fox                   | LC                     | LC          |
| <i>Otomys unisulcatus</i>         | Karoo Bush Rat                  | LC                     | LC          |
| <i>Panthera pardus</i>            | Leopard                         | VU                     | VU          |

|                               |                            |                     |    |
|-------------------------------|----------------------------|---------------------|----|
| <i>Papio ursinus</i>          | Chacma Baboon              | LC                  | LC |
| <i>Parahyaena brunnea</i>     | Brown Hyaena               | NT                  | NT |
| <i>Parotomys brantsii</i>     | Brants' Whistling Rat      | LC                  | LC |
| <i>Parotomys littledalei</i>  | Littledale's Whistling Rat | NT                  | LC |
| <i>Pedetes capensis</i>       | Springhare                 | LC                  | LC |
| <i>Phacochoerus africanus</i> | Common Warthog             | LC                  | LC |
| <i>Poecilogale albinucha</i>  | African Striped Weasel     | NT                  | LC |
| <i>Procavia capensis</i>      | Rock Hyrax                 | LC                  | LC |
| <i>Pronolagus saundersiae</i> | Hewitt's Red Rock Rabbit   | LC                  | LC |
| <i>Proteles cristata</i>      | Aardwolf                   | LC                  | LC |
| <i>Raphicerus campestris</i>  | Steenbok                   | LC                  | LC |
| <i>Rattus rattus</i>          | House Rat                  | Exotic (Not listed) | LC |
| <i>Redunca fulvorufula</i>    | Mountain Reedbuck          | EN                  | EN |
| <i>Rhodomys pumilio</i>       | Xeric Four-striped Mouse   | LC                  | LC |
| <i>Rhinolophus darlingi</i>   | Darling's Horseshoe Bat    | LC                  | LC |
| <i>Rousettus aegyptiacus</i>  | Egyptian Fruit Bat         | LC                  | LC |
| <i>Suncus varilla</i>         | Lesser Dwarf Shrew         | LC                  | LC |
| <i>Suricata suricatta</i>     | Suricate                   | LC                  | LC |
| <i>Sylvicapra grimmia</i>     | Common Duiker              | LC                  | LC |
| <i>Tadarida aegyptiaca</i>    | Egyptian Free-tailed Bat   | LC                  | LC |
| <i>Vulpes chama</i>           | Cape Fox                   | LC                  | LC |
| <i>Xerus inauris</i>          | Cape Ground Squirrel       | LC                  | LC |

## 9.6 Appendix F – Specialists Qualifications





**herewith certifies that**  
**Leigh-Ann Robynne de Wet**  
Registration Number: 400233/12  
**is a registered scientist**

in terms of section 20(3) of the Natural Scientific Professions Act, 2003  
(Act 27 of 2003)  
in the following field(s) of practice (Schedule 1 of the Act)  
Ecological Science (Professional Natural Scientist)

Effective 19 September 2012

Expires 31 March 2024



Chairperson

Chief Executive Officer



To verify this certificate scan this code



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Signature: *Hulpkrif*  
Employee Name: *Bronwyn*  
Employee Personnel No: *Postnet*  
Branch / Outlet Name and Code: *21/09/22*

# BACHELOR OF SCIENCE HONOURS IN ENVIRONMENTAL SCIENCES

with

## ECOLOGICAL INTERACTIONS AND ECOSYSTEM RESILIENCE

awarded to

**CARAMI VAN SCHALKWYK**

**WITH DISTINCTION**

after complying with all the requirements

**26 March 2019**

**Prof ND Kgwadi**  
Vice-Chancellor



**Prof M Verhoef**  
Registrar

University Number: 26338203  
Serial Number: 744839

This is an English translation of the content of the original certificate issued in Afrikaans and conferred at a graduation ceremony held on 26 March 2019.





**herewith certifies that**  
**Carami van Schalkwyk**  
Registration Number: 121757  
**is a registered scientist**

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

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

Effective 11 September 2019

Expires 31 March 2024



Chairperson

Chief Executive Officer



To verify this certificate scan this code

## 9.7 Appendix G – Specialists Declaration of Independence

I, Leigh-Ann de Wet, 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.



Leigh-Ann de Wet

Biodiversity Specialist

The Biodiversity Company

May 2023

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

Biodiversity Specialist

The Biodiversity Company

May 2023