
**TERRESTRIAL BIODIVERSITY, PLANT AND ANIMAL SPECIES
THEME SITE VERIFICATION AND SENSITIVITY REPORT FOR
THE SUNVELD ENERGY PV FACILITY AND BESS,
WESTERN CAPE**

Prepared for:

Sunveld Energy (Pty) Ltd

240 Main Road
Rondebosch
7700

Prepared by:

Biodiversity
Africa

30 Chudleigh Road
Plumstead, 7800
Cape Town, Western Cape



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Details of Company

Name	Biodiversity Africa
Email	Tarryn@biodiversityafrica.com
Tel	071 332 3994 or 078 340 6295
Address	30 Chudleigh Road Plumstead, 7800 Cape Town

Authors

Tarryn Martin (Botanical Specialist) (*Pri. Sci. Nat* 008745)

Tarryn has over ten years of experience working as a botanist, nine of which are in the environmental sector. She has worked as a specialist and project manager on projects within South Africa, Mozambique, Lesotho, Zambia, Tanzania, Cameroon, Swaziland and Malawi. The majority of these projects required lender finance and consequently met both in-country and lender requirements.

Tarryn has extensive experience writing botanical impact assessments, critical habitat assessments, biodiversity management plans, biodiversity monitoring plans and Environmental Impact Assessments to International Standards, especially to those of the International Finance Corporation (IFC). Her experience includes working on large mining projects such as the Kenmare Heavy Minerals Mine, where she monitored forest health, undertook botanical impact assessments for their expansion projects and designed biodiversity management and monitoring plans. She has also project managed Environmental Impact Assessments for graphite mines in northern Mozambique and has a good understanding of the Mozambique Environmental legislation and processes.

Tarryn holds a BSc (Botany and Zoology), a BSc (Hons) in African Vertebrate Biodiversity and an MSc with distinction in Botany from Rhodes University. Tarryn's Master's thesis examined the impact of fire on the recovery of C3 and C4 Panicoid and non-Panicoid grasses within the context of climate change for which she won the Junior Captain Scott-Medal (Plant Science) for producing the top MSc of 2010 from the South African Academy of Science and Art as well as an Award for Outstanding Academic Achievement in Range and Forage Science from the Grassland Society of Southern Africa. Tarryn is a professional member of the South African Council for Natural Scientific Professionals (since 2014).

Amber Jackson (Faunal Specialist) (*Cand. Nat. Sci*)

Amber has over ten years' experience in environmental consulting and has managed projects across various sectors including mining, agriculture, forestry, renewable energy, housing, coastal and wetland recreational infrastructure. Most of these projects required lender finance and therefore met both in-country, lender and sector specific requirements.

Amber completed the IFC lead and Swiss funded programme in Environmental and Social Risk Management course in 2018. The purpose of the course was to upskill Sub-Saharan African environmental consultants to increase the uptake of E&S standards by Financial Institutions.

Amber specialises in terrestrial vertebrate faunal assessments. She has conducted large scale faunal impact assessments that are to international lender's standards in Mozambique, Tanzania, Lesotho and Malawi. In South Africa her faunal impact assessments comply with the protocols for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial biodiversity and follows the SANBI Species Environmental Assessment Guideline. Her specialist input goes beyond impact assessments and includes faunal opportunities and constraints assessments, Critical Habitat Assessments, Biodiversity related Management Plans and Biodiversity Monitoring Programmes.

Amber holds a BSc (Zoology and Ecology, Environment & Conservation) and BSc (Hons) in Ecology, Environment & Conservation from WITS University and an MPhil in Environmental Management from University of Cape Town. Amber's honours focused on the landscape effects on Herpetofauna in Kruger National Park and her Master's thesis focused on the management of social and natural aspects of environmental systems with a dissertation in food security that investigated the complex food system of informal and formal distribution markets.

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Glossary of Terms

Alien Invasive Species refers to an exotic species that can spread rapidly and displace native species causing damage to the environment

Biodiversity is the term that is used to describe the variety of life on Earth and is defined as “*the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems*” (Secretariat of the Convention on Biological Diversity, 2005).

Biome - groupings based on dominant forms of plant life and prevailing climatic factors. Biomes have plants and/or animals living together with some degree of permanence, and one can observe large-scale patterns in global plant cover. Biomes broadly correspond with climatic regions as moisture and temperature strongly influence plant establishment and survival, although other environmental controls are sometimes important (SANBI, 2020).

Critical Biodiversity Areas (CBAs) are areas that are required to meet biodiversity targets for species, ecosystems or ecological processes and infrastructure. These include:

- All areas required to meet biodiversity pattern (e.g. species, ecosystems) targets;
- Critically Endangered (CR) ecosystems (terrestrial, wetland and river types);
- All areas required to meet ecological infrastructure targets, which are aimed at ensuring the continued existence and functioning of ecosystems and delivery of essential ecosystem services; and
- Critical corridors to maintain landscape connectivity (WCBSP, 2017).

Ecological Support Areas (ESAs) are areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of PAs or CBAs, and are often vital for delivering ecosystem services. They support landscape connectivity, encompass the ecological infrastructure from which ecosystem goods and services flow, and strengthen resilience to climate change. They include features such as regional climate adaptation corridors, water source and recharge areas, riparian habitat surrounding rivers or wetlands, and Endangered vegetation.

Ecosystem – a dynamic complex of animal, plant and micro-organism communities and their non-living environment interacting as a functional unit (SANBI, 2020).

Habitat Fragmentation occurs when large expanses of habitat are transformed into smaller patches of discontinuous habitat units isolated from each other by transformed habitats such as farmland.

Natural Habitat refers to habitats composed of viable assemblages of plant and/or animal species of largely native origin and/or where human activity has not essentially modified an area’s primary ecological function and species composition.

Other Natural Areas (ONAs) are areas that have not been identified as a priority in the current biodiversity spatial plan but retain most of their natural character and perform a range of biodiversity

and ecological infrastructure functions. Although they have not been prioritised for meeting biodiversity targets, they are still an important part of the natural ecosystem.

Project Area is defined as the area that will be directly impacted by project infrastructure such as the roads, solar panels and offices.

Project area of influence (PAOI) refers to the broader area around the project area that may be indirectly impacted by project activities.

Protected Area is a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values (*IUCN Definition 2008*).

Sensitive Species are species that are sensitive to illegal harvesting. As such, their names are obscured and listed as “Sensitive species #”. As per the best practice guideline that accompanies the protocol and screening tool, the name of the sensitive species may not appear in any BAR or EIA report, nor any specialist reports released into the public domain.

Species of Conservation Concern (SCC) includes all species that are assessed according the IUCN Red List Criteria as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Data Deficient (DD) or Near Threatened (NT), as well as range-restricted species which are not declining and are nationally listed as Rare or Extremely Rare [also referred to in some Red Lists as Critically Rare] (SANBI, 2021).

Vegetation type is defined in terms of dominant, common as well as rare species, as well as association with landscape features such as soil or geology, topography and climate (SANBI).

Acronyms

ADU	Animal Demography Unit
AOO	Area of Occupancy
BESS	Battery Energy Storage Systems
CBA	Critical Biodiversity Area
CI	Conservation Importance
CR	Critically Endangered
DFFE	Department of Forestry, Fisheries and Environment
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EN	Endangered
EOO	Extent of Occupancy
ESA	Ecological Support Area
FI	Functional Integrity
GIS	Geographical Information System
GN	Government Notice
IPP	Independent Power Producers
IUCN	International Union for Conservation of Nature
LC	Least Concern
MTS	Main Transmission Substation
NEM:BA	National Environmental Management: Biodiversity Act
NPAES	National Protected Areas Expansion Strategy
NT	Near Threatened
ONA	Other Natural Area
PAOI	Project Area of Influence
PNCO	Provincial Nature Conservation Ordinance
POSA	Plants of Southern Africa
PV	Photovoltaic
QDS	Quarter Degree Square
RR	Receptor Resilience
SA	South Africa
SANBI	South African National Biodiversity Institute
SACAD	South African Conservation Areas Database
SAPAD	South African Protected Areas Database
SCC	Species of Conservation Concern
SEF	Solar Energy Facility
SEI	Site Ecological Importance
TOPS	Threatened and Protected Species
VU	Vulnerable
WCBS	Western Cape Biodiversity Spatial Plan

1. INTRODUCTION

1.1. Project Description

Sunveld Energy (Pty) Ltd is proposing the construction and operation of a Solar Photovoltaic (PV) Facility and associated infrastructure on the farms Kruispad (Re/120) and Doornfontein (RE/118) located approximately 7.5 km east of Velddrif in the Western Cape Province (Figure 1.1). The size of the study area is approximately 2362 ha.

The net generation capacity of the Solar PV Facility will be up to 600 MW, which will consist of 12 sites or projects that may be developed singly or in groups in a phased-development approach. Each of the 12 x 50 MW sites will have distributed inverters and lead via underground cables to 10 distributed 33 kV mini-substations. The mini-substations will feed underground to two (2) on-site substations or the two (2) Battery Energy Storage Systems (BESS) then to the Main Transmission Substation (MTS) via 132 kV overhead cables. The BESS's can provide 4 hours of 600 MW and will make use of the same on-site substations to connect to the MTS at night. The MTS will be assessed in a separate environmental assessment process.

The proposed Solar PV Facility and associated infrastructure will include the following:

- Solar PV panels (monofacial or bifacial) with a maximum height of ± 3 m above the ground.
- Two (2) BESS sites (± 14 ha each) with a combined capacity of 2400 MWh.
- Two (2) on-site substation complexes each 300 MVA. Each substation will have a base of 75 x 75 m with a 200 x 200 m fenced area. These are collector/switching substations with 33kV input from the mini-substations and transforming to 132 kV to be routed via overhead powerlines to the Main Transmission Substation (MTS).
- Grid Connection (the length and preferred route of which will be determined after the site sensitivity verification assessments have been undertaken and layouts revised).
- Approximately 8 ha of temporary laydown areas. A permanent laydown area of a maximum of 2 ha will remain for operations.
- A network of gravel internal access roads (65 ha), each with a width of up to ± 4 m, will be constructed to provide access to the various components of each facility.
- Ancillary buildings of approximately 8 ha including (but not limited to) a 33kV switch room, gate-house, ablutions, workshops, storage and warehousing areas, site offices and control centre, canteen & visitors centre, staff lockers etc.
- Facility (IPP) substation (up to 4 ha).
- Inverter-station, transformers and internal electrical reticulation (underground cabling).
- Rainwater Tanks.
- Electrified perimeter fencing (not exceeding 3.5 m in height) and security infrastructure.

The total preliminary layout development footprint of the Solar PV Facility and associated infrastructure is approximately 940 ha. This is likely to change once Preferred Mitigated Layouts that take into account all the site sensitivities, are completed.

Biodiversity Africa has been appointed to undertake the site sensitivity verification assessment and fulfil the minimum report content requirements in terms of the Terrestrial Biodiversity, Plant and Animal Species for the proposed Sunveld Energy PV Facility and BESS.

1.2. Reporting Requirements and Objectives

In terms of the Protocol for the Specialist Assessment and Minimum Reporting Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN R. 320 of 2020) and Terrestrial Animal and Plant Species (GN R. 1150), prior to the commencement of a specialist assessment, the current use of the land and the potential environmental sensitivity of the project area under consideration as identified by the screening tool, must be confirmed by undertaking a site sensitivity verification. The results of the screening tool, together with the site sensitivity verification, ultimately determines the minimum report content requirements. Where the information gathered from the site sensitivity verification differs from the screening tool designation of 'very high' or 'high' and is found to be of a 'low' sensitivity, then a Compliance Statement must be submitted. However, if the site sensitivity verification confirms the findings of the Screening Report generated for this project area (Table 2.1), then a full Terrestrial Biodiversity Impact Assessment must be submitted as part of the Application for Environmental Authorisation (EA).

The objective of this site sensitivity verification report is to use the results from the botanical and faunal field survey to provide comment on whether the specialist agrees or disagrees with the findings of the Department of Forestry, Fisheries and Environment (DFFE) screening report for the Animal Species Theme, Plant Species Theme and Terrestrial Biodiversity Theme. An outcome of the report will be to provide a sensitivity map for the project area based on site specific data collected during the field survey. This map will be used to inform the placement of infrastructure.

The objectives of this site sensitivity verification report are to:

- Undertake a desktop assessment of the project area to determine its sensitivity and Species of Conservation Concern (SCC) (plants, amphibians, reptiles, mammals) that could be present within the project area.
- Undertake a field survey to record the following information:
 - Species present
 - Identification of species that are either protected (TOPS and PNCO) or considered threatened (Critically Endangered (CR), Endangered (EN), Vulnerable (VU)) on the South African Red Data List
 - Assess the level of degradation/ecological status of the project area (i.e. intact, near natural, transformed).
- Assess the sensitivity of the project area using the sensitivity analysis outlined in the Species Environmental Assessment Guideline (SANBI, 2020).
- Provide comment on whether the specialist agrees with the sensitivity for the Animal, Plant and Terrestrial Biodiversity Themes in the screening tool. If the specialist disagrees with the sensitivity rating in the screening tool, a reason will be provided, and the sensitivity provided based on the findings from the desktop assessment and field survey.

1.3. Limitations and Assumptions

This report is based on current available information and, as a result, the following limitations and assumptions are implicit:

- SCC are difficult to find and may be difficult to identify, thus species described in this report do not comprise an exhaustive list. It is almost certain that additional SCCs are present. However, every effort was made to identify SCC present in the project area during the field survey.
- Sampling could only be carried out at one stage in the annual or seasonal cycle. The survey was conducted in late Winter which is the start of the flowering season for this region and therefore falls within the correct sampling time. Although it is likely that some late flowering species have gone undetected, the time available in the field, and information gathered during the survey was sufficient to provide enough information to determine the status of the affected area and provide comment on the likelihood of occurrence of SCC.
- This assessment includes plants, mammals (excluding bats), amphibians and reptiles. It does not include birds, bats or invertebrates. Birds have been assessed by specialists within this respective field.
- The faunal assessment is based on a field survey to assess available habitat and active searching coupled with a desktop assessment.
- The assessment has been undertaken to meet the Protocol for the Specialist Assessment and Minimum Report Requirements for Environmental Impacts on Terrestrial Biodiversity (2020) and the Species Environmental Assessment Guidelines (2020).



Figure 1.1: Location of the project area in relation to Saldanha and Vredenburg.

2. METHODOLOGY

2.1. DFFE Screening Report

The DFFE screening report identifies environmental sensitivities for the project area. This is based on available desktop data and requires that a suitably qualified specialist verify the findings. Of relevance to this report is the animal species theme, plant species theme, and the terrestrial biodiversity theme (Table 2.1). Comment has been provided in the table below indicating how these themes have been assessed.

Table 2.1: Summary of DFFE screening report themes relevant to this study.

Theme	Sensitivity	Assessment
Animal Species Theme	HIGH <ul style="list-style-type: none"> Likely presence of four (4) bird species Likely presence of one invertebrate species. 	The animal species theme has been categorised as high due to the presence of four (4) bird species and one invertebrate species. The faunal assessment in this report focuses on amphibians, reptiles and mammals and includes a desktop assessment and field survey (refer to Chapter 3). Birds and invertebrates have been addressed in separate specialist reports and as such, comment will be provided on this theme by the respective specialist.
Plant Species Theme	MEDIUM <ul style="list-style-type: none"> Likely presence of 39 SCC 	A desktop assessment that includes records from both the Plants of Southern Africa (POSA) database and iNaturalist was undertaken in conjunction with a field survey. For SCC that might occur within the project area, the likelihood of occurrence has been assessed based on distribution records and available habitat in the project area (Refer to Chapter 4).
Terrestrial Biodiversity Theme	VERY HIGH <ul style="list-style-type: none"> Critical Biodiversity Area (CBA) 1 and 2 present Ecological Support Area (ESA) 1 and 2 present Endangered ecosystem – Saldanha Flats Strandveld 	The features driving the CBA and ESA status have been identified and comment has been provided on the implications of the project development on the functioning of the CBA/ESAs (refer to Chapter 5). Comment has been provided on the impact of the project on the Endangered (EN) ecosystem (refer to Chapter 5).

2.2. Desktop Assessment

2.2.1. *Animal Species Theme*

The known diversity of the vertebrate fauna (excluding birds and bats) in the project area was determined by a literature review. Species known from the region, or from adjacent regions, whose preferred habitat(s) were known to occur within the study area, were also included. Literature sources included:

- Amphibians –Du Preez & Carruthers (2017), FrogMap (ADU, 2023).
- Reptiles – Branch (1998), ReptileMap (ADU, 2023).
- Mammals – Stuart & Stuart (2014), MammalMap (ADU, 2023).
- IUCN.
- iNaturalist.

To establish which of those species identified in the literature review are SCC, the following sources were consulted:

- Atlas and Red List of Reptiles of South Africa, Lesotho and Swaziland (Bates *et al.*, 2014).
- Atlas and Red List of Frogs of South Africa, Lesotho and Swaziland (Minter *et al.*, 2004).
- Red List of Mammals of South Africa, Swaziland and Lesotho.

2.2.2. *Plant Species Theme*

A species list was compiled for the project area and the likelihood of occurrence assessed for species listed as CR, EN, VU and Near Threatened (NT). Key resources consulted include:

- The DFFE screening report for the project area (May 2023).
- The Plants of Southern Africa (POSA) database.
- iNaturalist.
- The Red List of South African Plants.

Species threat status was checked against the Red List of South African Plants. Protected species listed on the Western Cape Nature Conservation Laws Amendment Act, 2000 were also identified as they require permits for their removal and/or translocation.

2.2.3. *Terrestrial Biodiversity Theme*

A desktop assessment was undertaken prior to the site visit to determine whether there are any terrestrial biodiversity features within the project area that are considered sensitive. The vegetation types present within the project area and key features driving the CBA status of portions of the project area, were identified and confirmed during the field survey. Key resources consulted include:

- The DFFE screening report for the project area (May 2023).
- The South African Vegetation Map (SANBI, 2018).
- The Western Cape Biodiversity Spatial Plan (WCBSP) (2017).
- The Red List of Ecosystems for South Africa: Remnants Spatial Dataset (SANBI, 2021).
- The Revised National List of Ecosystems that are Threatened and in need of Protection (DFFE, 2022).
- National Protected Area Expansion Strategy (NPAES) (2010 & 2018).

- The South African Protected Areas Database (SAPAD, Q1, 2023) and the South African Conservation Areas Database (SACAD, Q1, 2023).

2.3. Field Survey

A field survey was undertaken during the early flowering season from 24-25 July 2023. Figure 2.1 indicates the sample sites and tracks for the botanical and faunal specialists.

2.3.1. *Animal Species Theme*

The purpose of the faunal survey was to determine the faunal habitats present in the project area and conduct searches for evidence of mammal, reptile, and amphibian species.

The project area was driven, and active searching conducted in various habitats present within the project area. Active searching for amphibians, reptiles, and mammals (excluding bats) includes direct and indirect observation.

Direct observations were made by walking and driving through the project area and recording species seen. In addition, habitats that typically provide refuge for faunal species were targeted to search for specific species:

- Reptiles and terrestrial amphibians were targeted in microhabitats by lifting rocks and logs, peeling away bark and scraping through leaf litter.
- Amphibians were targeted at water bodies where individuals were searched for along the banks and verge vegetation.
- Camera and binoculars were used to view mammal species from a distance without disturbing them. While walking the project area, mammals are often flushed from hiding and were recorded.

Indirect observation is the searching for evidence of faunal presence and includes spoor, skat, roadkill, skulls, quills, dens, burrows, hairs, scrapings, and diggings.

2.3.2. *Terrestrial Biodiversity and Plant Species Theme*

The purpose of the botanical survey was to assess the site-specific botanical state of the project area of Influence (PAOI) by recording the species present (both indigenous and alien invasive species), identifying sensitive plant communities such as vegetation associated with rocky outcrops, riparian areas or areas with Species of Conservation Concern (SCC), and identifying the current land use.

The project area was driven and walked, and sample plots were analysed by determining the dominant species in each plot, as well as any alien invasive species and potential SCC occurring within the plots (Figure 2.1). Each sample plot was sampled until no new species were recorded. Vegetation communities were then described according to the dominant species recorded from each type, and these were mapped and assigned a sensitivity score.

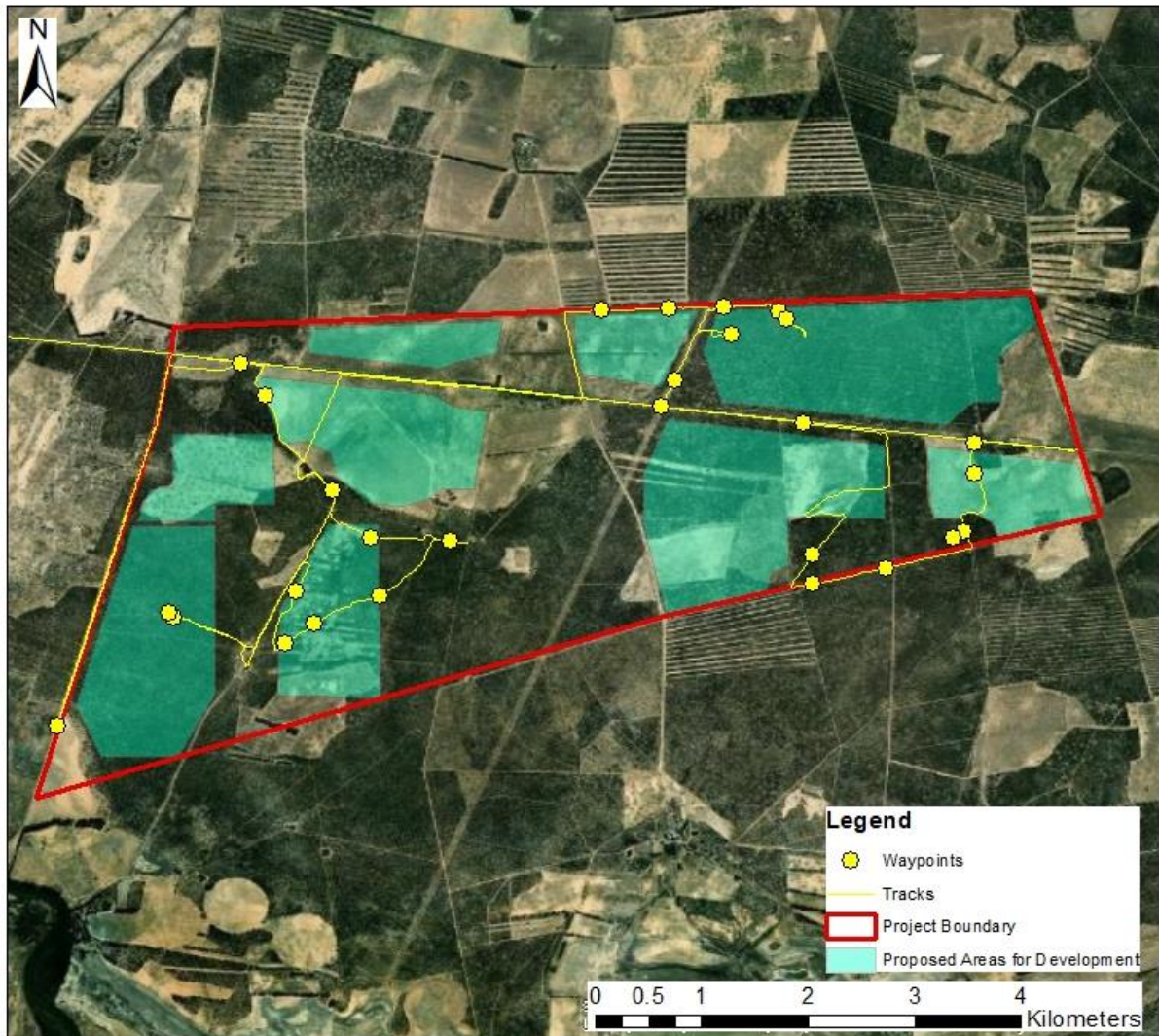


Figure 2.1: Map showing sample sites and tracks in relation to the project area.

2.4. Site Sensitivity Assessment

The Species Environmental Assessment Guideline (SANBI, 2020) was applied to assess the Site Ecological Importance (SEI) of the project area. The habitats and the SCC in the project area were assessed based on their conservation importance, functional integrity, and receptor resilience (Table 2.2). The combination of these resulted in a rating of SEI and interpretation of mitigation requirements based on the ratings.

The sensitivity map was developed using available spatial planning tools as well as by applying the SEI sensitivity based on the field survey.

Table 2.2: Criteria for establishing Site Ecological Importance and description of criteria.

Criteria	Description
Conservation Importance (CI)	<i>The importance of a site for supporting biodiversity features of conservation concern present e.g. populations of Threatened and Near-Threatened species (CR, EN, VU & NT), Rare, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes.</i>

Functional Integrity (FI)	<i>A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts.</i>
Biodiversity Importance (BI) is a function of Conservation Importance (CI) and the Functional Integrity (FI) of a receptor.	
Receptor Resilience (RR)	<i>The intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention.</i>
Site Ecological Importance (SEI) is a function of Biodiversity Importance (BI) and Receptor Resilience (RR)	

3. ANIMAL SPECIES THEME

3.1. Animal species with a distribution that includes the project area

The Western Cape is host to approximately 62 amphibian species, 155 reptile species and 172 mammal species (Birss, 2017; Shaw & Waller, 2017; Turner & Villiers, 2017). The project area is within or partly within the distribution range of approximately 12 amphibian species, 62 reptile species and 108 mammal species (IUCN, 2023).

Of these, 8 amphibian species, 36 reptile species and 58 terrestrial mammal species have been recorded within the same quarter degree square (QDS 3218CC, 3218CD) as the site (Figure 3.1) (FitzPatrick, 2023).

It is important to note that although an area may be within a species distribution, the species may no longer inhabit the area or may not inhabit it permanently due to a lack of available habitat. For example, the Bontebok has a distribution which includes the project area, but these animals no longer occur outside of reserves and private game farms. Both the QDS¹ (16,331ha) and pentad² (7,083ha) may include habitat features that are not present within the project area or within the PAOI, therefore, a species may occur in the broader area where habitat is available but since its preferred habitat is not present in the project area, it is unlikely to occur there.

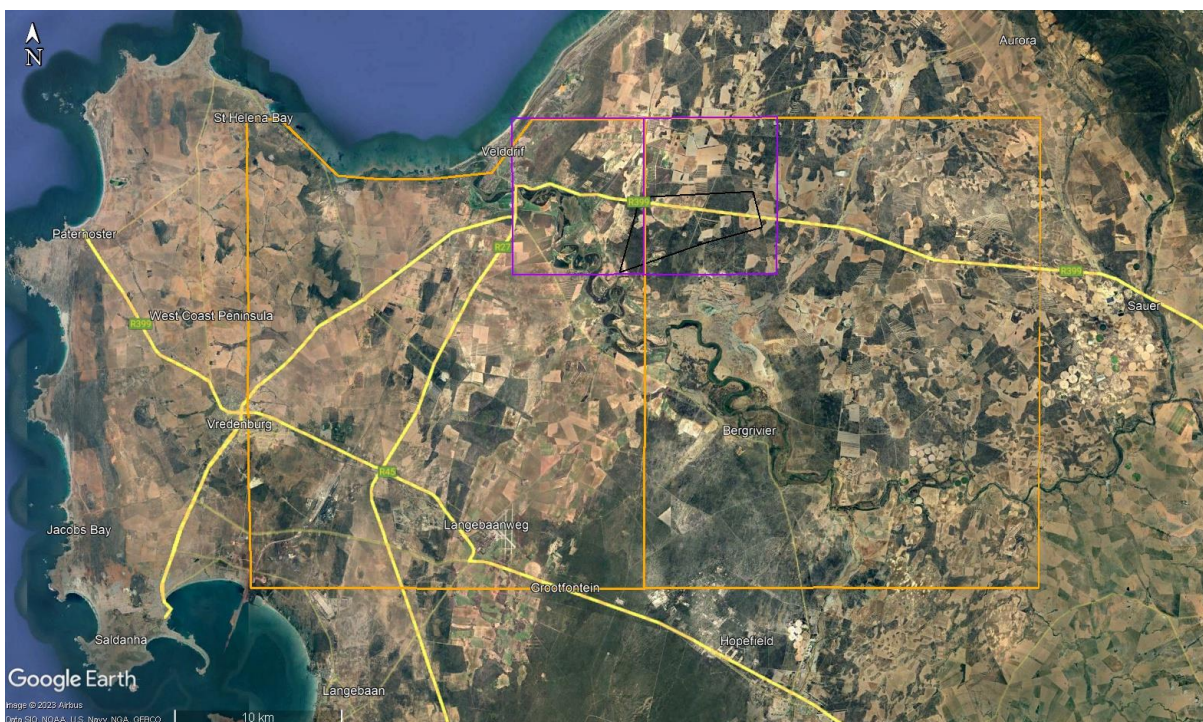


Figure 3.1: QDS 3418BA (orange) and pentad 3400/5_1830 (purple) in relation to the project options

¹ QDS: A spatial reference mapping system that divides longitude latitude square cells into smaller squares (quarters) for ease of locational reference, effectively, forming a system of geocodes.
² Pentad: A spatial reference mapping system that creates a coordinate grid of 5-minute x 5-minute.

3.2. Faunal habitats and species recorded in the project area

Four habitats were recorded during the field survey, namely, Strandveld, wetland/ponds, agricultural fields and transformed areas with trees. Animal species observed within these habitats, during the field survey, include Steenbok (n=2), Angulate Tortoise (n=4) and shells (n=2), Marbled Leaf-toed Gecko (n=3), Mole-rat mounds, spoor of a Mongoose, Porcupine burrow, tadpoles and subsurface tunnel of a Golden Mole species.

Since two Golden-mole species have a distribution which includes the project area (the Cape Golden Mole (LC) and the Grant's Golden Mole (VU)), the precautionary principle has been applied and it is assumed that both occur within the project area³.

Within the project area, stocked animals include sheep, cattle and ostrich and in the game section, south of the project area, the landowner reported Sable, Roan and Buffalo are kept. He also confirmed that Caracal and Jackal are present throughout the PAOI.

3.3. Fauna SCC distribution in relation to the project area

Faunal species of conservation concern are those listed as threatened, near-threatened and/or are endemic or range restricted. The Western Cape hosts several terrestrial vertebrate species of conservation concern (Turner & Villiers, 2017) of which four have a distribution which includes the project area. This includes one amphibian species, one reptile species and two mammal species (Table 3.1). An additional three reptile and one mammal SCC are worth mentioning given the proximity of their distribution to the project area (Table 3.2).

The likelihood of these species occurring in the project area was assessed in Table 3.3 below. Three species, the Cape Caco (*Cacosternum capense*), Kasner's Dwarf Burrowing Skink (*Scelotes kasneri*) and Grant's Golden Mole (*Eremitalpa granti*) have a high likelihood of occurrence, two a moderate likelihood of occurrence and three a low likelihood of occurrence.

Table 3.1: Faunal SCC that have a distribution which includes the project area.

Taxon	Common name	Species	Threat status	Likelihood of Occurrence	Importance of project area to SCC
Amphibian	Cape Caco	<i>Cacosternum capense</i>	NT	High	Medium
Reptile	Kasner's Dwarf Burrowing Skink	<i>Scelotes kasneri</i>	EN	High	Medium
Mammal	Grant's Golden Mole	<i>Eremitalpa granti</i>	VU	High	Medium
	African Clawless Otter	<i>Aonyx capensis</i>	NT	Low	Low

³ Photographs of the shallow subsurface tunnels that were observed have been placed on iNaturalist (<https://www.inaturalist.org/observations/177161114>).

Table 3.2: Faunal SCC whose distribution does not include the project area but occur near-by.

Taxon	Common name	Species	Threat status	Likelihood of Occurrence	Importance of project area to SCC
Reptile	Speckled Dwarf Tortoise	<i>Chersobius signatus</i>	EN	Low	Low
	Gronovi's Dwarf Burrowing Skink	<i>Scelotes gronovii</i>	NT	Moderate	Low
	Gray's Dwarf Legless Skink	<i>Acontias grayi</i>	NT	Moderate	Low
Mammal	Black-footed Cat	<i>Felis nigripes</i>	VU	Low	Low

Table 3.3: Faunal SCC with a distribution that includes the project area and the likelihood of occurrence within the project area.

*The Species Environmental Assessment Guideline (SANBI, 2020) specifies the likelihood of occurrence as Low, Moderate and High.

*For the purpose of this assessment Low=Unlikely to occur, Moderate=Possible occurrence and High = Probable occurrence.

Species	Threat Status	Distribution includes or partly includes the project area	Preferred habitat available in project area	Species records FrogMAP/ ReptileMAP/ MammalMAP	Likelihood of Occurrence in project area*	Justification
AMPHIBIAN						
Cape Caco <i>Cacosternum capense</i>	NT	✓	✓	✓	High Wetland/ Impoundment habitat	The project area falls within the known distribution range of this species, suitable, preferred habitat (wetland/impoundment) is present and there are records of this species within the broader project area. As such, the likelihood of occurrence is high within the wetland/impoundment habitat. However, it should be noted that these areas have been delineated and project infrastructure has been placed to avoid these areas and the recommended buffers. As such, impacts on this species will be negligible.
REPTILES						
Kasner's Dwarf Burrowing Skink <i>Scelotes kasneri</i>	EN	✓ EOO: 4480 km ²	✓	✓	High Strandveld	The project area falls within the known distribution range of this species, suitable, preferred habitat (Strandveld) is present and there are records of this species within the broader project area. As such, the likelihood of occurrence is high.
Gronovi's Dwarf Burrowing Skink <i>Scelotes gronovii</i>	NT	X EOO: 7810 km ²	✓	✓ 2017	Medium Strandveld	The project area falls just outside of the known distribution range of this species however, suitable, preferred habitat (Strandveld) is present and there are records of this species within the broader PAOI. As such, the likelihood of occurrence within the project area is medium.
Gray's Dwarf Legless Skink <i>Acontias grayi</i>	NT	X EOO: 5040 km ²	✓	✓ 1997	Medium Shrubland	The project area falls just outside of the known distribution range of this species however, suitable, preferred habitat (Strandveld) is present and there are records of this species within the broader PAOI. As such, the likelihood of occurrence within the project area is medium.
Speckled Dwarf Tortoise	EN	X	X	X	Low	The project area falls just outside of the known distribution range of this species and although Strandveld vegetation is

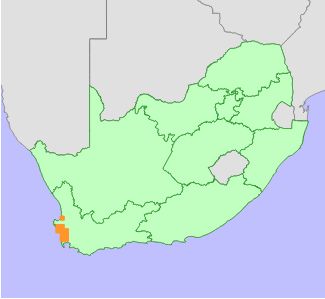
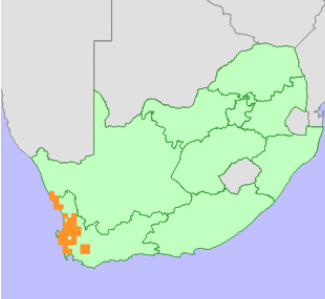

<i>Chersobius signatus</i>						present, no rocky habitat such as crevices, boulders or rocky slabs are present and there are no known records of this species within the broader PAOI. As such, the likelihood of occurrence is low.
MAMMALS						
Grant's Golden Mole <i>Eremitalpa granti</i>	VU	✓ EEO: 152000km ² AEO: 112 km ²	✓	✓	High Strandveld	The project area falls within the known distribution range of this species, suitable, preferred habitat (Strandveld) is present, there are records of this species within the broader PAOI and there were shallow burrows present that belong either to Grant's Golden Mole or the Cape Golden Mole. As such, the likelihood of occurrence is high.
Black-footed Cat <i>Felis nigripes</i>	VU	X	X	✓ 1907	Low	The project area falls just outside of the known distribution range of this species and suitable habitat (Savanna, Grassland, Desert) is not present. The last known record within the broader project area is from 1907. As such, the likelihood of occurrence is low.
African Clawless Otter <i>Aonyx capensis</i>	NT	✓	X	✓ 2018	Low	Although the project area falls within the known distribution this species and it has been recorded within the PAOI, the project area DOES NOT contain the preferred habitat for this species. It is likely to utilise the Berg River to the south of the project area. As such, the likelihood of occurrence within the project area is low.



4. PLANT SPECIES THEME

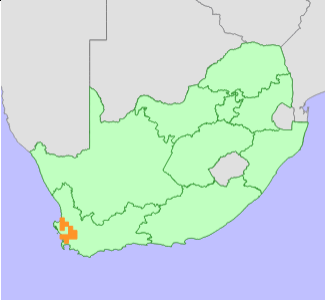
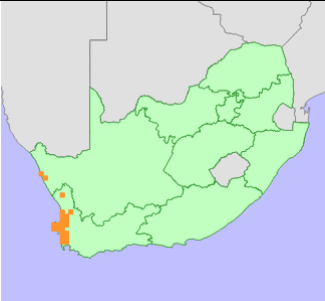

Fifty-eight (58) species were recorded within the project area (refer to Appendix 1 for a list of species confirmed to occur within the PAOI). Of these species, one was listed as Endangered (EN), two as Vulnerable (VU) and one as Near Threatened (NT). These species were present within the near-intact vegetation except for a population of *Leucospermum rodolentum* (VU) which were found to occur within the secondary vegetation, north of the R399.




A desktop assessment of the project area identified thirty-seven (37) threatened and near threatened species that could occur within the project area. Based on the results of the field survey, it was determined that of these thirty-seven (37) species, two (2) were confirmed to occur in the project area, ten (10) have a high likelihood of occurrence based on suitable available habitat being present, three (3) have a moderate likelihood of occurrence and twenty-four (24) have a low likelihood of occurrence (Table 4.1).

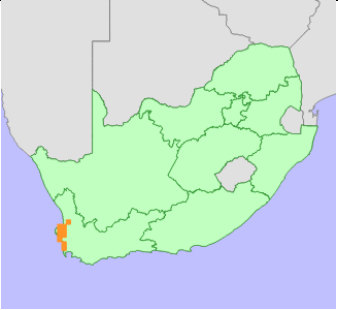

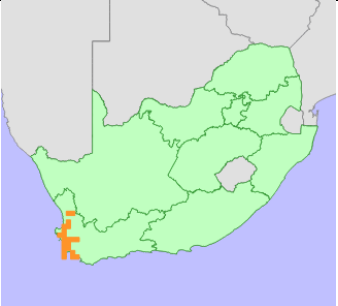
Table 4.1: Assessment of the likelihood of occurrence of SCC identified in the literature as possibly occurring within the project area.



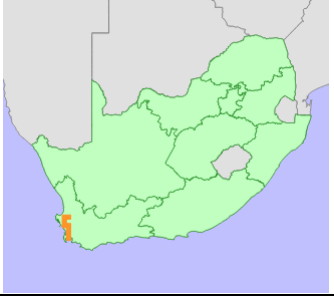
Family	Species	Conservation Status	Range and Habitat	Distribution	Likelihood of Occurrence
-	Sensitive species 878	EN B1ab(i,ii,iii,iv,v)	<p>This species occurs from Milnerton to Vredenburg Peninsula and has an EOO 840-1400 km². It is extinct in the southern part of the range.</p> <p>It occurs in sand plain fynbos and dune strandveld, sandy coastal flats and dunes (von Staden, 2008).</p> <p>There are records of this species on iNaturalist near Hopefield, Langebaan, St Helena Bay and Jacobsbaai. There is also a record north east of the project area.</p>		<p>Confirmed</p> <p>This species was recorded within the project area</p>
Proteaceae	<i>Leucospermum rodolentum</i>	VU A2c	<p>This species occurs from Namaqualand to the Cape Peninsula. The EOO for this species is not specified.</p> <p>It is associated with sand fynbos on the west coast lowlands, surviving in arid areas by tapping deep water. Saldanha Flats Strandveld is one of the major habitats of this species (Rebelo <i>et al.</i>, 2005).</p>		<p>Confirmed</p> <p>This species was recorded within the project area</p>
Amaranthaceae	<i>Sarcocornia freitagii</i>	EN B1ab(ii,iii,iv,v)+ 2ab(ii,iii,iv,v)	<p>This species occurs in Velddrif (Western Cape Province) and has a small EOO of 103 km².</p> <p>It is known from five locations and is associated with heavy sandy, clayey soils possibly derived from calcrete within Saldanha Flats Strandveld (Steffen <i>et al.</i>, 2014).</p>		<p>High</p> <p>Suitable habitat was present.</p>


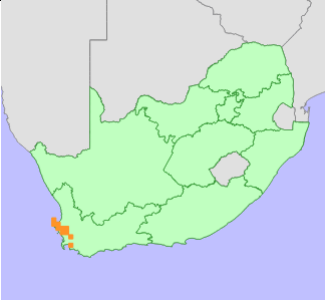
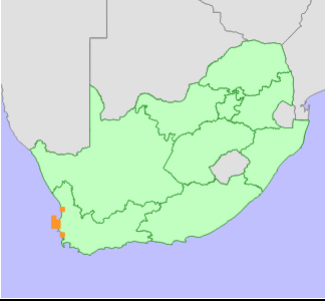
Family	Species	Conservation Status	Range and Habitat	Distribution	Likelihood of Occurrence
Fabaceae	<i>Xiphotheca reflexa</i>	EN A2bc; B1ab(i,ii,iii,iv,v)	<p>This species occurs from Piketberg to Elim (Western Cape Province) and has an EOO of 2389 km².</p> <p>It is known from seven small, severely fragmented populations and is associated with sandy fynbos. Saldanha Flats Strandveld is one of the major habitats of this species (Victor <i>et al.</i>, 2005).</p> <p>There is a record of this species on iNaturalist near Langebaan.</p>		<p>High</p> <p>Suitable habitat was present.</p>
Iridaceae	<i>Ferraria parva</i>	EN C2a(i)	<p>This species occurs on the Vredenburg Peninsula (Western Cape Province) with a small EOO of 336 km².</p> <p>It is known from eight subpopulations and is associated with deep sandy ground, sand over limestone, and crevices in limestone or calcrete pavement within Saldanha Limestone Strandveld and Saldanha Flats Strandveld (von Staden and Claassens, 2012).</p> <p>There are records of this species on iNaturalist near Langebaan and south east of the project area.</p>		<p>High</p> <p>Suitable habitat was present.</p>



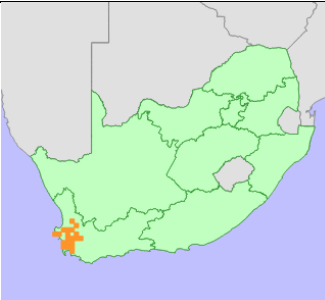
Family	Species	Conservation Status	Range and Habitat	Distribution	Likelihood of Occurrence
Proteaceae	<i>Leucadendron stellare</i>	EN A2c	<p>This species is endemic to the coastal lowlands of the Western Cape, where it occurs from Aurora to Cape Flats (Western Cape Province). The EOO of this species is not specified.</p> <p>It occurs in level, dry sands over clay, 30-170 m (Rebelo <i>et al.</i>, 2018).</p> <p>There are records of this species on iNaturalist near Sauer and south of the project area.</p>		High Suitable habitat was present.
Fabaceae	<i>Argyrobium velutinum</i>	VU A2c	<p>This species occurs from Namaqualand to the Cape Flats and has an EOO of 29 500 km².</p> <p>It is associated with alkaline coastal sands in Sandveld and sandveld-stranveld ecotones. Saldanha Flats Strandveld is one of the major habitat types of this species (Helme <i>et al.</i>, 2016).</p> <p>There are records of this species on iNaturalist near Jacobsbaaisouth east of the project area.</p>		High Suitable habitat was present.
Hemerocallidaceae	<i>Caesia sabulosa</i>	VU B1ab(ii,iii,iv,v)	<p>This species occurs from Southern Namaqualand, Kotzesrus to the Bokkeveld Plateau and the Cederberg, and southwards along the West Coast coastal plain to Darling. It has an EOO of 2200 km² and is known from less than 10 locations.</p> <p>It occurs on deep sandy flats (Helme and Raimondo, 2007).</p>		High Suitable habitat was present.


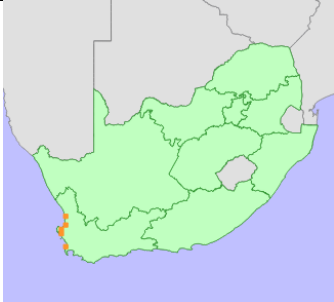
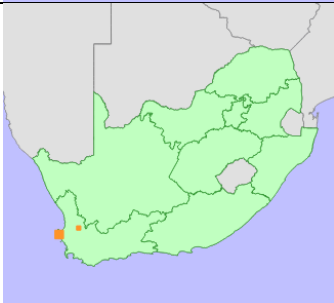
Family	Species	Conservation Status	Range and Habitat	Distribution	Likelihood of Occurrence
			There is a record of this species on iNaturalist near Langebaan.		
Asteraceae	<i>Cotula duckittiae</i>	VU B1ab(ii,iii)	<p>This species occurs from Yzerfontein to Bokbaai and has an EOO of 650 km².</p> <p>It is known from only 10 locations and is associated sandy flats (Helme, 2006).</p> <p>There is a record of this species on iNaturalist south of the project area.</p>		High Suitable habitat was present.
Proteaceae	<i>Leucadendron foedum</i>	VU A2c	<p>This species occurs from Piketberg to Hopefield. The EOO for this species is not specified.</p> <p>It is associated with sandy flats at 30-100m (Rebello <i>et al.</i>, 2006).</p> <p>There are records of this species on iNaturalist near Hopefield and north of Aurora.</p>		High Suitable habitat is present.
Proteaceae	<i>Leucospermum hypophyllocarpodendron subsp. canaliculatum</i>	VU A2c	<p>This species occurs from Piketberg to Hopefield, Cape Flats, Riebeek-Kasteel and Breede River Valley.</p> <p>It has an EOO of 4365 km², AOO 426 km² and is only known from six locations.</p> <p>This species occurs on flats with deep sandy soils (0-200 m).</p> <p>There are records of this species on iNaturalist near Hopefield and Langebaan.</p>		High Suitable habitat is present.


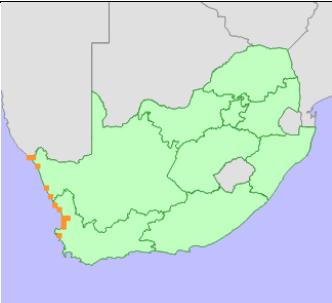
Family	Species	Conservation Status	Range and Habitat	Distribution	Likelihood of Occurrence
Asteraceae	<i>Oncosiphon africanum</i>	VU B1ab(ii,iii,iv,v)	<p>This species occurs from the Berg River Mouth to the Cape Peninsula It has an EOO of 4800 km² and is known from fewer than 10 locations.</p> <p>It is associated with coastal sands, salt marshes and inland sandy areas (Helme <i>et al.</i>, 2007).</p> <p>There are records of this species on iNaturalist in Langebaan as well as south and north of the project area.</p>		High Suitable habitat is present.
Proteaceae	<i>Leucadendron cinereum</i>	VU A2c+3c+4c	<p>This species occurs from the Berg River mouth to Kraaifontein. The EOO for this species is not specified.</p> <p>It is associated with flats within Sand Fynbos. Major habitats include Saldanha Flats Strandveld, Swartland Silcrete Renosterveld, Cape Flats Sand Fynbos, Atlantis Sand Fynbos, and Hopefield Sand Fynbos (Rebello <i>et al.</i>, 2004).</p> <p>There are records of this species on iNaturalist near Langebaan.</p>		Moderate Suitable habitat is present.
Proteaceae	<i>Protea scolymocephala</i>	VU A2c	<p>This species occurs from Gifberg to Hermanus. The EOO of this species is not specified.</p> <p>It is associated with sandy flats and coastal lowlands, often near drainage lines (0-400 m) (Rebello <i>et al.</i>, 2005).</p>		Moderate No suitable habitat present.

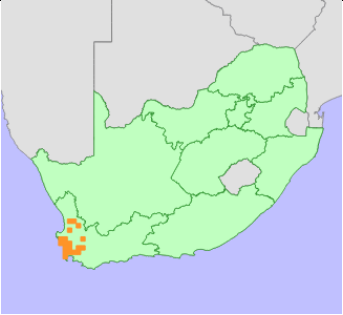
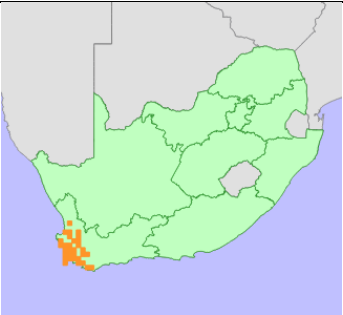

Family	Species	Conservation Status	Range and Habitat	Distribution	Likelihood of Occurrence
-	Sensitive species 222	VU	<p>The range of this species is not specified due to sensitivity of this species but endemic to the Western Cape Province. EOO 12 000 km² and known from less than 10 locations.</p> <p>This species is associated with sandy or clay flats (Helme and Raimondo, 2007).</p>		<p>Moderate</p> <p>Although suitable habitat is present, given how few locations remain it is unlikely to be present within the project area.</p>
Aizoaceae	<i>Lampranthus coccineus</i>	CR C2a(i)	<p>This species occurs from Graafwater to Saldanha and Darling (Western Cape Province) and has an EOO 1063 km².</p> <p>It is only known from five small, isolated subpopulations and is associated with seasonally moist sandy flats and lowland shale (Klak <i>et al.</i>, 2016).</p>		<p>Low</p> <p>No suitable habitat present.</p>
Aizoaceae	<i>Cleretum clavatum</i>	EN B1ab(i,ii,iii,iv,v)	<p>This species is endemic to the Western Cape Province occurring from Hopefield to Cape Flats with an EOO of 1855 km². Only 3 of 10 known locations remain.</p> <p>It is associated with seasonally wet sands (Klak and Raimondo, 2006).</p>		<p>Low</p> <p>No suitable habitat present.</p>




Family	Species	Conservation Status	Range and Habitat	Distribution	Likelihood of Occurrence
Aizoaceae	<i>Erepsia brevipetala</i>	EN B1ab(ii,iii,v)	<p>This species occurs from Piketberg to Hopefield (Western Cape Province) and has an EOO<1000 km².</p> <p>It is only known from three known locations and is associated with white clay slopes near watercourses (Helme <i>et al.</i>, 2006). There is a record of this species north east of Hopefield.</p>		Low No suitable habitat present.
Boraginaceae	<i>Echiostachys spicatus</i>	EN B1ab(ii,iii,iv,v)	<p>This species occurs from St. Helena Bay to Somerset West (Western Cape Province) and has an EOO 1700 km².</p> <p>It is known from six severely fragmented subpopulations and occurs in seasonally damp sandy flats overlying clays in Saldanha Flats Strandveld, Swartland Granite Renosterveld, Swartland Silcrete Renosterveld, Cape Flats Sand Fynbos, Atlantis Sand Fynbos, Hopefield Sand Fynbos (Helme and Raimondo, 2007).</p> <p>There are records of this species on iNaturalist near Vredenberg, Langebaan and south of Hopefield.</p>		Low No suitable habitat present.
Hypoxidaceae	<i>Empodium veratrifolium</i>	EN B1ab(ii,iii,iv,v)	<p>This species occurs from Lambert's Bay to Saldanha Bay (Western Cape Province) and has an EOO<500 km².</p> <p>It is known from less than 15 subpopulations and is associated granite boulders but occasionally also on calcrete usually within coastal areas (Helme and Raimondo, 2005).</p>		Low No suitable habitat present.

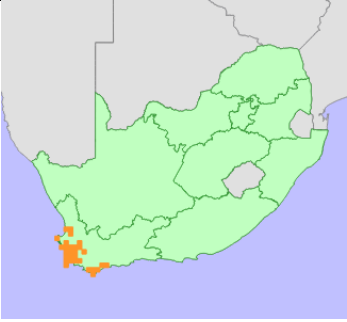
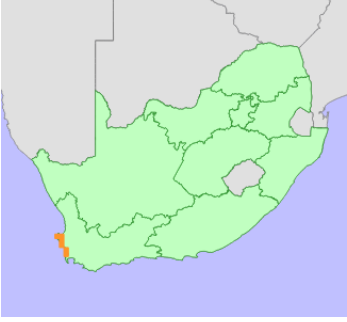
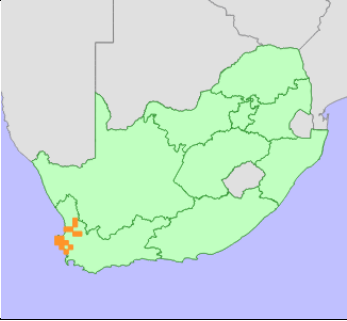
Family	Species	Conservation Status	Range and Habitat	Distribution	Likelihood of Occurrence
			There are record of this species on iNaturalist near Langebaan, Vredenburg, Saldanha and St Helena Bay.		
Plumbaginaceae	<i>Limonium depauperatum</i>	EN B1ab(i,ii,iii,iv)	<p>This species occurs from the Cape Flats up the West Coast and has an EOO<5000 km².</p> <p>It is known from four locations which are all declining. It is associated with river and estuary banks in Saldanha Flats Strandveld and Cape Flats Sand Fynbos (Victor and Mucina, 2004).</p>		<p>Low</p> <p>Suitable habitat not present within the project area.</p>
Asteraceae	<i>Cotula eckloniana</i>	VU B1ab(iii,v)+2ab(iii,v)	<p>This species occurs from Lambert's Bay southwards along the Cape West Coast to the Cape Peninsula and Agulhas Plain.</p> <p>It has an EOO of 8587 - 18 685 km² and AOO of <100 km². It is only known from seven (7) confirmed locations but up to 15 locations possible.</p> <p>It is associated with saline alluvium floodplains, salt pans and sandy coastal flats (Powell <i>et al.</i>, 2013).</p>		<p>Low</p> <p>Suitable habitat is not present.</p>
Aizoaceae	<i>Drosanthemum hispifolium</i>	VU B1ab(ii,iii,iv,v)	<p>This species occurs from Clanwilliam to Koeberg and has an EOO 14 400 km².</p> <p>It is known from eight (8) locations remain and is associated with lowland hills or flats in loamy shale (Klak <i>et al.</i>, 2006).</p>		<p>Low</p> <p>Suitable habitat is not present.</p>



Family	Species	Conservation Status	Range and Habitat	Distribution	Likelihood of Occurrence
Iridaceae	<i>Ferraria densepunctulata</i>	VU C2a(i)	<p>This species occurs from Lambert's Bay to Langebaan and is known from between six and eight remaining subpopulations with less than 1000 mature individuals remaining.</p> <p>It is associated with rocky or calcareous sandy sites near the coast, as well as limestone pavements on the Vredenburg Peninsula (von Staden and Claassens, 2012).</p>		<p>Low</p> <p>Suitable habitat is not present.</p>
Aizoaceae	<i>Galenia crystallina</i> var. <i>maritima</i>	VU B1ab(iii)	<p>This species occurs from Lambert's Bay to the Cape Peninsula and has an EOO of 3580 km².</p> <p>It is known from between five to ten locations and is associated with damp hollows in silt near the sea (von Staden, 2016).</p>		<p>Low</p> <p>Suitable habitat is not present.</p>
Iridaceae	<i>Geissorhiza lewisiae</i>	VU B1ab(i,ii,iii,iv,v) +2ab(i,ii,iii,iv,v)	<p>This species occurs from Olifants River Valley to the Vredenburg Peninsula and has an EOO of 2 082 km².</p> <p>It is known from between five and nine locations and is associated with granite outcrops, limestone pavements and calcrete soils in Saldanha Flats Strandveld, Saldanha Granite Strandveld, and Citrusdal Shale Renosterveld (von Staden, 2011).</p>		<p>Low</p> <p>Suitable habitat is not present.</p>

Family	Species	Conservation Status	Range and Habitat	Distribution	Likelihood of Occurrence
Asteraceae	<i>Helichrysum bachmannii</i>	VU B1ab(iii,iv,v)+ 2ab(iii,iv,v)	<p>This species occurs in a small area between Langebaan, Velddrif and Vredenburg on the West Coast</p> <p>It has a small EOO of 716 km² and is known from four locations although it is suspected that there is a minimum of five more.</p> <p>It occurs on granite outcrops and in sandy soils within Saldanha Granite Strandveld, Saldanha Flats Strandveld, and Langebaan Dune Strandveld near the coast (Helme and Raimondo, 2010).</p> <p>There are records of this species on iNaturalist near St. Helena Bay and Jacobsbaai.</p>		<p>Low</p> <p>Suitable habitat is not present.</p>
Asteraceae	<i>Helichrysum dunense</i>	VU B1ab(ii,iii,v)	<p>This species occurs from Elandsbaai in the Western Cape to the Orange River in the Northern Cape. It has an EOO of 1500 km² and is known from five locations but suspected to be under collected and to occur from around 10 locations.</p> <p>It is associated with coastal calcareous dunes (Helme and Raimondo, 2006).</p>		<p>Low</p> <p>Suitable habitat is not present.</p>

Family	Species	Conservation Status	Range and Habitat	Distribution	Likelihood of Occurrence
Thymelaeaceae	<i>Lachnaea capitata</i>	VU A2ac	<p>This species occurs from Clanwilliam to the Cape Peninsula, Franschhoek and the Breede River Valley. The EOO for this species is not specified.</p> <p>It is associated with acid sand flats that are often seasonally damp (Beyers <i>et al.</i>, 2006).</p> <p>There are records of this species on iNaturalist near Hopefield.</p>		Low Suitable habitat is not present.
Thymelaeaceae	<i>Lachnaea grandiflora</i>	VU A2ac	<p>This species occurs from Swartboskraal in Clanwilliam to the Cape Peninsula and Bredasdorp. The EOO for this species is not specified.</p> <p>It is associated with sandy flats and sandy areas on lower mountain slopes within Fynbos. Saldanha Flats Strandveld is one of the major habitat types of this species (Raimondo and Helme, 2008).</p> <p>There are records of this species on iNaturalist near Hopefield and Grootfontein.</p>		Low Suitable habitat is not present.
Plumbaginaceae	<i>Limonium acuminatum</i>	VU A2c; B1ab(iii,iv,v)+ 2ab(iii,iv,v); C1	<p>This species occurs from Rocher Pan to Yzerfontein.</p> <p>It has an EOO of 1200 km² and is associated with coastal limestone outcrops and occasionally on calcareous coastal sands in Langebaan Dune Strandveld, Saldanha Limestone Strandveld, Saldanha Flats Strandveld, and Saldanha Granite Strandveld (Helme <i>et al.</i>, 2005).</p>		Low No suitable habitat present.

Family	Species	Conservation Status	Range and Habitat	Distribution	Likelihood of Occurrence
Scrophulariaceae	<i>Manulea corymbosa</i>	VU B1ab(ii,iii,iv,v)+ 2ab(ii,iii,iv,v)	This species occurs from Velddrif to the Cape Peninsula and has an EOO <1880 km ² . It occurs on sandy soils near the coast (Turner, 2007). There are records of this species on iNaturalist in the West Coast National Park.		Low No suitable habitat present..
Fabaceae	<i>Otholobium venustum</i>	VU B1ab(ii,iii,v)+ 2ab(ii,iii,v)	This species occurs from Lambert's Bay to Langebaan and has an EOO and AOO<1000 km ² . It is known from eight locations. This species is associated with calcareous sands and clays within 3 km of the coast (Helme and Raimondo, 2005).		Low No suitable habitat present.
-	Sensitive species 1225	VU A2c	This species occurs from Lambert's Bay to Melkbosstrand, and inland to Citrusdal, Piketberg, Tulbagh and Kalbaskraal. It has an EOO of 17 789 km ² and is associated with the coastal lowlands on stony or gravelly clay soil derived from shale or granite on lower slopes and flats within Fynbos (Helme <i>et al.</i> , 2018).		Low Suitable habitat is not present.

Family	Species	Conservation Status	Range and Habitat	Distribution	Likelihood of Occurrence
-	Sensitive species 599	VU A2c	<p>This species occurs from Elandsbaai to the Cape Peninsula and Bredasdorp. It has an EOO of 28 608 km² and AOO estimated <2000 km² and is estimated to occur between 20 and 30 locations.</p> <p>This species is a habitat specialist that occurs on damp sandy flats on wetland margins and floodplains within Fynbos (Helme and von Staden, 2018).</p>		Low No suitable habitat present.
-	Sensitive species 816	CR B2ab(ii,iii,iv,v); C2a(i)	<p>This species occurs from Saldanha to Milnerton and has a small AOO of 5 km². Three small, severely fragmented subpopulations each consisting of no more than 50 mature individuals are known.</p> <p>This species is associated with calcareous sands or limestone gravel within coastal scrubs (Goldblatt <i>et al.</i>, 2006).</p> <p>There are records of this species on iNaturalist near Langebaan and Vredenburg.</p>		Low No suitable habitat present.
-	Sensitive species 244	VU B1ab(ii,iii,iv,v)	<p>This species occurs from Lamberts Bay to Yzerfontein and inland to Redelinghuys and Hopefield. It has an EOO of 3500 km² and is known from 10 known locations.</p> <p>It is associated with limestone and granite outcrops (Helme and Raimondo, 2008).</p>		Low Suitable Habitat is not present.

Family	Species	Conservation Status	Range and Habitat	Distribution	Likelihood of Occurrence
Asteraceae	<i>Steirodiscus tagetes</i>	VU B1ab(ii,iii,iv,v)	<p>This species occurs along the Cape West Coast between St Helena Bay and False Bay. It has an EOO of 5325 km² and is known from six to eight remaining locations.</p> <p>It is associated with sand dunes near the coast (Raimondo <i>et al.</i>, 2016).</p>		<p>Low</p> <p>No suitable habitat present.</p>
Campanulaceae	<i>Wahlenbergia umbellata</i>	VU D2	<p>This species is only known from one location in Lambert's Bay. The EOO of this species is not specified.</p> <p>It is associated with coastal sands (Welman and Victor, 2005).</p>		<p>Low</p> <p>Project area does not occur in Lambert's Bay where the one known population occurs.</p>

5. TERRESTRIAL BIODIVERSITY THEME

5.1. Western Cape Biodiversity Spatial Plan

The Western Cape Biodiversity Spatial Plan (WCBSP, 2017) maps biodiversity priority areas, including Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) which require safeguarding to ensure the persistence of biodiversity and ecosystems functioning, through a systematic conservation planning process.

CBA's are defined as *“areas of high biodiversity and ecological value and need to be kept in a natural or near-natural state, with no further loss of habitat or species”* (WCBSP Handbook, 2017). The provided map distinguishes between CBA 1 areas, which are those that are likely to be in a natural condition, and CBA 2 areas, which are areas that are potentially degraded or represent secondary vegetation.

ESA's are *“Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of Protected Areas (Pas) or CBAs and are often vital for delivering ecosystem services. They support landscape connectivity, encompass the ecological infrastructure from which ecosystem goods and services flow, and strengthen resilience to climate change.”* ESA's should be maintained in a functional and natural state although some habitat loss may be acceptable. As with the CBAs, a distinction is made between ESA 1 that are areas in a natural, near natural or moderately degraded condition and ESA 2 which are degraded and need to be restored.

According to the WCBSP (2017), portions of the project area occur within a CBA1, CBA 2 and ESA 1 (Figure 5.1). The reason layer indicates that the spatial planning unit in which the project area occurs was designated as a CBA and ESA for the following reasons:

- Saldanha Flats Strandveld (EN)
- Watercourse Protection – South Western Coastal Belt

Comment has been provided on how the development will impact the features associated with these portions of the project area being listed as a CBA and ESA.

Table 5.1: CBA and ESA feature and comment.

Feature	Comment
Saldanha Flats Strandveld (EN)	This vegetation type was confirmed to occur within the project project area and has been mapped (Figure 5.4). Project infrastructure must avoid CBA 1 that overlap with near-intact Saldanha Flats Strandveld which has a SEI of Very High (refer to section 6.2). These areas must be considered a no-go area.
Watercourse protection- South Western Coastal Belt	Since this is an aquatic feature, the aquatic specialist must provide comment on how the development will affect this feature.

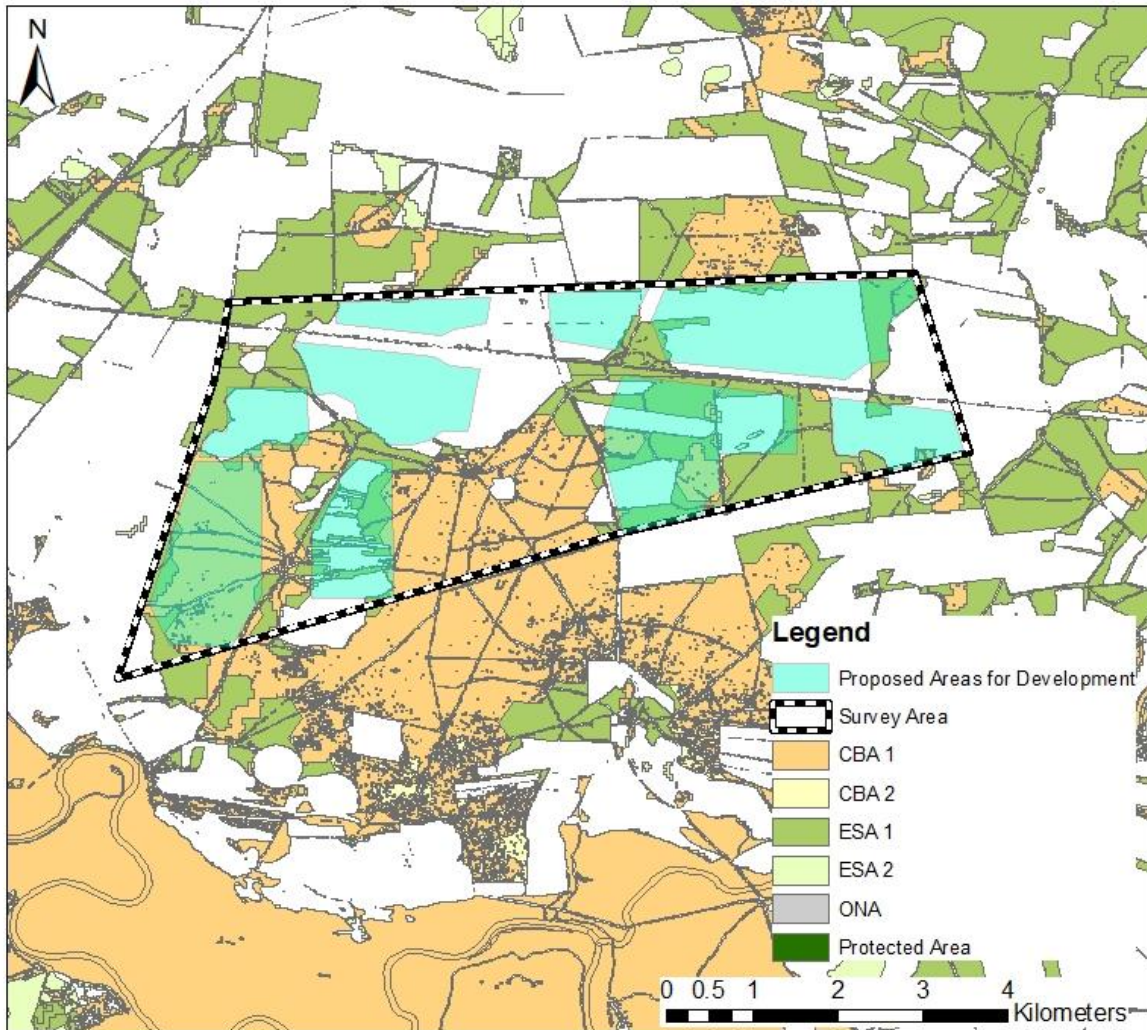


Figure 5.1: The project area in relation to the CBAs and ESAs

5.2. Vegetation Types Present

The national vegetation map presents vegetation types at a coarse scale. These are then refined based on the results of the site survey which identifies the actual vegetation type present within the project area.

According to the national vegetation map, the project area falls within Saldanha Flats Strandveld (Figure 5.2 and 5.3). This was confirmed by the field survey which identified patches of near-intact and degraded Saldanha Flats Strandveld present within the project area (Figure 5.4) as well as Secondary Vegetation and Transformed area. Each of these are described in further detail below.

5.2.1. Saldanha Flats Strandveld (Degraded and Near-Intact)

Saldanha Flats Strandveld occurs on extensive coastal flats (altitudes of 0-120 m) from St Helena Bay and the southern banks of the Great Berg River near its mouth in the north, to Saldanha and Langebaan in the south, with the southernmost extension at the coast near Yzerfontein and Rietduin. This sclerophyllous shrubland is characterised by a sparse emergent and moderately tall shrub layer and an open succulent shrub layer forming the undergrowth. This vegetation type is known for its conspicuous displays of geophytes and herbaceous flora in spring (Rebelo *et al.*, 2006) (Figure 5.5).

Within the project area, shrubs such as *Searsia glauca*, *Olea exasperate*, *Searsia laevigata*, *Searsia dissecta*, *Gymnosporia buxifolia* and *Euclea tomentosa* formed bush clumps surrounded by smaller shrubs, herbs and restios such as *Eriocephalus racemosus*, *Zygophyllum morgsana*, *Struthiola ciliata*, *Crassothonna cylindrica*, *Lycium amoena*, *Asparagus capensis*, *A. rubicundus*, *Salvia africana*, *Salvia lanceolata*, *Ruschia macowanii*, *Zygophyllum flexuosa*, *Gladiolus carinatus*, *Microlooma sagittatum*, *Euphorbia mauritanica*, a number of *Oxalis*, *Babiana* and *Lachenalia* species, as well as *Thamnochortus sp.* and *Wildenowia incurvata*.

The patches of degraded Saldanha Flats Strandveld had a lower species diversity than the near-intact patches.

Saldana Flats Strandveld is classified as Endangered (EN) (B1(i)) due to its narrow distribution and high rates of habitat loss in the past 28 years which has placed this ecosystem type at risk of collapse (DFFE, 2022). Only 36% (591.6 km²) of the historical extent remains and it is considered poorly protected. The conservation target for Saldanha Flats Strandveld is 24%.

5.2.2. Secondary Vegetation

A patches of Secondary Vegetation was present in the north eastern corner of the project area (Figure 5.6). This vegetation shows evidence of historical disturbance and was more heavily infested with alien invasive species such as *Acacia cyclops*. Species diversity was lower and comprised of species that were more resilient to disturbance such as annuals. However, a population of *Leucospermum rodolentum*, which is listed as a VU species, was recorded within this area.

5.2.3. Transformed Area

The Transformed areas are characterised by vegetation that has been cleared and the land has been ploughed and used for agricultural purposes (Figure 5.7). These areas are of low ecological significance but have been mapped as they are suitable for development from an ecological perspective.

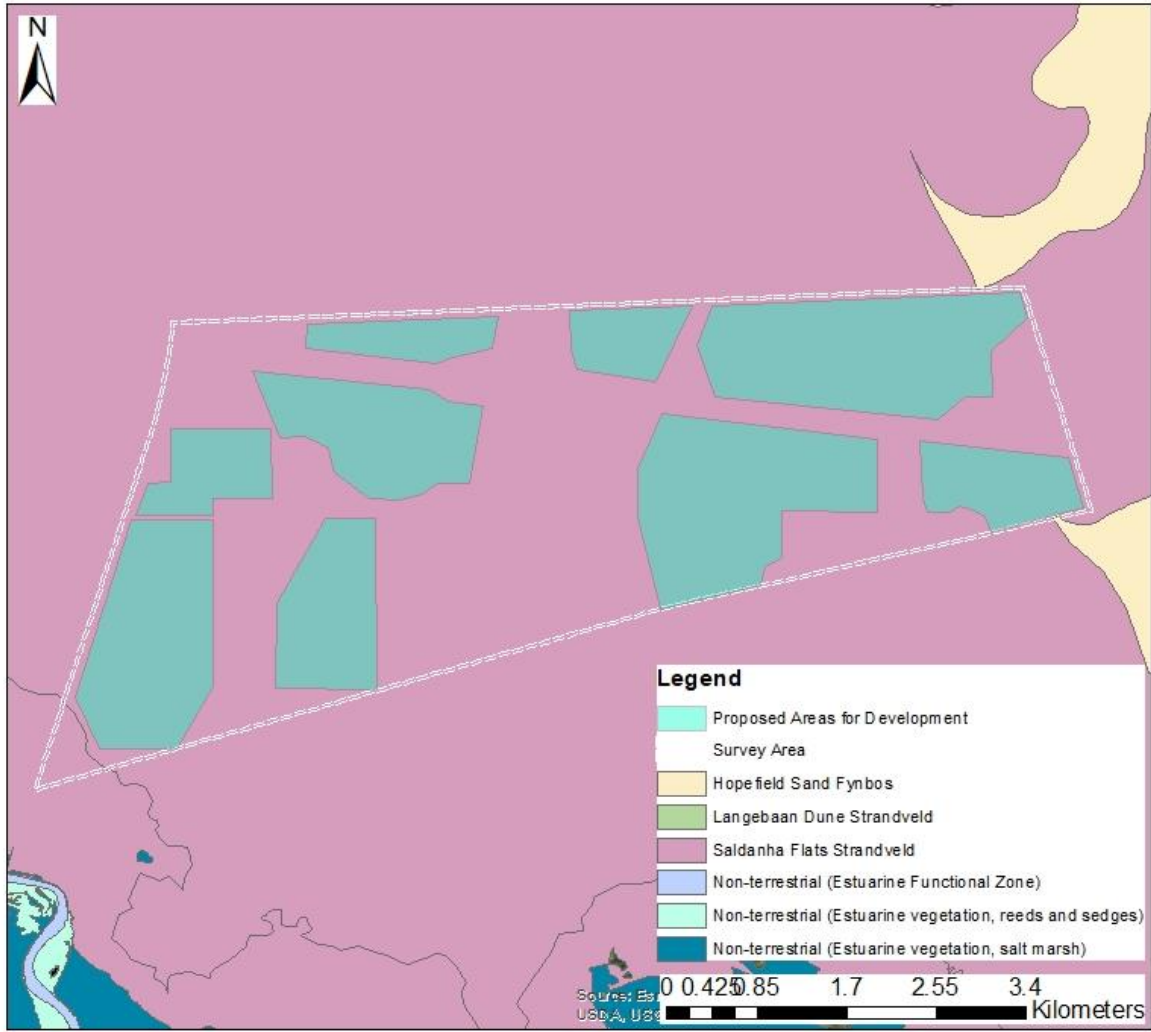


Figure 5.2: National Vegetation Map for the project area.

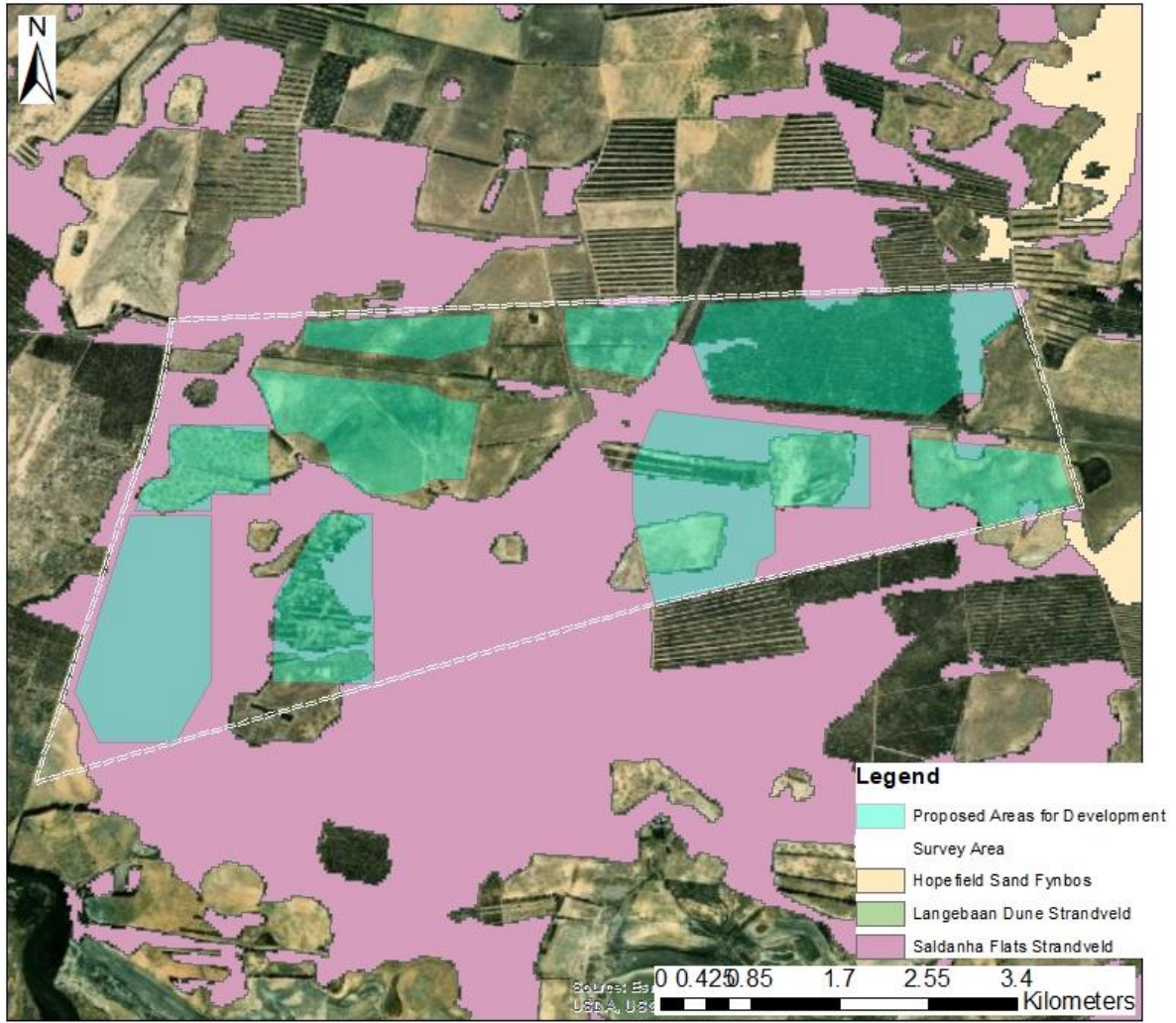


Figure 5.3: Map showing remnant patches of natural vegetation (SANBI, 2021).

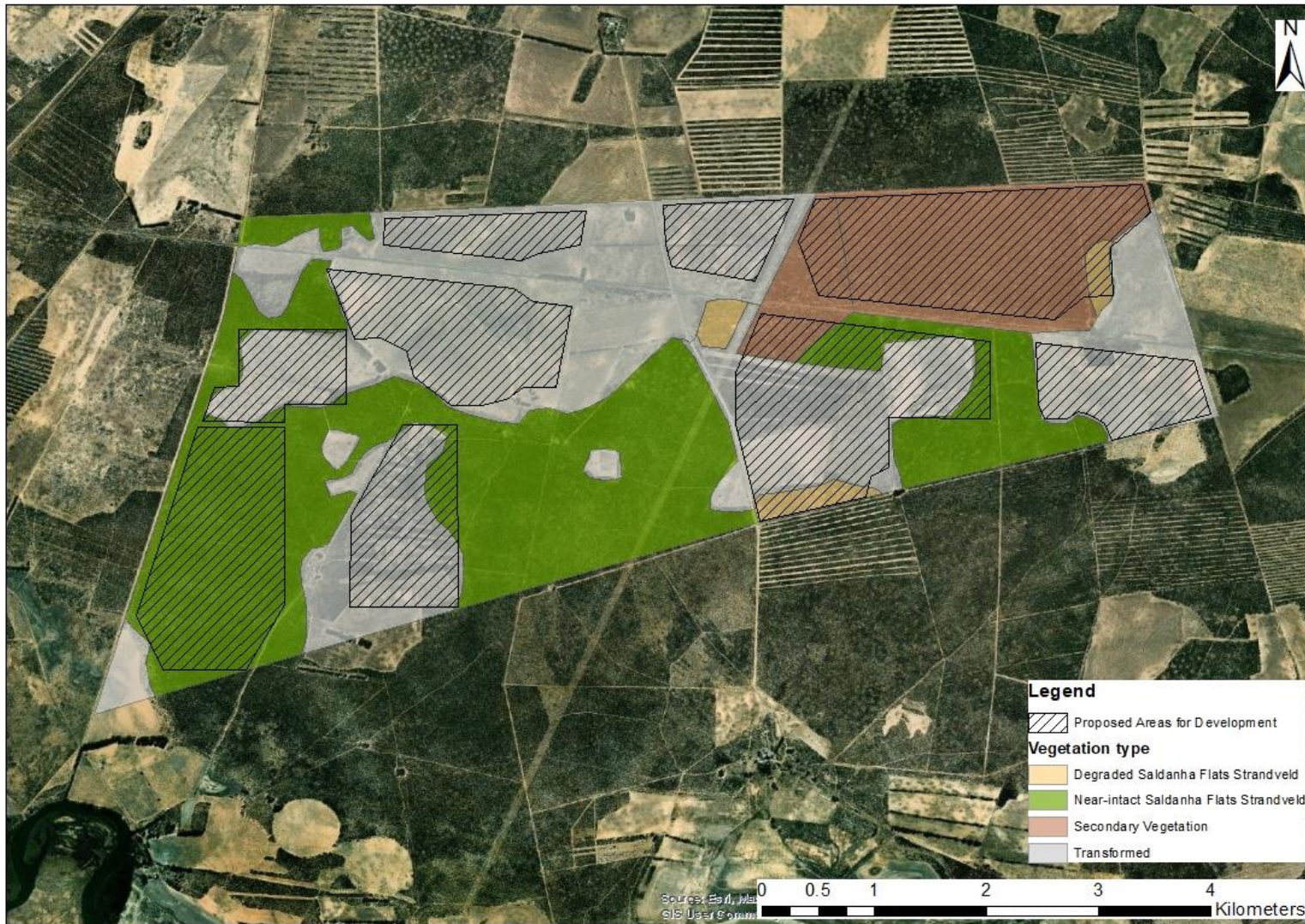


Figure 5.4: Vegetation Map for the project area based on the results of the field survey.



Figure 5.5: Photograph illustrating the Saldanha Flats Strandveld vegetation community present in the project area.



Figure 5.6: Photograph illustrating the Secondary vegetation present in the project area.



Figure 5.7: Photograph illustrating transformed areas

5.3. Protected Areas and National Protected Area Expansion Strategy

The South African Protected Areas Database (SAPAD) and the South African Conservation Areas Database (SACAD) is a spatial dataset that includes all the protected areas (PA) and conservation areas (CA) within South Africa. Data on privately owned PAs are also included in the dataset which is maintained and updated on a quarterly basis. This dataset therefore provides the most up to date information on protected areas and conservation areas in South Africa. According to SACAD and SAPAD (2023, Q1), the project area does not occur within or near to a protected area. However, the project does occur within the Cape West Coast Biosphere Reserve (Figure 5.8).

Biosphere reserves are ‘learning places for sustainable development’. They are sites for testing interdisciplinary approaches to understanding and managing changes and interactions between social and ecological systems, including conflict prevention and management of biodiversity. They are places that provide local solutions to global challenges. Biosphere reserves include terrestrial, marine and coastal ecosystems. Each site promotes solutions reconciling the conservation of biodiversity with its sustainable use.

Biosphere reserves are nominated by national governments and remain under the sovereign jurisdiction of the states where they are located. Biosphere Reserves are designated under the intergovernmental MAB Programme by the Director-General of UNESCO following the decisions of the MAB International Coordinating Council (MAB ICC). Their status is internationally recognized.

The Cape West Coast Biosphere Reserve stretches northward from the Diep River in Cape Town to the Berg River and covers 378 000 ha of coastal lowland plains. It is unique in terms of its natural beauty, biodiversity, history, culture and location. It was proclaimed and supported by all three spheres of government and the formal designation procedure was completed in November 2000. The aim of the Cape West Coast Biosphere Reserve is to foster human development that is ecologically sustainable (cwcb.co.za).

The proposed project area does not occur within a NPAES Focus Area (2010) or a negotiated Focus Area (2018).



Figure 5.8: Map illustrating the project area in relation to conservation areas and NPAES.

6. SITE ECOLOGICAL IMPORTANCE

The results from the desktop assessment and field survey have been used to calculate the SEI for the vegetation and faunal habitat present within the project area, the outcome of which, has been used to comment on the results of the DFFE screening report in Chapter 7.

6.1. Site Ecological Importance - Fauna

The SEI for faunal species habitat within the project area was determined to be medium for the wetland/ impoundment habitat and medium for the near-intact and degraded Strandveld habitat, Secondary vegetation and transformed areas (Table 6.1).

Table 6.1: Sensitivity assessment for each faunal habitat type within the project area.

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	BI	Receptor Resilience	SEI
Wetland/ impoundment habitat	Medium	Low	Low	Very Low	Medium
	High likelihood of occurrence within the project area of the Cape Caco which is listed as NT.	Small wetland/impoundments with almost no habitat connectivity but migrations still possible across modified habitat.		The habitat for this species is likely to be removed and therefore this species is unlikely to remain at a site when impact or disturbance is occurring and unlikely to return once impact/disturbance has been removed.	
Near-intact Saldanha Flats Strandveld Habitat	High	High	High	High	Medium
	High likelihood of occurrence within the project area of the Kasner's Dwarf Burrowing Skink listed as EN.	Large areas with good habitat connectivity and functional corridors with only minor negative ecological impacts and no signs of major past disturbance.		Species have a high likelihood of returning to site once disturbance or impact has been removed.	
Near-intact Saldanha Flats Strandveld, Degraded Saldanha Flats Strandveld, Secondary Vegetation and transformed	High	High	High	High	Medium
	High likelihood of occurrence within the project area of the Grant's Golden Mole listed as VU.	Large area with good habitat connectivity and potentially functional ecological corridors.		Species have a high likelihood of returning to site once disturbance or impact has been removed.	

6.2. Site Ecological Importance - Flora

The SEI was determined for each vegetation type present within the proposed developable area (Table 6.2). The *Near-Intact Saldanha Flats Strandveld* was determined to have a very high SEI based on the vegetation type being listed as EN and because of the confirmed SCC and SCC with a high likelihood of occurrence within the project area.

Degraded Saldanha Flats Strandveld was determined to have a high SEI, *Secondary Vegetation* was determined to have a low SEI and the *Transformed* vegetation to have a Very Low SEI.

Management guidelines for each category have been included in section 6.4 below.

Table 6.2: Sensitivity assessment for each vegetation type within the project area.

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	BI	Receptor Resilience	SEI
Near-intact Saldanha Flats Strandveld	Very High	High	Very High	Medium	Very High
	>0.1% of Endangered Cape Flats Dune Strandveld is present within the project area and there is one confirmed EN species, two confirmed VU species and one confirmed NT species present.	>10 ha of an Endangered ecosystem present with good habitat connectivity and functional corridors.		Habitat will recover slowly (more than ten years) to restore >70% of the original species composition.	
Degraded Saldanha Flats Strandveld	Very High	High	Very High	High	High
	>0.1% of Endangered Cape Flats Dune Strandveld is present within the project area and there is one confirmed EN species, two confirmed VU species and one confirmed NT species present.	>10 ha of an Endangered ecosystem present with good habitat connectivity and functional corridors.		Habitat that can recover relatively quickly (5-10 years) to restore >70% of the original species composition.	
Secondary Vegetation	Medium	High	Medium	High	Low
	Confirmed VU species (<i>Leucospermum rodolentum</i>) listed under Criterion A.	Large area with good habitat connectivity and potentially functional ecological corridors.		Habitat that can recover relatively quickly (5-10 years) to restore >70% of the original species composition.	

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)	BI	Receptor Resilience	SEI
Transformed	Low	Low	Low	Very High	Very Low
	No confirmed or highly likely populations of SCC.	Almost no habitat connectivity but migrations are still possible across some transformed landscapes.		Habitat can recover quickly (less than 5 years) to restore >70% of the original species composition.	

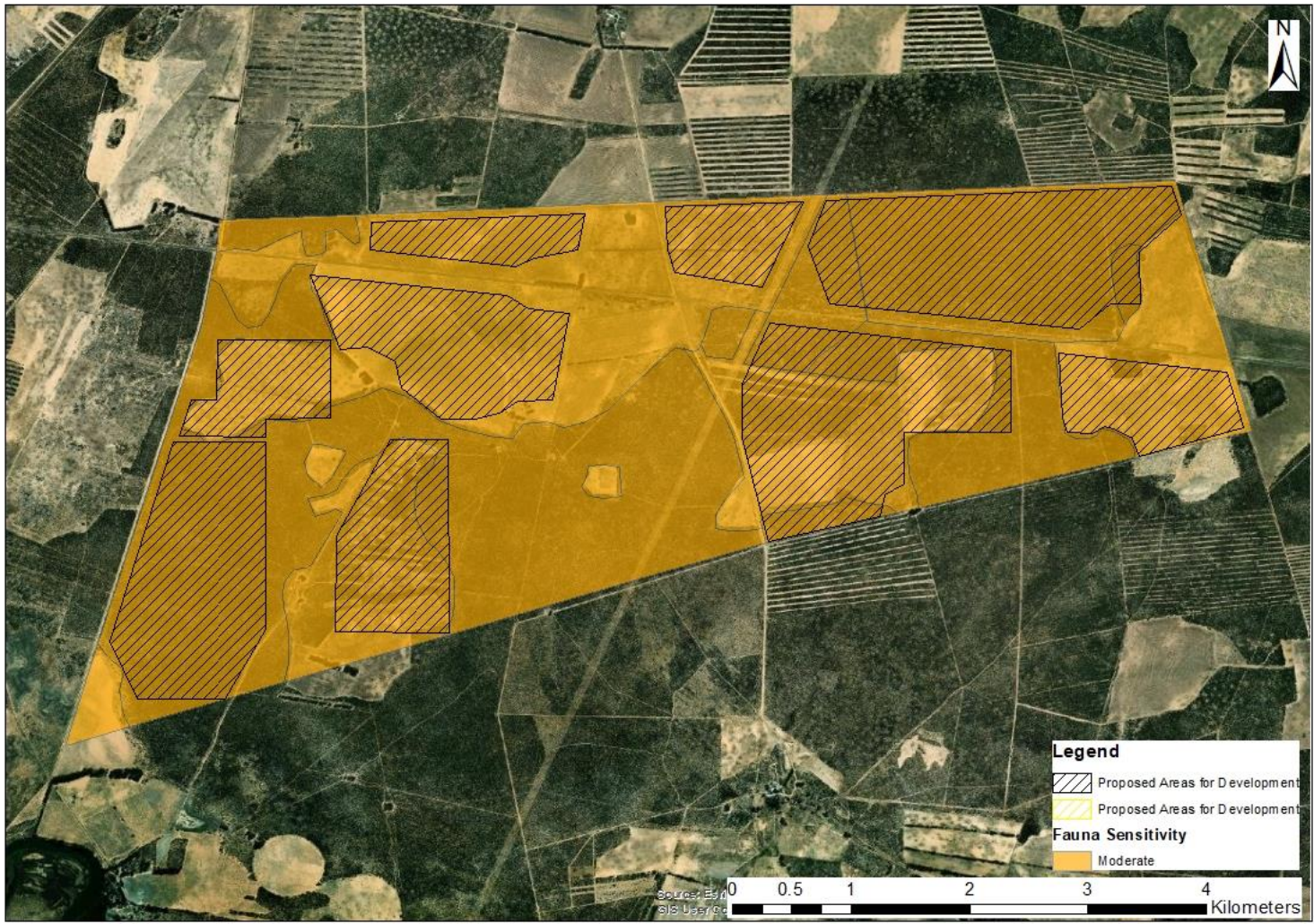


Figure 6.1: Fauna sensitivity map for the project area based on data gathered from the field survey.

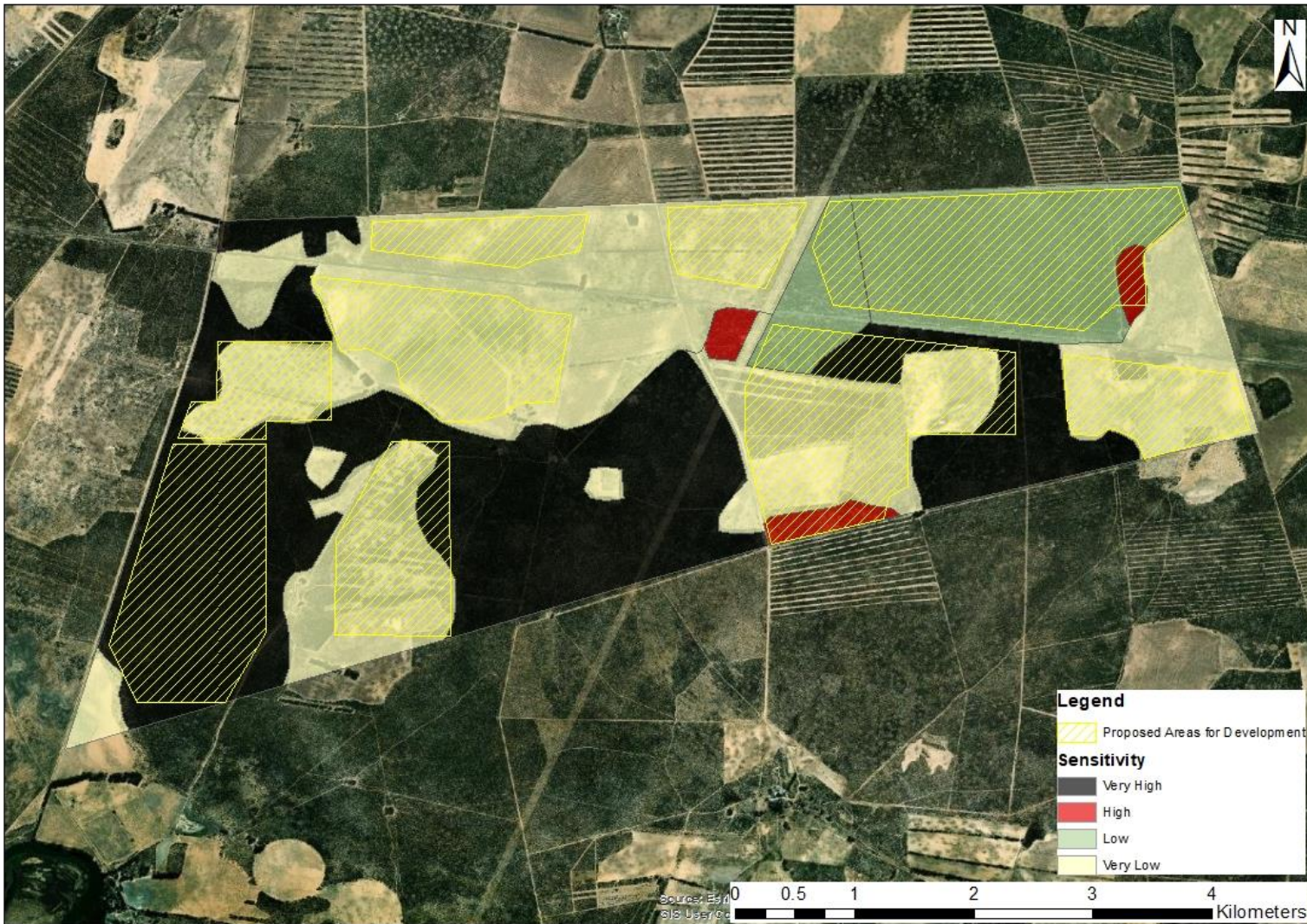


Figure 6.2: Botanical sensitivity map for the project area based on data gathered from the field survey.

6.3. Combined SEI

According to the Species Environmental Assessment Guideline (SANBI, 2020), the SEI evaluated for each taxon/receptor should be combined into a single multi-taxon/receptor evaluation of SEI for the project area to allow the component authority to evaluate the SEI for the entire project area rapidly and at a single glance. As such, the highest overall SEI rating has been applied to each habitat type assessed in terms of the faunal and botanical sensitivity. Table 6.3 combines the overall SEI for each habitat type based on the assessment in Table 6.1 and 6.2. The overall SEI for the near-intact Saldanha Flats Strandveld is very high, for degraded Saldanha Flats Strandveld is high and for secondary and transformed vegetation is medium (Figure 6.3). Management guidelines for interpreting SEI in the context of the proposed development have been outlined in section 6.4 below.

Table 6.3: Combined overall SEI for each habitat type.

Habitat	Floral SEI	FAUNAL SEI	OVERALL COMBINED SEI
Near-intact Saldanha Flats Strandveld	Very High	Medium	Very High
Degraded Saldanha Flats Strandveld	High	Medium	High
Secondary Vegetation	Low	Medium	Medium
Transformed	Very Low	Medium	Medium

6.4. Management Guidelines

Management guidelines recommend the following:

- For areas with a **very high SEI**, no destructive development activities should be considered. Offset mitigation is not possible and therefore not acceptable for these areas.
- For areas with a **high SEI**, avoidance mitigation must be implemented where feasible and where this is not feasible, minimisation mitigation such as reducing the project footprint. Limited development activities of low impact are acceptable in these areas. Offset mitigation may be required for high impact activities.
- For areas of **medium SEI**, development activities of medium impact are acceptable provided appropriate mitigation and management measures are implemented.
- For areas of **low SEI**, development activities of medium to high impact are acceptable provided appropriate mitigation and management measures are implemented.
- For areas of **very low SEI**, development activities of medium to high impact are acceptable and mitigation and management measures may not be required although they are good practice.

Project infrastructure must be designed to avoid areas with a very high SEI. Infrastructure located in areas with a medium, low or very low SEI are deemed acceptable.

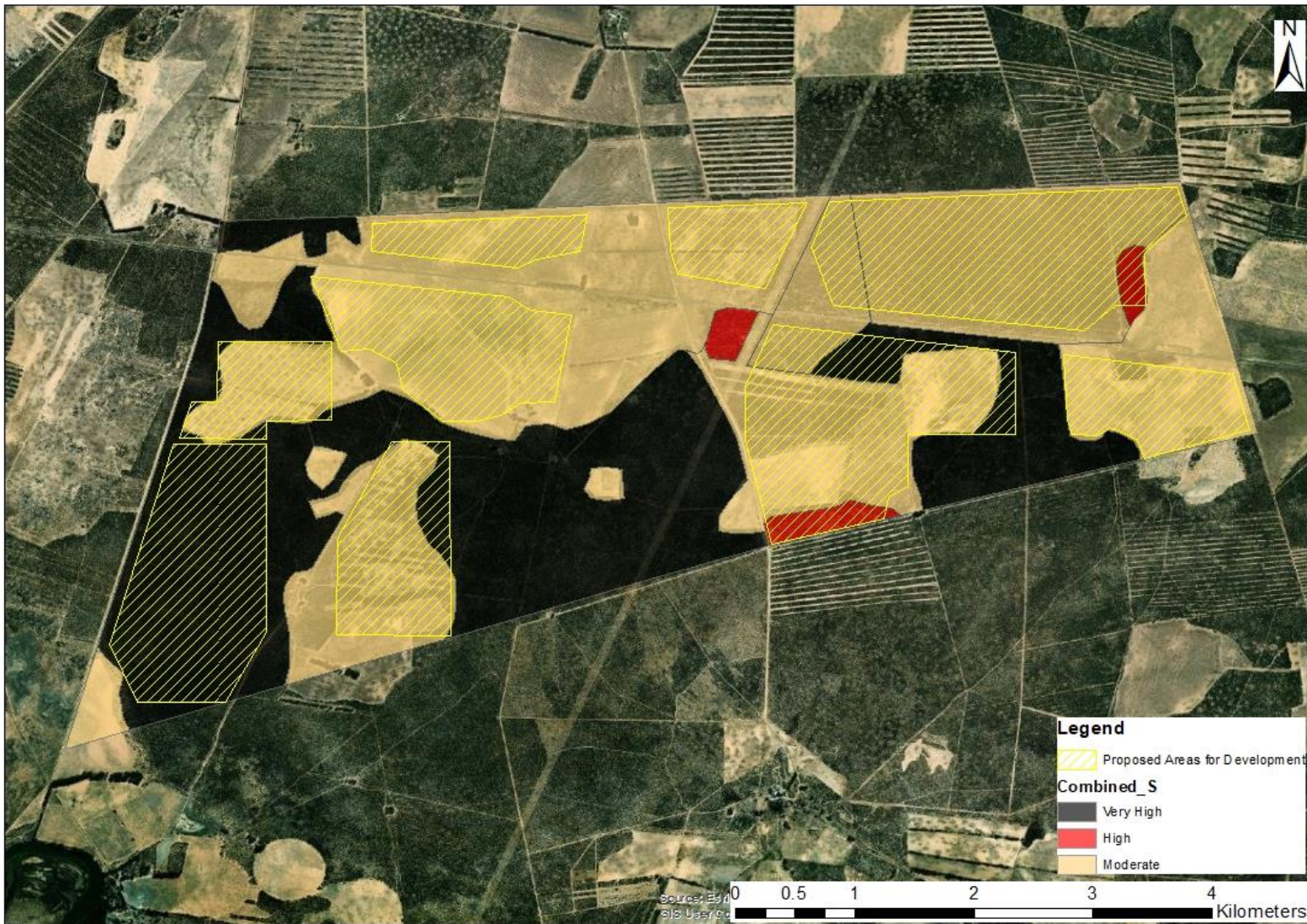


Figure 6.3: Combined sensitivity map for the project area based on data gathered from the field survey.

7. CONCLUSIONS

7.1. Conclusions

The DFFE screening report indicates that entire project area is of:

- High Sensitivity for the Animal Species Theme based on the likely presence of four bird species.
- Medium Sensitivity for the Plant Species Theme based on the likely presence of thirty-nine SCC.
- Very High Sensitivity for the Terrestrial Biodiversity Theme based on the project area occurring within a CBA 1, CBA 2, ESA 1, ESA 2 and an Endangered Ecosystem (Saldanha Flats Strandveld).

The DFFE screening report is not always accurate and as such comment has been provided below.

Animal Species Theme

The faunal specialist has assessed the project area for reptile, amphibian and mammal species. The DFFE screener listed bird SCC and these have been assessed by a specialist in that field.

Reptile, amphibian and mammal species not picked up in the screening tool have been assessed and included in this report. Based on the results of the field survey and desktop analysis, the SEI for Reptile, amphibian and mammal SCC was determined to be medium due to the high likelihood of occurrence of the Cape Caco (NT), Kasner's Dwarf Burrowing Skink (EN), and Grant's Golden Mole (VU) within the PAOI.

Plant Species Theme

Given that three threatened species and one near-threatened species were confirmed to occur within the project area and there is a high likelihood of occurrence of an additional ten species, the specialist disagrees with the rating of medium sensitivity for the plant species theme. It is proposed that the sensitivity for the Plant Species Theme is Very High for near-intact Saldanha Flats Strandveld, high for degraded Saldanha Flats Strandveld, low for Secondary Vegetation and Very Low for Transformed areas.

Terrestrial Biodiversity Theme

Based on the results of the field survey and desktop analysis, the specialist disagrees with the rating of Very High Sensitivity for the entire project area.

Areas that are a CBA 1 and overlap the near-intact Saldanha Flats Strandveld should be very high as per the screening report. However, Secondary Vegetation should have a low sensitivity and transformed areas should have a very low sensitivity.

7.2. Recommendations

Based on the results of the field survey which has informed the SEI analysis, infrastructure should be placed in areas of low and very low sensitivity for the combined SEI (refer to section 6.3) and must avoid areas of very high sensitivity.

Given the sensitivity of the project area, a full ecological impact assessment is required.

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APPENDIX 1: PLANT SPECIES RECORDED IN THE PROJECT AREA

Family	Species	Red List
FABACEAE	<i>Acacia cyclops</i>	Not Evaluated
APIACEAE	<i>Arctopus dregei</i>	Near Threatened
ASTERACEAE	<i>Arctotis hirsuta</i>	Least Concern
ASPARAGACEAE	<i>Asparagus capensis</i>	Least Concern
ASPARAGACEAE	<i>Asparagus rubicundus</i>	Least Concern
AMARANTHACEAE	<i>Atriplex nummularia</i>	Not Evaluated
IRIDACEAE	<i>Babiana ambigua</i>	Least Concern
IRIDACEAE	<i>Babiana cf nana subsp. nana</i>	Endangered
IRIDACEAE	<i>Babiana confusa</i>	Least Concern
AMARYLLIDACEAE	<i>Boophone haemanthoides</i>	Least Concern
AMARYLLIDACEAE	<i>Brunsvigia orientalis</i>	Least Concern
AIZOACEAE	<i>Cleretum bellidiforme</i>	Least Concern
AIZOACEAE	<i>Conicosia pugioniformis</i>	Least Concern
ASTERACEAE	<i>Crassothonna cylindrica</i>	Least Concern
POACEAE	<i>Cynadon dactylon</i>	Least Concern
ASTERACEAE	<i>Dimorphotheca pluvialis</i>	Least Concern
EBENACEAE	<i>Diospyros glabra</i>	Least Concern
ASTERACEAE	<i>Eriocephalus racemosus</i>	Least Concern
EBENACEAE	<i>Euclea tomentosa</i>	Least Concern
EUPHORBIACEAE	<i>Euphorbia caput-medusae</i>	Least Concern
EUPHORBIACEAE	<i>Euphorbia mauritanica</i>	Least Concern
IRIDACEAE	<i>Ferraria sp</i>	
IRIDACEAE	<i>Gladiolus carinatus</i>	Least Concern
CELASTRACEAE	<i>Gymnosporia buxifolia</i>	Least Concern
HYACINTHACEAE	<i>Lachenalia bulbifera</i>	Least Concern
PROTEACEAE	<i>Leucospermum rodolentum</i>	Vulnerable
SOLANACEAE	<i>Lycium amoenum</i>	Least Concern
SCROPHULARIACEAE	<i>Manulea altissima</i>	Least Concern
IRIDACEAE	<i>Melasphaerula graminea</i>	Least Concern
MELIANTHACEAE	<i>Melianthus comosus</i>	Least Concern
APOCYNACEAE	<i>Microloma sagittatum</i>	Least Concern
POLYGALACEAE	<i>Muraltia scoparia</i>	Least Concern
POLYGALACEAE	<i>Muraltia spinosa</i>	Least Concern
OLEACEAE	<i>Olea exasperata</i>	Least Concern
CACTACEAE	<i>Opuntia ficus-indica</i>	Not Evaluated
OXALIDACEAE	<i>Oxalis luteola</i>	Least Concern
OXALIDACEAE	<i>Oxalis pes-caprae</i>	Least Concern
OXALIDACEAE	<i>Oxalis suavis</i>	Vulnerable
GERANIACEAE	<i>Pelargonium sp</i>	

IRIDACEAE	<i>Romulea tabularis</i>	Least Concern
AIZOACEAE	<i>Ruschia macowanii</i>	Least Concern
AMARANTHACEAE	<i>Salsola sp</i>	
LAMIACEAE	<i>Salvia africana</i>	Least Concern
LAMIACEAE	<i>Salvia lanceolata</i>	Least Concern
ANACARDIACEAE	<i>Searsia dissecta</i>	Least Concern
ANACARDIACEAE	<i>Searsia glauca</i>	Least Concern
ANACARDIACEAE	<i>Searsia laevigata</i>	Least Concern
SOLANACEAE	<i>Solanum linnaeanum</i>	Least Concern
RESTIONACEAE	<i>Staberoha cf distachyos</i>	Least Concern
THYMELAEACEAE	<i>Struthiola ciliata</i>	Least Concern
RESTIONACEAE	<i>Thamnochortus sp</i>	
ASPHODELACEA	<i>Trachyandra ciliata</i>	Least Concern
ASPHODELACEA	<i>Trachyandra sp</i>	
RHAMNACEAE	<i>Trichocephalus stipularis</i>	Least Concern
RESTIONACEAE	<i>Willdenowia incurvata</i>	Least Concern
SCROPHULARIACEA	<i>Zaluzianskya villosa</i>	Least Concern
ZYGOPHYLLACEAE	<i>Zygophyllum flexuosa</i>	Least Concern
ZYGOPHYLLACEAE	<i>Zygophyllum morgsana</i>	Least Concern

APPENDIX 2: PROOF OF SACNASP REGISTRATION AND HIGHEST QUALIFICATION



SACNASP
South African Council for Natural Scientific Professions


herewith certifies that
Tarryn Barbara Lee Martin
Registration Number: 008745
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 (Professional Natural Scientist)
Botanical Science (Professional Natural Scientist)

Effective 29 January 2014 Expires 31 March 2023




Chairperson


Chief Executive Officer



To verify this certificate scan this code

Application for Professional Natural Science in the field of Zoology is currently awaiting approval.





we certify that

Amber Leah Jackson

was admitted to the degree of

*Master of Philosophy
in Environmental Management*

on 9 June 2011

Handwritten signature of Alan Price in black ink.

Vice-Chancellor



Handwritten signature of Hugh Amoore in black ink.

Registrar

APPENDIX 3: CV

CONTACT DETAILS

Name	Tarryn Martin
Name of Company	Biodiversity Africa
Designation	Director
Profession	Botanical Specialist and Environmental Manager
E-mail	tarryn@biodiversityafrica.com
Office number	+27 (0)71 332 3994
Education	2010: Master of Science with distinction (Botany) 2004: Bachelor of Science (Hons) in African Terrestrial Vertebrate Biodiversity 2003: Bachelor of Science
Nationality	South African
Professional Body	SACNASP: South African Council for Natural Scientific Profession: Professional Natural Scientist (400018/14) SAAB: Member of the South African Association of Botanists IAIASa: Member of the International Association for Impact Assessments South Africa Member of Golden Key International Honour Society
Key areas of expertise	<ul style="list-style-type: none">• Biodiversity Surveys and Impact Assessments• Environmental Impact Assessments• Critical Habitat Assessments• Biodiversity Management and Monitoring Plans

PROFILE

Tarryn has over ten years of experience working as a botanist, nine of which are in the environmental sector. She has worked as a specialist and project manager on projects within South Africa, Mozambique, Lesotho, Zambia, Tanzania, Cameroon and Malawi.

She has extensive experience writing botanical impact assessments, critical habitat assessments, biodiversity management plans, biodiversity monitoring plans and Environmental Impact Assessments to International Standards, especially to those of the International Finance Corporation (IFC). Her experience includes working on large mining projects such as the Kenmare Heavy Minerals Mine, where she monitored forest health, undertook botanical impact assessments for their expansion projects and designed biodiversity management and monitoring plans. She has also project managed Environmental Impact Assessments for graphite mines in northern Mozambique and has a good understanding of the Mozambique Environmental legislation and processes.

Tarryn holds a BSc (Botany and Zoology), a BSc (Hons) in African Vertebrate Biodiversity and an MSc with distinction in Botany from Rhodes University. Tarryn's Master's thesis examined the impact of fire on the recovery of C₃ and C₄ Panicoid and non-Panicoid grasses within the context of climate change for which she won the Junior Captain Scott-Medal (Plant Science) for producing the top MSc of 2010 from the South African Academy of Science and Art as well as an Award for Outstanding Academic Achievement in Range and Forage Science from the Grassland Society of Southern Africa. Tarryn is a professional member of the South African Council for Natural Scientific Professionals (since 2014).

EMPLOYMENT EXPERIENCE

Director and Botanical Specialist, Biodiversity Africa

July 2021 - present

- Botanical and ecological assessments for local and international EIAs in Southern Africa

- Identifying and mapping vegetation communities and sensitive areas
- Designing and implementing biodiversity management and monitoring plans
- Designing rehabilitation plans
- Designing alien management plans
- Critical Habitat Assessments
- Large ESIA studies
- Managing budgets

Principal Environmental Consultant, Branch Manager and Botanical Specialist,
Coastal and Environmental Services

May 2012-June 2021

- Botanical and ecological assessments for local and international EIAs in Southern Africa
- Identifying and mapping vegetation communities and sensitive areas
- Designing and implementing biodiversity management and monitoring plans
- Designing rehabilitation and biodiversity offset plans
- Designing alien management plans
- Critical Habitat Assessments
- Large ESIA studies
- Managing budgets
- Cape Town branch manager
- Coordinating specialists and site visits

Accounts Manager, Green Route DMC

October 2011- January 2012

- Project and staff co-ordination
- Managing large budgets for incentive and conference groups travelling to southern Africa
- Creating tailor-made programs for clients
- Negotiating rates with vendors and assisting with the ground management of inbound groups to ensure client satisfaction.

Camp Administrator and Project Co-ordinator, Windsor Mountain International Summer Camp, USA

April 2011 - September 2012

- Co-ordinated staff and camper travel arrangements, main camp events and assisted with marketing the camp to prospective families.

Freelance Project Manager, Green Route DMC

November 2010 - April 2011

- Project and staff co-ordination
- Managing large budgets for incentive and conference groups travelling to southern Africa
- Creating tailor-made programs for clients
- Negotiating rates with vendors and assisting with the ground management of inbound groups to ensure client satisfaction.

Camp Counselor, Windsor Mountain Summer Camp, USA

June 2010 - October 2010

NERC Research Assistant, Botany Department, Rhodes University, Grahamstown in collaboration with Sheffield University, Sheffield, England

April 2009 - May 2010

- Set up and maintained experiments within a common garden plot experiment
- collected, collated and entered data

- Assisted with the analysis of the data and writing of journal articles

Head Demonstrator, Botany Department, Rhodes University

March 2007 - October 2008

Operations Assistant, Green Route DMC

September 2005 - February 2007

- Project and staff co-ordination
- Managing large budgets for incentive and conference groups travelling to southern Africa
- Creating tailor-made programs for clients
- Negotiating rates with vendors and assisting with the ground management of inbound groups to ensure client satisfaction

PUBLICATIONS

- Ripley, B.; Visser, V.; Christin, P.A.; Archibald, S.; Martin, T and Osborne, C. Fire ecology of C₃ and C₄ grasses depends on evolutionary history and frequency of burning but not photosynthetic type. *Ecology*. 96 (10): 2679-2691. 2015
- Taylor, S.; Ripley, B.S.; Martin, T.; De Wet, L-A.; Woodward, F.I.; Osborne, C.P. Physiological advantages of C₄ grasses in the field: a comparative experiment demonstrating the importance of drought. *Global Change Biology*. 20 (6): 1992-2003. 2014
- Ripley, B; Donald, G; Osborne, C; Abraham, T and Martin, T. Experimental investigation of fire ecology in the C₃ and C₄ subspecies of *Alloteropsis semialata*. *Journal of Ecology*. 98 (5): 1196 - 1203. 2010
- South African Association of Botanists (SAAB) conference, Grahamstown. Title: Responses of C₃ and C₄ Panicoid and non-Panicoid grasses to fire. January 2010
- South African Association of Botanists (SAAB) conference, Drakensberg. Title: Photosynthetic and Evolutionary determinants of the response of selected C₃ and C₄ (NADP-ME) grasses to fire. January 2008

COURSES

- Rhodes University and CES, Grahamstown
- EIA Short Course 2012
- Fynbos identification course, Kirstenbosch, 2015.
- Photography Short Course, Cape Town School of Photography, 2015.
- Using Organized Reasoning to Improve Environmental Impact Assessment, 2018, International IAIA conference, Durban

CONSULTING EXPERIENCE

International Projects

- 2020 – 2021: Project manager for the 2Africa subsea cable ESIA in Mozambique.
- 2020 – 2021: Project manager for the Category B EIA for the Wihinana Graphite Mine, Cabo delgado, Mozambique
- 2020 – 2021: Project manager for the category B exploration ESIA for Sofala Heavy Minerals Mine, Inhambane, Mozambique
- 2020: Critical Habitat Assessment for a graphite mine in Cabo Delgado, Mozambique. This assessment was to IFC standards.
- 2020: Analysed the botanical dataset for Lurio Green Resources and provided comment on the findings and gaps.
- 2020: Biodiversity Management Plan and Monitoring Plan for mine at Pilivilli in Nampula Province, Mozambique. This assessment was to IFC standards.
- 2019: Botanical Assessment for a cocoa plantation, Tanzania. This assessment was to IFC standards.
- 2019: Critical Habitat Assessment, Biodiversity Management Plan and Ecosystem Services Assessment for JCM Solar Farm in Cameroon. This assessment was to IFC standards.
- 2019: Undertook the Kenmare Road and Infrastructure Botanical Baseline Survey and Impact Assessment for an infrastructure corridor that will link the existing mine at Moma to the new proposed mine at Pillivilli in Nampula Province, Mozambique. This assessment was to IFC standards.

- 2012 – Present: Kenmare Terrestrial Monitoring Program Project Manager and Specialist Survey, Nampula Province, Mozambique.
- 2018: Conducted a field survey and wrote a botanical report to IFC standards for the proposed Balama Graphite Mine Environmental and Social Impact Assessment (ESIA) in Cabo Delgado Province, Mozambique.
- 2018: Co-authored the critical habitat assessment chapter for the proposed Kenmare Pilivilli Heavy Minerals Mine.
- 2018: Authored the Conservation Efforts chapter for the Kenmare Pilivilli Heavy Minerals Mine.
- 2017-2018: Co-authored and analysed data for the Kenmare Bioregional Survey of *Icuria dunensis* (species trigger for critical habitat) in Nampula Province, Mozambique. This was for a mining project that needed to be IFC compliant.
- 2017: Conducted a field survey and wrote a botanical report to IFC standards for the proposed Ancuabe Graphite Mine Environmental and Social Impact Assessment (ESIA) in Cabo Delgado Province, Mozambique.
- 2017-2018: Managed the Suni Resources Montepuez Graphite Mine Environmental Impact Assessment. This included the management of ten specialists, the co-ordination of their field surveys, regular client liaison and the writing of the Environmental Impact Assessment Report which summarised the specialists findings, assessed the impacts of the proposed mine on the environment and provided mitigation measures to reduce the impact.
I was also the lead botanist for this baseline survey and impact assessment and undertook the required field work and analysed the data and wrote the report.
- 2017: Undertook the botanical baseline survey and impact assessment for the proposed Kenmare Pilivilli Heavy Mineral Mine in Nampula Province, Mozambique. This was to IFC Standards.
- 2017: Ecological Survey for the Megaruma Mining Limitada Ruby Mine Exploration License, Cabo Delgado, Mozambique.
- 2016: Undertook the botanical baseline survey and impact assessment, wrote an alien invasive management plan and co-authored the biodeiversity monitoring plan for this farm. The project was located in Zambezia Province, Mozambique.
- 2015-2016: Conducted the Triton Minerals Nicanda Hills Graphite Mine Botanical Survey and Impact Assessment. Was also the project manager and specialist co-ordinator for this project. The project was located in Cabo Delgado Province, Mozambique.
- 2015: Was part of the team that undertook a Critical Habitat Assessment for the Nhangonzo Coastal Stream site at Inhassora in Mozambique that Sasol intend to establish drill pads at. This project needed to meet the IFC standards.
- 2014: Lurio Green Resources Wood Chip Mill and Medium Density Fibre-board Plant, Project Manager and Ecological Specialist, Nampula Province, Mozambique. 2014-2015.
- 2013-2014: LHDA Botanical Survey, Baseline and Impact assessment, Lesotho.
- 2014: Biotherm Solar Voltaic Ecological Assessment, Zambia.
- 2013-2014: Lurio Green Resources Plantation Botanical Assessment, Vegetation and Sensitivity Mapping, Specialist Co-ordination, Nampula Province, Mozambique.
- 2013: Syrah Resources Botanical Baseline Survey and Ecological Assessment., Cabo Delgado Mozambique.
- 2013-2014: Baobab Mining Ecological Baseline Survey and Impact Assessment, Tete, Mozambique.

South African Projects

- 2021 - Present: Project Manager for the Sturdee Energy Solar PV facility, Western Cape
- 2021: Ecological Assessment for the Sturdee Energy Solar PV facility, Western Cape
- 2021: Rehabilitation plan for a housing development (Hope Village)
- 2020: Ecological Assessment for the Eskom Juno-Gromis Powerline deviation, Western Cape

- 2020: Project Manager for the Basic Assessment for SANSA development at Matjiesfontein (Western Cape). Project received authorization in 2021.
- 2020: Ecological Assessment for construction of satellite antennae, Matjiesfontein, Western Cape
- 2019: Ecological Assessment for a wind farm EIA, Kleinzee, Northern Cape
- 2019: Ecological Assessment for two housing developments in Zeerust, North West Province
- 2019: Botanical Assessment in Retreat, Cape Town for the DRDLR land claim.
- 2019: Cape Agulhas Municipality Botanical Assessment for the expansion of industrial zone, Western Cape, South Africa, 2019.
- 2018: Ecological Assessment for the construction of a farm dam in Greyton, Western Cape.
- 2018: Conducted the Ecological Survey for a housing development in Noordhoek, Cape Town
- 2018: Conducted the field survey and developed an alien invasive management plan for the Swartland Municipality, Western Cape.
- 2017: Undertook the field survey and co-authored a coastal dune study that assesses the impacts associated with the proposed rezoning and subdivision of Farm Bookram No. 30 to develop a resort.
- 2017: Project managed and co-authored a risk assessment for the use of Marram Grass to stabilise dunes in the City of Cape Town.
- 2015-2016: iGas Saldanha to Ankerlig Biodiversity Assessment Project Manager, Saldanha.
- 2015: Innowind Ukomoleza Wind Energy Facility Alien Invasive Management Plan, Eastern Cape Province, South Africa.
- 2015: Savannah Nxuba Wind Energy Facility Powerline Ecological Assessment, ground truthing and permit applications, Eastern Cape South Africa.
- 2014: Cob Bay botanical groundtruthing assessment, Eastern Cape, South Africa.
- 2013-2016: Dassiesridge Wind Energy Facility Project Manager, Eastern Cape, South Africa.
- 2013: Harvestvale botanical groundtruthing assessment, Eastern Cape, South Africa.
- 2012: Tsitsikamma Wind Energy Facility Community Power Line Ecological Assessment, Eastern Cape, South Africa.
- 2012: Golden Valley Wind Energy Facility Power Line Ecological Assessment, Eastern Cape, South Africa.
- 2012: Middleton Wind Energy Facility Ecological Assessment and Project Management, Eastern Cape, South Africa.
- 2012: Mossel Bay Power Line Ecological Assessment, Western Cape, South Africa.
- 2012: Groundtruthing the turbine sites for the Waainek Wind Energy Facility, Eastern Cape, South Africa.
- 2012: Toliara Mineral Sands Rehabilitation and Offset Strategy Report, Madagascar.

CONTACT DETAILS

Name	Amber Jackson
Name of Company	Biodiversity Africa
Designation	Director
Profession	Faunal Specialist and Environmental Manager
E-mail	amber@biodiversityafrica.com
Office number	+27 (0)78 340 6295
Education	2011 M. Phil Environmental Management (University of Cape Town) 2008 BSc (Hons) Ecology, Environment and Conservation (University of the Witwatersrand) 2007 BSc 'Ecology, Environment and Conservation' and Zoology (WITS)
Nationality	South African
Professional Body	SACNASP: South African Council for Natural Scientific Profession (100125/12) ZSSA: Zoological Society of Southern Africa HAA: Herpetological Association of Southern Africa IAIASa: Member of the International Association for Impact Assessments South Africa
Key areas of expertise	<ul style="list-style-type: none">• Biodiversity Surveys and Impact Assessments• Environmental Impact Assessments• Critical Habitat Assessments• Biodiversity Management and Monitoring Plans

PROFILE

Amber has over ten years' experience in environmental consulting and has managed projects across various sectors including mining, agriculture, forestry, renewable energy, housing, coastal and wetland recreational infrastructure. Most of these projects required lender finance and therefore met both in-country, lender and sector specific requirements.

Amber completed the IFC lead and Swiss funded programme in Environmental and Social Risk Management course in 2018. The purpose of the course was to upskill Sub-Saharan African environmental consultants to increase the uptake of E&S standards by Financial Institutions.

Amber specialises in terrestrial vertebrate faunal assessments. She has conducted large scale faunal impact assessments that are to international lender's standards in Mozambique, Tanzania, Lesotho and Malawi. In South Africa her faunal impact assessments comply with the protocols for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial biodiversity and follows the SANBI Species Environmental Assessment Guideline. Her specialist input goes beyond impact assessments and includes faunal opportunities and constraints assessments, Critical Habitat Assessments, Biodiversity related Management Plans and Biodiversity Monitoring Programmes.

Amber holds a BSc (Zoology and Ecology, Environment & Conservation) and BSc (Hons) in Ecology, Environment & Conservation from WITS University and an MPhil in Environmental Management from University of Cape Town. Amber's honours focused on the landscape effects on Herpetofauna in Kruger National Park and her Master's thesis focused on the management of social and natural aspects of environmental systems with a dissertation in food security that investigated the complex food system of informal and formal distribution markets

EMPLOYMENT EXPERIENCE

Director and Faunal Specialist, Biodiversity Africa

July 2021 - present

- Faunal assessments for local and international EIAs in Southern Africa
- Identifying and mapping habitats and sensitive areas
- Designing and implementing biodiversity management and monitoring plans
- Critical Habitat Assessments
- Large ESIA studies
- Managing budgets

Principal Environmental Consultant and Faunal,

Coastal and Environmental Services

September 2011-June 2021

- Faunal and ecological assessments for local and international EIAs in Southern Africa
- Identifying and mapping habitat and sensitive areas
- Designing and implementing biodiversity management and monitoring plans
- Critical Habitat Assessments
- Large ESIA studies
- Coordinating specialists and site visits
- Faunal Impact Assessment
- Project Management, including budgets, deliverables and timelines.
- Environmental Impact Assessments and Basic Assessments project
- Environmental Control Officer
- Public/client/authority liaison
- Mentoring and training of junior staff

COURSES

- **Herpetological Association of Southern Africa Conference- Cape St Frances** September 2019
- **International Finance Corporation Environmental and Social Risk Management (ESRM) Program** January – November 2018
- **IAIA WC EMP Implementation Workshop** 27 February 2018
- **IAIAsa National Annual Conference** August 2017
Goudini Spa, Rawsonville.
- **Biodiversity & Business Indaba, NBBN** April 2017
Theme: Moving Forward Together (Partnerships & Collaborations)
- **Snake Awareness, Identification and Handling course, Cape Reptile Institute (CRI)** November 2016
- **Coaching Skills programme, Kim Coach** November 2016
- **Western Cape Biodiversity Information Event, IAIAsa** May 2016
Theme: Biodiversity offsets & the launch of a Biodiversity Information Tool
- **Photography Short Course** 2015.
Cape Town School of Photography,
- **Mainstreaming Biodiversity into Business: WHAT, WHY, WHEN and HOW** June 2014 Hosted by Dr Marie Parramon Gurney on behalf of the NBBN at the Rhodes Business School
- **IAIAsa National Annual Conference** September 2013
Thaba’Nchu Sun, Bloemfontein
- **St Johns Life first aid course** July 2012

CONSULTING EXPERIENCE

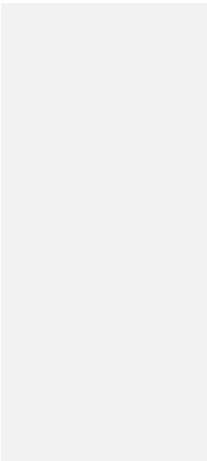
International Projects

- 2018-Crooks Brothers Post EIA Work- Environmental and Social EMPr, Policies, E&S Management Plans and Monitoring Programmes
- 2018-Triton Ancuabe Graphite Mine (ESHIA), Mozambique. IFC Standards.
- 2016-Bankable Feasibility Study of Simandou Infrastructure Project – Port and Railway Summary of critical habitat, biodiversity offset plan and monitoring and evaluation plan.
- 2016-Lurio Green Resources Forestry Projects ESIA project upgrade to Lender standards including IFC, EIB, FSC and AfDB.
- 2014-Green Resources Woodchip and MDF plant (EPDA).
- 2014-Niassa Green Resources Forestry Projects ESIA to Lender standards including IFC, EIB, FSC and AfDB.

- 2020-Kenmare Faunal Biodiversity Management Plan, Mozambique.
- 2020-Kenmare Faunal Monitoring Programme (year 1)- Baseline, Mozambique.
- 2019-Kenmare addendum ESIA Faunal Impact Assessment, Mozambique.
- 2019-Kenmare infrastructure corridor ESIA Faunal Impact Assessment, Mozambique.
- 2019/20-Olam Cocoa Plantation Faunal Impact Assessment, Tanzania.
- 2019-JCM Solar Voltaic project Faunal desktop critical habitat assessment, Cameroon.
- 2018-Suni Resources Balama Graphite Mine Project Faunal Impact Assessment, Mozambique.
- 2017/18-Battery Minerals Montepuez Graphite Mine Project Faunal Impact Assessment, Mozambique.
- 2017-Triton Minerals Nicanda Hills Graphite Mine Project Faunal Impact Assessment, Mozambique.
- 2017-Sasol Biodiversity Assessment, Mozambique.
- 2014-Lesotho Highlands Water Project Faunal Impact Assessment, Lesotho.
- 2012-Malawi Monazite mine Projects (ESIA) EMP ecological management contribution
- Liberia Palm bay & Butow (ESIA)
- PGS Seismic Project (ESIA), Mozambique.

South African Projects

- 2018-Port St Johns Second Beach Coastal Infrastructure Project - E&S Risk Assessment
- 2015-Blouberg Development Initiative- E&S Risk Assessment
- 2019-Boulders Powerline BA Faunal desktop impact assessment, WC, SA.
- 2019-Ramotshere housing development BA Faunal desktop impact assessment, NW, SA.
- 2019-Cape Agulhas Municipality Industrial development faunal impact assessment, WC, SA.
- 2019-SANSA Solar PV BA Faunal desktop impact assessment, WC, SA.
- 2019-Wisson Coal to Urea Faunal desktop assessment, Mpumalanga.
- 2019-Assessment Boschendal Estate Faunal Opportunities and Constraints, WC, SA.
- 2019-Ganspan-Pan Wetland Reserve Recreational and Tourist Development Avifaunal Impact Assessment, NC, SA.
- 2018-City of Johannesburg Municipal Reserve Proclamation for Linksfield Ridge and Northcliff Hill Faunal Assessment, South Africa.
- 2017-Augrabies falls hydro-electric project Hydro-SA Faunal Impact Assessment.
- Port St Johns Second Beach Coastal Infrastructure Project (EIA), South Africa.
- Woodbridge Island Revetment checklist.
- Belmont Valley Golf Course and Makana Residential Estate (EIA)
- Belton Farm Eco Estate (BA).
- Ramotshere housing development (BA).
- G7 Brandvalley Wind Energy Project (EIA)
- G7 Rietkloof Wind Energy Project (EIA)
- G7 Brandvalley Powerlines (BA)
- G7 Rietkloof Powerlines (BA)
- Boschendal wine estate Hydro-electric schemes (BA, 24G and WULA)
- Mossel Bay Wind Energy Project (EIA)
- Mossel Bay Powerline (BA) 132kV interconnection
- Inyanda Farm Wind Energy (EIA)
- Middleton Wind Energy (EIA)
- Peddie Wind Energy (EIA)

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- Cookhouse Wind Energy Project (EIA)
 - Haverfontein Wind Energy Project (EIA)
 - Plan 8 Wind Energy Project (EIA)
 - Brakkefontein Wind Energy Project (EIA)
 - Grassridge Wind Energy Project (EIA) (Coega)
 - St Lucia Wind Energy Project (EIA)
 - ACSA ECO CT (Lead ECO)
 - Enel Paleisheuwel Solar farm (Lead ECO)
 - NRA Caledon road upgrade ECO
 - Solar Capital DeAar Solar farm annual audits
 - Eskom Pinotage substation WUL offset compliance