TERRESTRIAL BIODIVERSITY, BOTANICAL AND FAUNAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED KIBOKO LANDING STRIP, HERBETSDALE, WESTERN CAPE PROVINCE

Prepared for:

Cape EAPRAC
17 Progress Street,
George, Western Cape,
6529, South Africa

Prepared by:

30 Chudleigh Road
Plumstead, 7800
Cape Town, Western Cape



June 2023

Details of Company

Biodiversity Africa	Biodiversity Africa is situated in Cape Town and specialises in terrestrial botanical and faunal impact assessments.
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. She was awarded the Denzil and Dorethy Carr Prize for her plant collection in 2006. 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.

Declaration of Independence

Tarryn Martin (Botanical Specialist)

- I, Tarryn Martin, declare that, in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Amended Environmental Impact Assessment Regulations, 2017;
- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this report are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

13 June 2023

…….. ……

SIGNED DATE

Amber Jackson (Faunal Specialist)

- I, Amber Jackson, declare that, in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Amended Environmental Impact Assessment Regulations, 2017;
- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this report are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

13 June 2023

…….. ……

SIGNED DATE

Non-Technical Summary

Project Description

The project entails the development of an ICAO Code 2 grass landing strip, one (1) Hangar and a semi-permanent reservoir on Portion 1 of Farm 172, near Herbertsdale, Mossel Bay Municipality, Western Cape Province. The landing strip will be used for private flights (this is the primary objective of the landing strip) for the owner and/or guests he may be bringing in. In addition and due to its proximity to Gondwana but also because of the presence of large game, the landing strip may also be used for local fire fighting as well as anti-poaching as and when may be necessary for on-site or the neighbouring Gondwana Game Reserve. It is anticipated that there will be a maximum of 4-8 flights per month, with the exception of emergency (fire) or anti-poaching flights.

The proposed runway and associated infrastructure will result in the permanent loss of 400m^2 of vegetation and long term loss of 8.8ha of natural vegetation as a result of mowing and ad hoc burning. Mowing is similar to grazing pressure and is likely to result in a change in species composition. However, it is anticipated that if rehabilitation of the site occurs, the site will return to its current state which is why the loss is long term rather than permanent.

The purpose of this report is to assess the impact of the project on the terrestrial ecology of the project site and immediate surrounds.

Methodology

A desktop assessment was undertaken prior to the site visit to determine the vegetation types and faunal habitats present, identify species of conservation concern that might occur on site and identify the threat and conservation status of the project site. This was followed by a field survey undertaken in spring on the 22 September 2022 during the flowering season.

Vegetation and Floristics

Within the project area are two distinct vegetation types. On the eastern half is degraded grassy fynbos that has returned after the area was previously disturbed. Dominant graminoid species include *Cenchrus clandestinus, Cynadon dactylon* and *Eragrostis capensis*. Within the grassy layer are some indigenous fynbos species such as *Helichrysum cymosum, Helichrysum patulum, Nidorella ivifolia, Stoebe plumosum, Phylica purpurea, Erica quadrangularis, Romulea flava* and *Romulea rosea. Acacia mearnsii* is scattered throughout the site. The vegetation structure is typically half a meter with some emergent shrubs reach 1-1.5m.

The western half of the project site is a medium tall shrubland of 1.5-2m tall and is representative of degraded Swellendam Silcrete Fynbos which is listed as Endangered. Dominant species include *Leucandendron salignum, Protea neriifolia, Leucadendron rubrum, Hermannia salviifolia, Phylica purpurea, Oedera imbricata, Selago dolosa, Crassula tetragona, Achyranthemum paniculatum* and *Metatlasia densa. Acacia mearnsii* is scattered throughout the site.

Thirty-three species were recorded within the project site. Of these thirty-three species, none are listed on the South African Red Data List and ten are listed as Schedule 4 (Protected) species on the

Western Cape Nature Conservation Law Amendment Act (2000). Schedule 4 species will require permits for their removal. No species on the TOPS list were recorded within the site.

One species, *Acacia mearnsii* (Black Wattle) is listed as a Category 1b Alien Invasive Plant Species on the National Environmental Management: Biodiversity Act (2004) Alien Invasive Species Lists, 2020. Individuals of this species must be removed, and project activities must not result in the further spread of these alien invasive species.

Fauna

The project area (Portion 1 of Farm 172) is privately owned yet there are no fences between the Gondwana Private Nature Reserve and the project area, therefore the faunal species in the reserve could permanently or occasionally inhabit the project area. The Gondwana Private Nature Reserve hosts 189 bird, 49 mammal, 26 reptiles and 11 amphibian species. The habitat available in the runway could support terrestrial amphibians, generalist birds and small mammals such as rodents. The wetland downslope to the east of runway likely supports amphibian breeding in the wet season.

No threatened amphibian species have a distribution which includes the project area. Five Western Cape endemic amphibian species have a distribution which includes the project area. Three have a low likelihood of occurrence and two species have a high likelihood of occurrence within the project area based on habitat available.

No threatened or near-threatened reptile species have a distribution which includes the project area. One WC endemic species has a distribution which includes the project area, the Little Karoo Dwarf Chameleon (*Bradypodion gutturale*) and is listed as least concern. Suitable habitat is present within the proposed development footprint and this species is considered highly likely to occur in the project area.

Four threatened mammal species that occur in the Reserve have access to the project area, this includes Cheetah (VU), Bontebok (VU), White Rhino (NT), and Grey Rhebok (NT). None were observed in the project area during the site visit, and if they occur it is most likely be transient. None are expected to be solely dependent on the project area. There was evidence of Rhino activity as a midden was found in the western section. In addition to the above SCC, one endangered, two vulnerable and five near threatened mammal species have a distribution which includes the project area. Only one species, the Fynbos Golden Mole, although not observed during the field survey has a high likelihood of occurrence in the project area given its wide habitat tolerance, however, the likelihood of it solely relying on the entire project site is low.

Two bird species of conservation concern where highlighted in the DFFE Screener, namely the Denham's Bustard (*Neotis denhami*) and Knysna Warbler *(Bradypterus sylvaticus*) listed as vulnerable. This is due to the project area having suitable mapped habitat within the distribution range of these species. Denham's Bustard has a moderate likelihood of occurrence in the project area and the Knysna Warbler has a Low likelihood of occurrence in the project area. Seven additional SCC have a distribution which includes the project area and have been recorded in same pentad (3400_2150) within which the project site occurs. Two have a high likelihood, three have a moderate and two a low likelihood of occurring in the project are.

Site Ecological Importance

Based on a combination of the desktop assessment and field survey, it has been determined that the western side of the project area has an overall Site Ecological Importance (SEI) of high due to the likely occurrence of plant SCC and the vegetation type being listed as Endangered. In contrast, eastern portion, which is degraded has an SEI of low and a Moderate SEI for faunal SCC.

Twelve impacts were identified for the project, eight of which are of low significance after mitigation measures have been implemented and four of which is moderate significance.

Recommendations

It is recommended that the following conditions are included in the Final EMPr as well as the conditions of the Environmental Authorisation (EA), if granted:

- All necessary plant permits must be obtained prior to the commencement of any construction activities. Species requiring permits include:
    - *Bobartia macrospatha*
    - *Erica quadrangularis*
    - *Erica discolor*
    - *Lampranthus elegans*
    - *Leucadendron rubrum*
    - *Leucadendron salignum*
    - *Moraea setifolia*
    - *Protea neriifolia*
    - *Romulea flava*
    - *Romulea rosea*
- Alien species occurring within and directly adjacent (within 50m of the landing strip) to the site must be removed.
- Where feasible existing access roads must be used and all service infrastructure must be located within the same servitude and preferably along the access road.
- It is recommended that the surrounding vegetation within the project site is managed and rehabilitated to increase species diversity and richness to counteract the impact of the loss of vegetation due to the transformation of vegetation within the landing strip boundary. This would include removing alien invasive plant species, rehabilitating degraded areas and implementing a controlled burning regime for this area. It is recommended that an area at least ten times the size of the area to be impacted (i.e. 88 ha) of Swellendam Silcrete Fynbos, is set aside and rehabilitated.

  It is recommended that the plant species diversity and richness of the proposed set aside area and the brushcut safe zone on Portion 1 of Farm 172, are monitored by a botanical specialist during the first 20 years of the operational phase of the project or until the botanist confirms that monitoring is no longer required. It is recommended that at a minimum of five fixed points are monitored within the set aside area and a minimum of five within the safe zone area. Monitoring should occur every second year between year 1 and 6 to establish baseline conditions that account for climatic variation. Monitoring can then be adjusted to every five years from year 6 to year 20. During the first six years, the botanical specialist will need to identify suitable key indicator species representative of near-intact fynbos and their

presence/absence monitored. It is also recommended that the presence/absence and density of alien invasive plant species are monitored within this area. The botanical specialist can advise on whether monitoring should continue after year 20 as well as provide input on whether the frequency of the proposed monitoring can be adjusted, based on the results of the survey. It is possible that less frequent monitoring events are suitable.

If the landing strip is decommissioned and the transformed area rehabilitated back to its current state, as confirmed by a botanical specialist, then the monitoring can cease since this vegetation has been returned to its natural state and there is no net loss.

- Gondwana Private Nature Reserve wildlife management must be consulted to provide input into the procedure that must be followed should an animal be on the runway, and at risk of collision, during take-off or landing.
- If the runway is rolled and checked daily, it is unlikely that any birds of SCC will build a nest and lay eggs on the runway. However, in the unlikely event that there are nests with chicks on the runway, the following mitigation measures must be implemented:
    - In the unlikely event that a nest with eggs or chicks of a bird SCC be found, the nest with >2m buffer must be demarcated and must be avoided. A protocol must be in place to notify planes, in advance, to approach their landing and/or take off to avoid these. Timeframes from laying to hatching are 23-25 days plus 7 weeks till fledgeling.
    - If the SCC nest cannot be avoided, in the case of an emergency flight (fire, medical etc.) proof of emergency must be made available if requested by authorities.
- In addition to all mitigations listed above a clause must be included in contracts for ALL personnel working on the project stating that: "*no wild animals will be hunted, killed, poisoned or captured. No wild animals will be imported into, exported from or transported in or through the province. No wild animals will be sold, bought, donated and no person associated with the development will be in possession of any live wild animal, carcass or anything manufactured from the carcass*." A clause relating to fines, possible dismissal and legal prosecution must be included should any of the above transgressions occur.
- During establishment of the runway it is recommended that the removal of large established trees that host raptors may only be removed outside of breeding season and may only be done when birds are not nesting and rearing young.

Conclusion

Provided the recommended mitigation measures are implemented, the specialist is of the opinion that the development can proceed, provided the recommendations contained in this report are implemented.

Table of Contents

List of Figures

List of Tables

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).

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.
Key Biodiversity Area are globally recognised sites that contain significant concentrations of biodiversity.

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.

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)*

Acronyms

CBA	Critical Biodiversity Area
CR	Critically Endangered
CCR	Core Cape Subregion
ECO	Environmental Control Officer
EDGE	Evolutionarily Distinct and Globally Endangered
EN	Endangered
EIA	Environmental Impact Assessment
EOO	Extent of Occupancy
GBIF	Global Biodiversity Information Facility
GCFR	Greater Cape Floristic Region
GIS	Geographical Information System
IBA	Important Birding Areas
IUCN	International Union for Conservation of Nature
KBA	Key Birding Areas
LC	Least Concern
NBSAP	National Biodiversity and Strategy Action Plan
NEMBA	National Environmental Management Biodiversity Act
PAOI	Project Area of Influence
PNCO	Provincial Nature Conservation Ordinance
SCC	Species of Conservation Concern
QDS	Quarter Degree Square
SA	South Africa
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
TOPS	Threatened and Protected Species
VU	Vulnerable

Specialist Check List

The contents of this specialist report complies with the legislated requirements as described in the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN R. 320 of 2020).

SPECIALIST REPORT REQUIREMENTS ACCORDING TO GN R. 320			SECTION OF REPORT
3.1	The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:		
	3.1.1	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Page 2 and Appendix 1 and 2
	3.1.2	A signed statement of independence by the specialist;	Page 2
	3.1.3	A statement of the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 2.3
	3.1.4	A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	Chapter 2
	3.1.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	Section 1.3
	3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	Section 5.3
	3.1.7	Additional environmental impacts expected from the proposed development;	Chapter 6
	3.1.8	Any direct, indirect and cumulative impacts of the proposed development;	Chapter 6
	3.1.9	The degree to which the impacts and risks can be mitigated;	Chapter 6
	3.1.10	The degree to which the impacts and risks can be reversed;	
	3.1.11	The degree to which the impacts and risks can cause loss of irreplaceable resources;	
	3.1.12	Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	Section 7.2
	3.1.13	A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a “low” terrestrial biodiversity sensitivity and that were not considered appropriate;	N/A
	3.1.14	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	Chapter 7
	3.1.15	Any conditions to which this statement is subjected.	Section 7.2
3.2	The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant.		✓
3.3	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.		

1. INTRODUCTION

1.1. Project Location and Description

The project entails the development of an ICAO Code 2 grass landing strip, one (1) Hangar and a semi-permanent reservoir on Portion 1 of Farm 172, near Herbertsdale, Mossel Bay Municipality, Western Cape Province (Figure 1.1 AND 1.2).

The landing strip will be used for private flights (this is the primary objective of the landing strip) for the owner and/or guests he may be bringing in. In addition and due to its proximity to Gondwana but also because of the presence of large game, the landing strip may also be used for local fire fighting as well as anti-poaching as and when may be necessary for on-site or the neighbouring Gondwana Game Reserve. It is anticipated that there will be a maximum of 4-8 flights per month, with the exception of emergency (fire) or anti-poaching flights.

The airstrip will be a rolled (compacted) grass surface. The compacted grass runway will be created by regularly mowing the existing vegetation and then compacted with a heavy roller until the surface complies with the required standards. Rocks that are located on the runway will be removed by hand to ensure the safe landing of planes. The airstrip will be 1154.73m long and 20m wide and covers an area of 2.3ha.

A 50m safe zone covering an area of approximately 12ha will be brushcut around the runway to allow pilots to observe any obstacles such as animals that might be moving towards the runway.

A hanger building (20m x 20m), a compacted grass apron/parking area, a taxiway and a turning circle area, will be constructed next to the runway. A semi-permanent (corrugated iron) water reservoir with a 125 000 litre (125m^3) capacity will be located next to the turning circle. The construction reservoir will not require the removal of any vegetation or soil.

The 7m high hanger building will be a steel frame covered with galvanised chromadek roof and wall sheeting. The building will have a concrete floor and cover an area of approximately 400m^2 and will contain one toilet, basin, shower and kitchen sink that will be linked to a conservancy tank that will be emptied when required with a private tanker truck and disposed of at an approved municipal facility.

The estimated footprint breakdown of the facilities includes:

- 50m brushcut safe zone: 12.21 ha
- Brushcut & rolling of landing strip: 2.3ha
- Hanger: 400m^2
- Apron/Parking area: 3000m^2
- Taxiway: 2000m^2
- Turning circle: 1427m^2
- Water reservoir: 33m^2

The purpose of this report is to assess the impact of the project on the terrestrial ecology of the project site and immediate surrounds.

Figure 1.1: Map showing the location of the proposed runway in relation to Herbetsdale and Mosselbay

Figure 1.2: Map showing the proposed layout of the airstrip and associated safety zone.

1.2. DFFE Environmental Risk Screener

The results from the national Department of Forestry, Fisheries and Environment (DFFE) Screening Tool for the site, show that the proposed project area falls within an area with a:

- High Animal Species Theme based on the presence of threatened bird species including Denham's Bustard (*Neotis denhami*) and Knysna Warbler (*Bradypterus sylvaticus).*
- Medium Plant Species Theme based on the likely presence of 30 threatened plant species.
- Very high Biodiversity Theme based on the presence of Ecological support area 1 and Critically endangered ecosystem.

The results from the field survey (refer to section 6.4) indicate that a full assessment is required for the Plant, Animal and Terrestrial Biodiversity Themes. This report provides comment on each of these themes

Please note this report does not include invertebrates.

1.3. Objectives

The objectives of the ecological assessment are as follows:

- Undertake a desktop assessment of the site to determine its sensitivity and species of conservation concern (SCC) that could be present within the site.
- Undertake a botanical field survey, to record the following information:
    - Species present
    - Identification of species that are either protected (TOPS and PNCO) or considered threatened (CR, EN, VU) on the South African Red Data List
    - Assess the level of degradation/ecological status of the site (i.e. intact, near natural, transformed)
- Undertake a faunal assessment to determine the likelihood of occurrence of species of conservation concern.
- Assess the sensitivity of the site using the sensitivity analysis outlined in the Species Guideline Document (2020)
- For areas of moderate and high sensitivity, assess the impact that the construction of the development will have on the plant and faunal species.
- Where necessary, provide mitigation measures to reduce the impact of the infrastructure on the environment.
- Provide a specialist statement/opinion

1.4. Limitations and Assumptions

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

- The report is based on a project description received from the client.
- Species of Conservation Concern (SCC) are difficult to find and may be difficult to identify, thus species described in this report do not comprise an exhaustive list.
- Sampling was carried out during spring when the majority of plants were in flower. However, it is possible that some early flowering geophytes may have gone undetected. This has been supplemented by the desktop assessment where comment has been made on the likelihood of occurrence of species of conservation concern based on habitat availability.

2. METHODOLOGY

2.1. Project Area

The "project area" is defined as the area that will be directly impacted by project infrastructure. In this instance it is the runway and associated safe zone. The project area of influence (PAOI) refers to the broader area around the project area that may be indirectly impacted by project activities.

2.2. Desktop Assessment

2.2.1. Plants and Terrestrial Biodiversity

A desktop assessment was undertaken prior to the site visit to determine the vegetation types present, identify species of conservation concern that might occur on site and identify the threat and conservation status of the project site. Key resources that were consulted include:

- The DFFE screening report for the site;
- The South African Vegetation Map (Mucina and Rutherford, 2018);
- The Western Cape Biodiversity Spatial Plan (2017);
- The Red List of Terrestrial Ecosystems (SANBI, 2021);
- National Biodiversity Management: Biodiversity Act (NEMBA) List of Threatened or Protected Species;
- The National Biodiversity Assessment (SANBI, 2018);
- The Plants of Southern Africa (POSA) database; and
- iNaturalist.

A species list was compiled for the site and the likelihood of occurrence assessed for species listed as critically endangered, endangered and vulnerable (Section 4.5).

2.2.2. Fauna

A desktop assessment was undertaken to determine which faunal species that have a distribution that includes the project area and those that have been recorded in the general area. Key resources that were consulted include:

- Amphibians –Du Preez & Carruthers (2017), FrogMap (ADU, 2021);
- Reptiles – Branch (1998), ReptileMap (ADU, 2021);
- Birds – Chittenden (2009), SABAP2; and
- Mammals – Stuart & Stuart (2014), MammalMap (ADU, 2021).
- Gondwana Private Nature Reserve list of faunal species (Annexure 4)

To establish which of those species identified in the literature review are Species of Conservation Concern (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;
- Red Data book of Birds of South Africa, Lesotho and Swaziland (Taylor et al., 2015); and
- CITES Appendix I and II.

2.3. Field Survey

A field survey was undertaken in spring on the 22 September 2022 during the flowering season. The purpose of the survey was to assess the site-specific ecological state of the project area by recording the species present (both indigenous and alien invasive species), identifying sensitive ecosystems (e.g. areas with species of conservation concern), identifying faunal habitat present and identifying the current land use.

Most plants within the site were in flower during the survey however some early flowering geophytes may have gone undetected. To supplement this, comment has been provided on the likelihood of occurrence of SCC identified in the DFFE screening report and available literature based on the condition of the site and the previous land use.

The project site was walked and all species within the site recorded, including alien invasive species and potential SCC. The site 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 points and tracks within and adjacent to the project site.

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 species of conservation concern in the project area were assessed based on their conservation importance, functional integrity and receptor resilience (Table 2.1). 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 2.1: Criteria for establishing Site Ecological Importance and description of criteria

Criteria	Description
Conservation Importance (CI)	*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.*
Functional Integrity (FI)	*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.*
Biodiversity Importance (BI) is a function of Conservation Importance (CI) and the Functional Integrity (FI) of a receptor.	
Receptor Resilience (RR)	*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.*
Site Ecological Importance (SEI) is a function of Biodiversity Importance (BI) and Receptor Resilience (RR)	

2.5. Description of impact analysis methodology used

To ensure a balanced and objective approach to assessing the significance of potential impacts, a rating scale developed by CES has been developed in accordance with the requirements outlined in Appendix 1 of the EIA Regulations (2014 and subsequent 2017 & 2021 amendments).

Impact significance pre-mitigation

This rating scale adopts six key factors to determine the overall significance of the impact prior to mitigation:

1. **Nature of impact:** Defines whether the impact has a negative or positive effect on the receiving environment.
2. **Type of impact:** Defines whether the impact has a direct, indirect or cumulative effect on the environment.
3. **Duration:** Defines the relationship of the impact to temporal scales. The temporal scale defines the significance of the impact at various time scales as an indication of the duration of the impact. This may extend from the short-term (less than 5 years, equivalent to the construction phase) to permanent. Generally, the longer the impact occurs the greater the significance of any given impact.

4. **Extent:** Describes the relationship of the impact to spatial scales i.e. the physical extent of the impact. This may extend from the local area to an impact that crosses international boundaries. The wider the spatial scale the impact extends, the more significant the impact is considered to be.
5. **Probability:** Refers to the likelihood (risk or chance) of the impact occurring. While many impacts generally do occur, there is considerable uncertainty in terms of others. The scale varies from unlikely to definite, with the overall impact significance increasing as the likelihood increases.
6. **Severity or benefits:** The severity/beneficial scale is used in order to scientifically evaluate how severe negative impacts would be, or how beneficial positive impacts would be on the receiving environment. The severity of an impact can be evaluated prior and post mitigation to demonstrate the seriousness of the impact if it is not mitigated, as well as the effectiveness of the mitigation measures. The word 'mitigation' does not only refer to 'compensation', but also includes concepts of containment and remedy. For beneficial impacts, optimization refers to any measure that can enhance the benefits. Mitigation or optimisation should be practical, technically feasible and economically viable.

For each impact, the duration, extent and probability are ranked and assigned a score. These scores are combined and used to determine the overall impact significance prior to mitigation. They must then be considered against the severity rating to determine the overall significance of an activity. This is because the severity of the impact is far more important than the other three criteria. The overall significance is either negative or positive (Criterion 1) and direct, indirect or cumulative (Criterion 2).

Table 2.2: Evaluation Criteria.

Duration (Temporal Scale)		
Short term	*Less than 5 years*	
Medium term	*Between 5-20 years*	
Long term	*Between 20 and 40 years (a generation) and from a human perspective also permanent*	
Permanent	*Over 40 years and resulting in a permanent and lasting change that will always be there*	
Extent (Spatial Scale)		
Localised	*At localised scale and a few hectares in extent*	
Study Area	*The proposed site and its immediate environs*	
Regional	*District and Provincial level*	
National	*Country*	
International	*Internationally*	
Probability (Likelihood)		
Unlikely	*The likelihood of these impacts occurring is slight*	
May Occur	*The likelihood of these impacts occurring is possible*	
Probable	*The likelihood of these impacts occurring is probable*	
Definite	*The likelihood is that this impact will definitely occur*	
Severity Scale	*Severity*	*Benefit*
Very Severe/ Beneficial	An irreversible and permanent change to the affected system(s) or party(ies) which cannot be	A permanent and very substantial benefit to the affected system(s) or party(ies), with no real alternative to achieving this

	mitigated.	benefit.
Severe/ Beneficial	Long term impacts on the affected system(s) or party(ies) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming, or some combination of these.	A long-term impact and substantial benefit to the affected system(s) or party(ies). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these.
Moderately severe/Beneficial	Medium to long term impacts on the affected system(s) or party (ies), which could be mitigated.	A medium to long term impact of real benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are equally difficult, expensive and time consuming (or some combination of these), as achieving them in this way.
Slight	Medium- or short-term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary.	A short to medium term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these.
No effect/don't or can't know	The system(s) or party(ies) is not affected by the proposed development.	In certain cases, it may not be possible to determine the severity of an impact.

** In certain cases, it may not be possible to determine the severity of an impact thus it may be determined: Don't know/Can't know.*

Table 2.3: Description of Overall Significance Rating

Significance Rate		***Description***
Don't Know		*In certain cases, it may not be possible to determine the significance of an impact. For example, the primary or secondary impacts on the social or natural environment given the available information.*
NO SIGNIFICANCE		*There are no primary or secondary effects at all that are important to scientists or the public.*
LOW NEGATIVE	***LOW POSITIVE***	*Impacts of low significance are typically acceptable impacts for which mitigation is desirable but not essential. The impact by itself is insufficient, even in combination with other low impacts, to prevent the development being approved. These impacts will result in negative medium to short term effects on the natural environment or on social systems.*
MODERATE NEGATIVE	**MODERATE POSITIVE**	*Impacts of moderate significance are impacts that require mitigation. The impact is insufficient by itself to prevent the implementation of the project but in conjunction with other impacts may prevent its implementation. These impacts will usually result in a negative medium to long-term effect on the natural environment or on social systems.*

HIGH NEGATIVE	***HIGH POSITIVE***	*Impacts that are rated as being high are serious impacts and may prevent the implementation of the project if no mitigation measures are implemented, or the impact is very difficult to mitigate. These impacts would be considered by society as constituting a major and usually long-term change to the environment or social systems and result in severe effects.*
VERY HIGH NEGATIVE	***VERY HIGH POSITIVE***	*Impacts that are rated as very high are very serious impact which may be sufficient by itself to prevent the implementation of the project. The impact may result in permanent change. Very often these impacts are unmitigable and usually result in very severe effects or very beneficial effects.*

Impact significance post-mitigation

Once mitigation measures are proposed, the following three factors are then considered to determine the overall significance of the impact after mitigation.

1. **Reversibility Scale**: This scale defines the degree to which an environment can be returned to its original/partially original state.
2. **Irreplaceable loss Scale:** This scale defines the degree of loss which an impact may cause.
3. **Mitigation potential Scale:** This scale defines the degree of difficulty of reversing and/or mitigating the various impacts ranges from very difficult to easily achievable. Both the practical feasibility of the measure, the potential cost and the potential effectiveness is taken into consideration when determining the appropriate degree of difficulty.

Table 2.4: Post-mitigation Evaluation Criteria

Reversibility	
Reversible	*The activity will lead to an impact that can be reversed provided appropriate mitigation measures are implemented.*
Irreversible	*The activity will lead to an impact that is permanent regardless of the implementation of mitigation measures.*
Irreplaceable loss	
Resource will not be lost	*The resource will not be lost/destroyed provided mitigation measures are implemented.*
Resource will be partly lost	*The resource will be partially destroyed even though mitigation measures are implemented.*
Resource will be lost	*The resource will be lost despite the implementation of mitigation measures.*
Mitigation potential	
Easily achievable	*The impact can be easily, effectively and cost effectively mitigated/reversed.*
Achievable	*The impact can be effectively mitigated/reversed without much difficulty or cost.*
Difficult	*The impact could be mitigated/reversed but there will be some difficultly in ensuring effectiveness and/or implementation, and significant costs.*
Very Difficult	*The impact could be mitigated/reversed but it would be very difficult to ensure effectiveness, technically very challenging and financially very costly.*

The following assumptions and limitations are inherent in the rating methodology:

- Value Judgements: Although this scale attempts to provide a balance and rigor to assessing the significance of impacts, the evaluation relies heavily on the values of the person making the judgment.
- Cumulative Impacts: These affect the significance ranking of an impact because it considers the impact in terms of both on-site and off-site sources. This is particularly problematic in terms of impacts beyond the scope of the proposed development. For this reason, it is important to consider impacts in terms of their cumulative nature.
- Seasonality: Certain impacts will vary in significance based on seasonal change. Thus, it is difficult to provide a static assessment. Seasonality will need to be implicit in the temporal scale, with management measures being imposed accordingly (e.g. dust suppression measures being implemented during the dry season).

3. DESCRIPTION OF THE RECEIVING ENVIRONMENT

3.1. Climate, topography, geology and soils

The project site is located within the Fynbos Biome which is situated along most of the Cape Fold Belt as well as the adjacent lowlands between the mountains and the Atlantic Ocean in the west and the Indian Ocean in the south (Mucina *et al.,* 2011). This region is comprised of a mosaic of geological substrates made up of sandstone, quartzite, granite, gneiss, shales and young limestone sediments. Within Swellendam Silcrete Fynbos, the vegetation type in which the project site occurs, the substrate is comprised of silcrete and conglomerate with dry, shallow, loamy sand of Houwhoek form.

Climate is characterised by a mean annual precipitation of 320-860mm with no obvious peak. However, slightly drier months occur in December and January. Mean daily maximum for the area is 28°C in January and the mean daily minimum is 5.5°C in July.

The topography of the site is relatively flat with a change in elevation from 362 m asl to 372 masl (difference of 10m) between the western and eastern boundary (Figure 3.1).

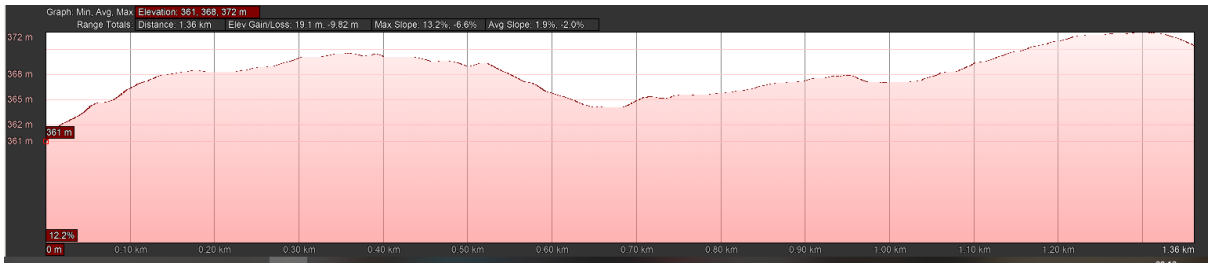


Figure 3.1: Elevation profile of the site from north to south

3.2. Historical and current land Use

Historical imagery of the site was obtained for 1969, 2005, 2011, 2018 and 2022 (Figure 3.2 and 3.3). Imagery from 1969 indicates that a large portion of the eastern site was once cleared. Based on the 2005 imagery, which shows striations, it is likely that this was for cultivation. The land appears to have been left fallow from at least 2005 onwards and over time has slowly returned to a near natural state with a combination of indigenous species and alien invasive species such as black wattle *(Acacia mearnsii).*

The land is currently used as a private game reserve and antelope and big game species such as buffalo and lions are present.

Figure 3.2: Aerial imagery from 1969 of the proposed site, showing areas that were previously cleared.

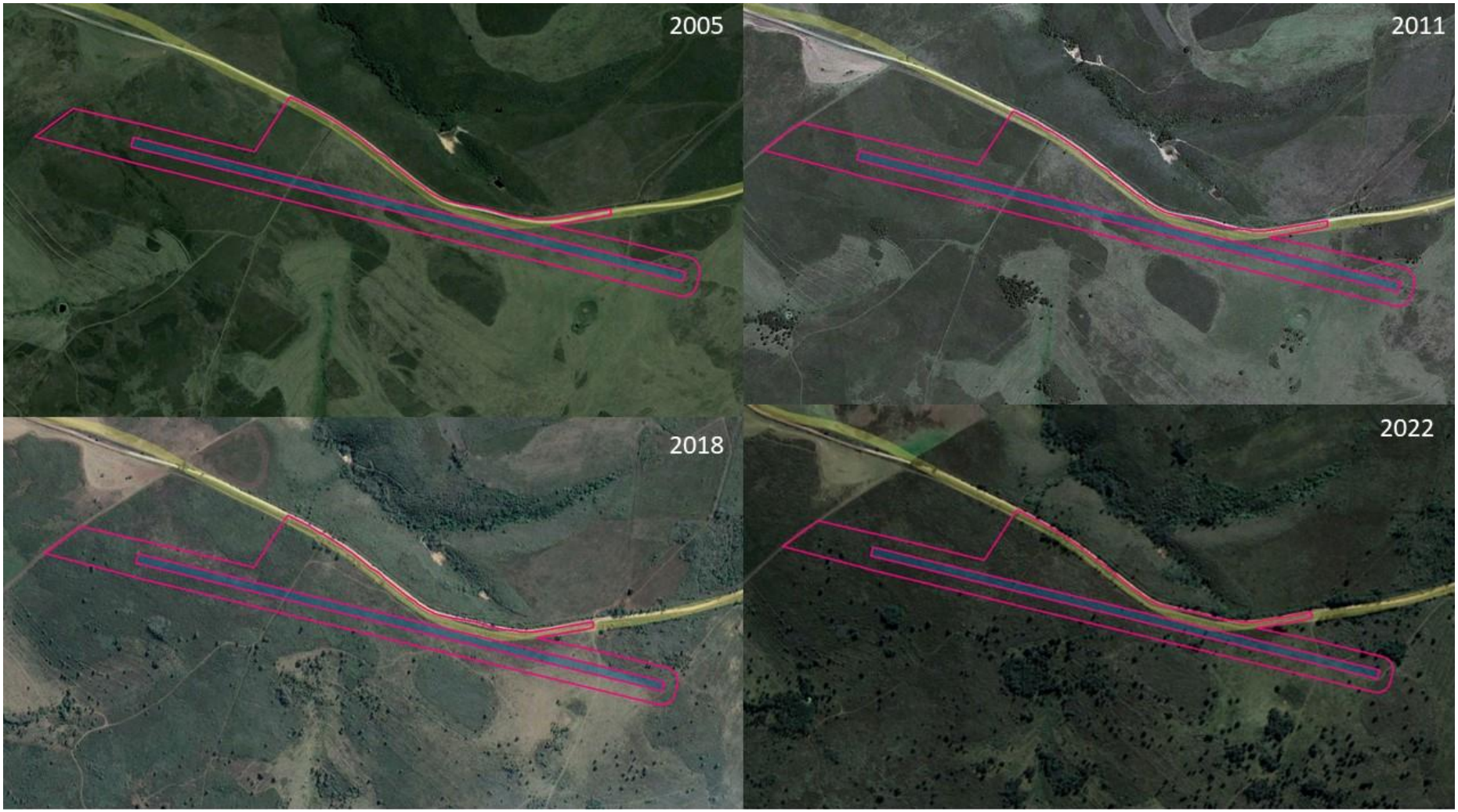


Figure 3.3: Satellite imagery showing the historical land use between 2005 and 2022

4. VEGETATION AND FLORISTICS

4.1. Vegetation

The project site occurs within the Fynbos Biome which occupies most of the Cape Fold Belt as well as the lowlands that occur between the mountains and the Atlantic Ocean in the west and south (Rebelo *et. al*. 2006). Within the biome are three vegetation complexes namely fynbos, renosterveld and strandveld. Of relevance to this project is fynbos which is described as a evergreen, fire-prone shrubland characterised by communities of restios, ericoid shrubs and proteoid shrubs.

According to the National Vegetation Map (2018), which was compiled to provide a greater level of detail for floristically based vegetation units in South Africa, the project site occurs within Swellendam Silcrete Fynbos with South Outeniqua Sandstone Fynbos to the north and Mossel Bay Shale Renosterveld to the south (Figure 4.1).

4.1.1. Swellendam Silcrete Fynbos

Swellendam Silcrete Fynbos, the vegetation type that the proposed development will impact, occurs in the Western Cape Province as relatively large patches on the Langeberg, from Swellendam to the region between Riversdale and Albertinia (Rebelo *et al.,* 2006). It then becomes highly fragmented north of Albertinia up to the Kleinbrak River. It is associated with mainly undulating hills and is structurally a medium tall evergreen shrubland or grassland. Species are mostly asteraceous although it becomes graminoid in disturbed areas. Proteoid fynbos is common on the southern slopes and ericaceous fynbos is found in wetter habitats.

This vegetation type is listed as Endangered with a conservation target of 30%. This vegetation type is poorly protected with only 4% statutorily conserved. Of the 868ha of historical extent, 390 ha (45%) remains intact.

4.1.2. South Outeniqua Sandstone Fynbos

South Outeniqua Sandstone Fynbos occurs in the Western Cape Province on the southern slopes of the Outeniqua Mountains (Rebelo *et al.,* 2006). It is associated with gentle to steep south-facing slopes. The dominant vegetation is tall, open to medium dense shrubland with a medium dense, medium tall shrub understorey. It is mainly proteoid and restioid fynbos with ericaceous fynbos on the upper slopes. Grassy fynbos is common in the lower areas and scrub fynbos in the riparian areas.

This vegetation type is listed as Least Concern with a conservation target of 23%. This vegetation type is listed as well protected with 47% statutorily conserved. Of the 1571 ha of historical extent, 1053ha (67%) remains intact.

4.1.3. Mossel Bay Shale Renosterveld

Mossel Bay Shale Renosterveld occurs in the Western Cape Province on the coastal plains and valleys from Riversdale to Botterberg, west of the Robinson Pass. It is associated with undulating hills and tablelands and is steeply dissected by rivers. The vegetation is characterised as a medium dense, medium tall cupressoid-leaved shrubland dominated by renosterbos and large, sparse shrubs. Thicket patches and thicket elements are common in fire safe environments such as steep slopes, gullies and termitaria.

This vegetation type is listed as Critically Endangered with a conservation target of 27%. None is statutorily conserved. Of the 866ha of historical extent, 329 ha (38%) remains intact.

4.2. Vegetation types recorded on site

Within the project area are two distinct vegetation types. On the eastern half is degraded grassy fynbos that has returned after the area was previously disturbed (refer to section 3.2) (Figure 4.2). Dominant graminoid species include *Cenchrus clandestinus, Cynadon dactylon* and *Eragrostis capensis*. Within the grassy layer are some indigenous fynbos species such as *Helichrysum cymosum, Helichrysum patulum, Nidorella ivifolia, Stoebe plumosum, Phylica purpurea, Erica quadrangularis, Romulea flava* and *Romulea rosea. Acacia mearnsii* is scattered throughout the site. The vegetation structure is typically half a meter with some emergent shrubs reach 1-1.5m.

The western half of the project site is a medium tall shrubland of 1.5-2m tall and is representative of degraded Swellendam Silcrete Fynbos (Figure 4.3). Dominant species include *Leucandendron salignum, Protea neriifolia, Leucadendron rubrum, Hermannia salviifolia, Phylica purpurea, Oedera imbricata, Selago dolosa, Crassula tetragona, Achyranthemum paniculatum* and *Metatlasia densa. Acacia mearnsii* is scattered throughout the site.

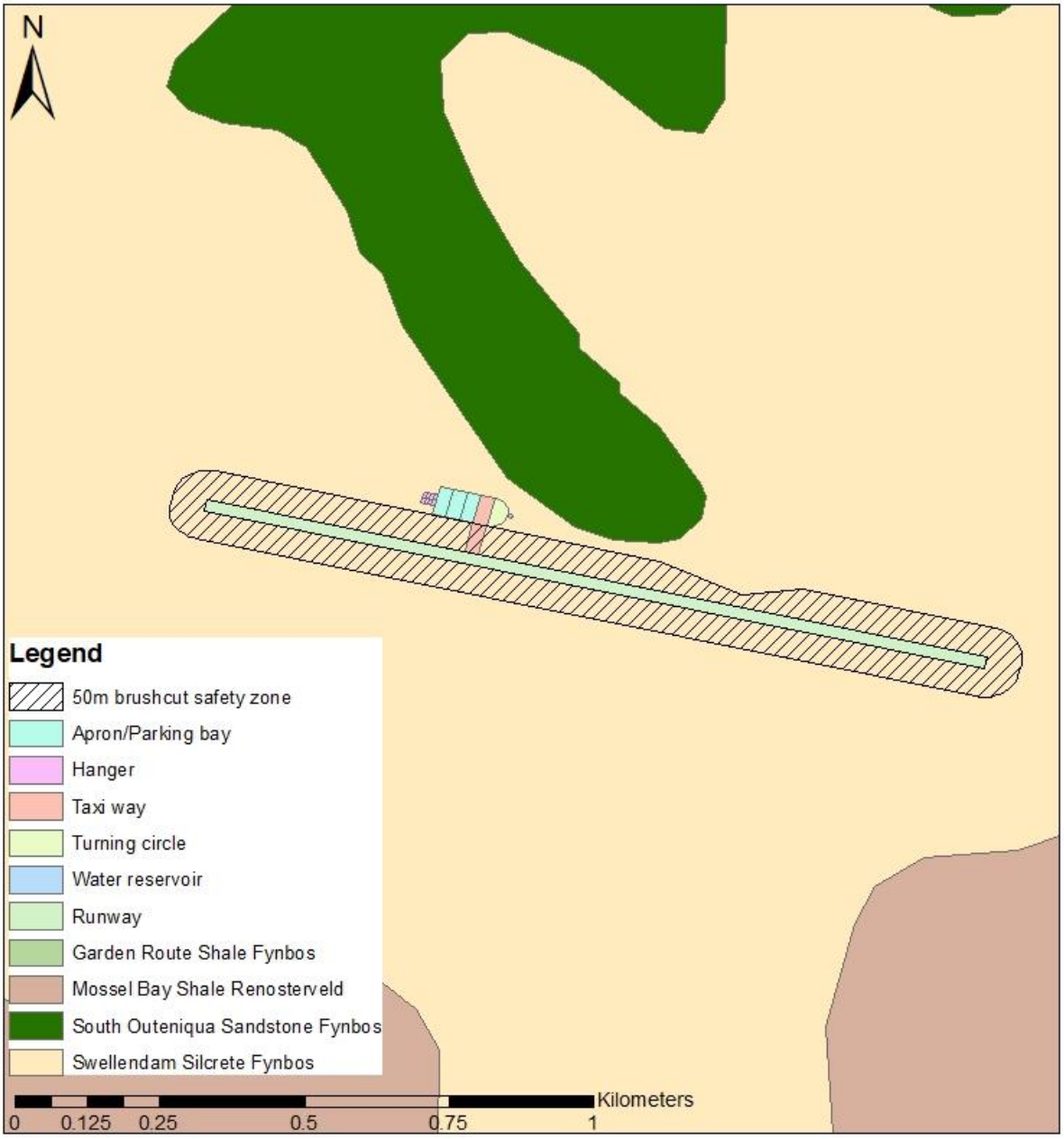


Figure 4.1: National Vegetation Map showing the proposed project site in relation to the vegetation types present.

Figure 4.2: Typical vegetation found along the eastern section of the proposed development

Figure 4.3: Typical vegetation found within the western section of the proposed development

Figure 4.4: Vegetation map for the proposed project site

4.3. Floristics

Thirty-three species were recorded within the project site (Table 4.1). Of these thirty-three species, none are listed on the South African Red Data List and ten are listed as Schedule 4 (Protected) species on the Western Cape Nature Conservation Law Amendment Act (2000). Schedule 4 species will require permits for their removal. No species on the TOPS list were recorded within the site.

One species, *Acacia mearnsii* (Black Wattle) is listed as a Category 1b Alien Invasive Plant Species on the National Environmental Management: Biodiversity Act (2004) Alien Invasive Species Lists, 2020. Individuals of this species must be removed and project activities must not result in the further spread of these alien invasive species.

Table 4.1: A list of species recorded on site and their conservation status

Family	Scientific Name	Red List Status	PNCO
FABACEAE	*Acacia mearnsii*	NE	
RUBIACEAE	*Anthospermum aethiopicum*	LC	
ASTERACEAE	*Athanasia quinquedentata*	LC	
IRIDACEAE	*Bobartia macrospatha*	LC	Schedule 4
POACEAE	*Cenchrus clandestinus*	NE	
SCROPHULARIACEAE	*Chaenostoma campanulatum*	LC	
PTERIDACEAE	*Cheilanthes capensis*	LC	
ROSACEAE	*cliffortia ruscifolia*	LC	
CRASSULACEAE	*Crassula tetragona*	LC	
POACEAE	*Eragrostis capensis*	LC	
ERICACEAE	*Erica quadrangularis*	LC	Schedule 4
ERICACEAE	*Erica discolor*	**LC**	Schedule 4
ASTERACEAE	*Helichrysum cymosum*	LC	
ASTERACEAE	*Helichrysum patulum*	LC	
MALVACEAE	*Hermannia flammula*	LC	
MALVACEAE	*Hermannia salviifolia*	LC	
AIZOACEAE	*Lampranthus elegans*	LC	Schedule 4
PROTEACEAE	*Leucadendron rubrum*	LC	Schedule 4
PROTEACEAE	*Leucadendron salignum*	LC	Schedule 4
LOBELIACEAE	*Lobelia tomentosa*	LC	
IRIDACEAE	*Moraea setifolia*	LC	Schedule 4
ASTERACEAE	*Nidorella ivifolia*	LC	
ASTERACEAE	*Oedera imbricata*	LC	
GERANIACEAE	*Pelargonium candicans*	LC	
RHAMNACEAE	*Phylica purpurea*	LC	
PROTEACEAE	*Protea neriifolia*	LC	Schedule 4
IRIDACEAE	*Romulea flava*	LC	Schedule 4
IRIDACEAE	*Romulea rosea*	LC	Schedule 4
SCROPHULARIACEAE	*Selago dolosa*	LC	
ASTERACEAE	*Stoebe plumosum*	LC	
ASTERACEAE	*Syncarpha paniculatum*	LC	
FABACEAE	*Tephrosia capensis*	LC	

4.4. Species of Conservation Concern

A list of species of conservation concern that could occur within the project site was compiled during the desktop study. This list drew on records from the POSA database, the DFFE screener and records from iNaturalist. Thirty SCC were identified in the literature as possibly occurring on site. The likelihood of occurrence was assessed for each of these species based on their distribution and habitat requirements and compared to available habitat within the project site. Of these thirty species, four have a high likelihood of occurrence within the site (Table 4.2), eight have a moderate likelihood of occurrence and eighteen have a low likelihood of occurrence (Appendix 3).

Table 4.2: List of Species of Conservation Concern that were confirmed or have a high likelihood of occurrence within the project site based on habitat availability.

Family	Scientific Name	Red List Status	Description	Likelihood of Occurrence
ERICACEAE	*Erica unicolor subsp. mutica*	EN	This species is known from less than five locations, occuring between Mossel Bay to Herbetsdale and George (Manyama, 2007). It is associated with lowlands and lower south and north-facing slopes in fynbos. This species has a high likelihood of occurrence within the project site.	High
RUTACEAE	*Diosma passerinoides*	VU	This species is known from 25 subpopulations from Robertson and Caledon to Bredasdorp, Albertinia and eastwards to Baviaanskloof (Raimondo and Zikishe, 2012). It occurs in renosterveld on dry clay soils and is associated with patches of silcrete. There are records of this species south of the project site and as such the likelihood of occurrence is high.	High
IRIDACEAE	*Freesia fergusoniae*	VU	This species is known from fewer than 20 locations where it occurs from Swellendam to Oudtshoorn and Mossel Bay (Raimondo *et al.,* 2018). It is associated with clay soils in renosterveld. The likelihood of occurrence within the project site is high.	High
	Sensitive species 800	VU	This species occurs from the Cape Peninsula to Knysna and is associated with limestone and clay loam soils in fynbos, renosterveld and coastal lowlands (Vlok *et al.,* 2008). There are records of this species within close proximity of the site and as such the likelihood of occurrence is High.	High

5. FAUNA

5.1. Amphibians

The Western Cape hosts 62 amphibian species, 36 of which are endemic to the Western Cape, eight are threatened and seven are near threatened (Turner & Villiers, 2017).

The project area intersects the distribution range of 22 amphibian species all listed as least concern (IUCN, 2022; Du Preez & Carruthers, 2017).

Of the 22 species eight have been confirmed within the same QDS of the project area and 13 were recorded in the study area (FitzPatrick, 2022; iNaturalist, 2022). Gondwana have recorded 11 amphibian species (Annexure 4).

The habitat available in the runway could support the Rain Frog (*Breviceps sp*.) species and the wetland downslope to the east of runway likely supports amphibian breeding in the wet season. During the site visit the Clicking Stream Frog was heard calling from the dry wetland.

No threatened amphibian species have a distribution which includes the project area.

Five Western Cape endemic amphibian species have a distribution which includes the project area (Table 5.1; Figure 5.1). Three western cape endemic species have a low likelihood of occurrence within the project area based on habitat available and two species have a high likelihood of occurrence (Table 4.2). None of these species solely depend on the project area for survival and although endemic none are significantly range restricted therefore the species is very unlikely to be detrimentally impacted on by the loss of the project area.

Table 5.1: WC Endemic amphibian species in relation to the project area and the likelihood of occurrence.

Species	Threat Status	Habitat	Occurrence in the project area
Arum Lily Frog (*Hyperolius horstockii*)	LC	Coastal fynbos wetlands in heathland. Requires emergent vegetation in vleis, dams and slow-flowing streams with relatively permanent water for breeding. Avoids very deep water (IUCN SSC ASG, 2013). EOO: 18000 km^2 AOO: 900 km^2	Low No suitable habitat is present in the project area but could occur in the wetland east of the project footprint during breeding season.
Sand Toad (*Vandijkophrynus angusticeps*)	LC	Fynbos heathland and some agricultural areas. Requires temporary depressions in sandy and clay soils to breed (IUCN SSC ASG, 2013).	High Likely to occur within the project area in the dry season. Likely to occur in the wetland during breeding season.
Mountain Rain Frog *Breviceps montanus*	LC	Inhabits fynbos heathland and mountain fynbos and some pine plantations up to 1,600 m asl. This species does not require water to breed (IUCN SSC ASG, 2013).	High Suitable habitat is present in the project area.

Tradouw Mountain Toadlet *Capensibufo tradouwi*	LC	Near-endemic to the Western Cape entering Eastern Cape Province marginally. This species inhabits mountain fynbos heathland and grassy fynbos between 1,000-1,600 m asl. It breeds in permanent and temporary waterbodies including shallow pools in seepage areas, or moist depressions, vleis and slow streams (IUCN SSC ASG, 2013).	Low No suitable habitat is present in the project area but could occur in the wetland east of the project footprint during breeding season.
Banded Stream Frog *Strongylopus bonaespei*	LC	Inhabits mountain fynbos heath land and it is sometimes found on the margins of forest with an EOO of. 20,000 km^2. Breeds in shallow, seasonal, well-vegetated marshy areas and seepages in high winter rainfall areas (IUCN SSC ASG, 2013).	Low No suitable habitat is present in the project area but could occur in the wetland east of the project footprint during breeding season.

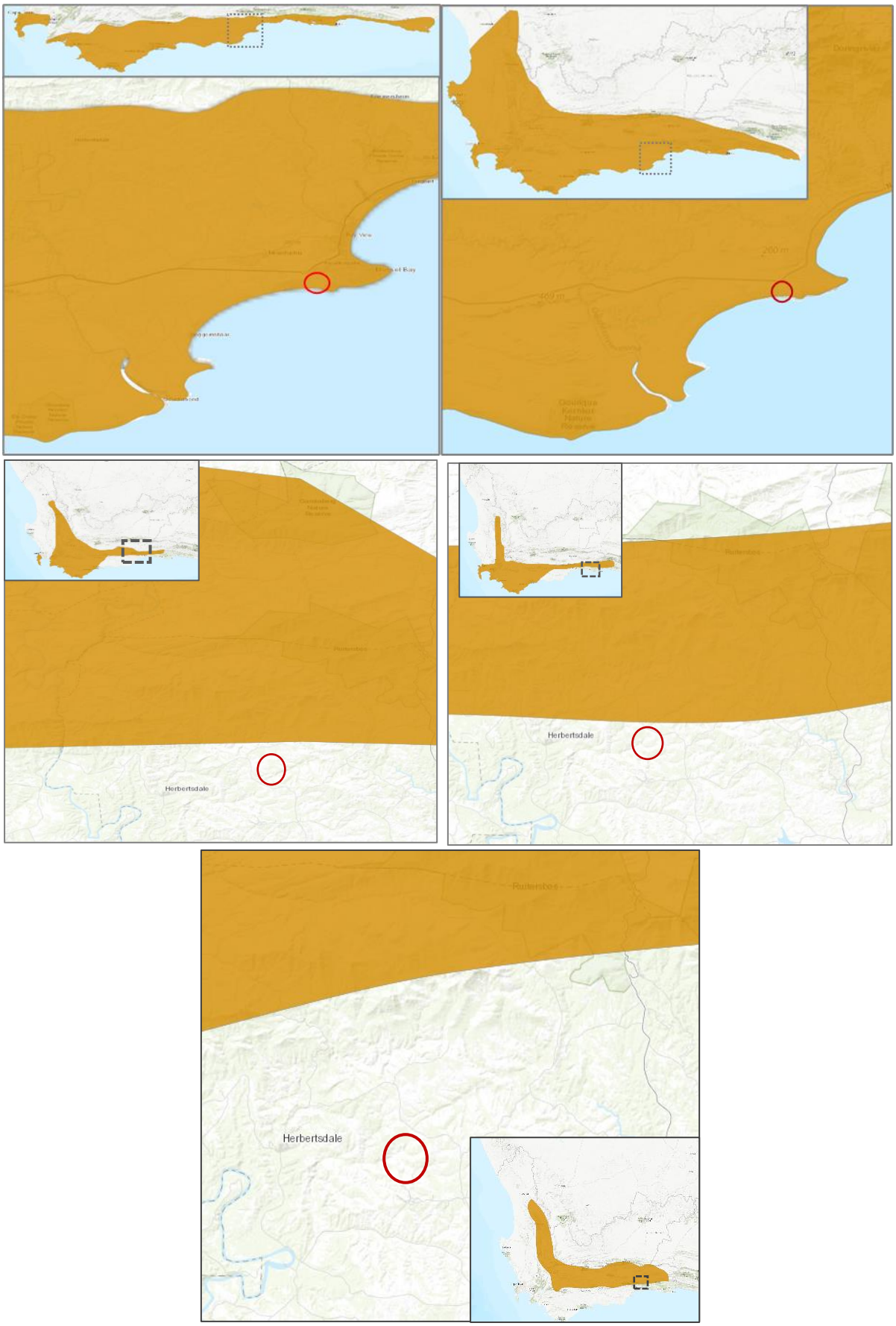


Figure 5.1: Distribution of West Cape endemic amphibian species in relation to the project site
Top left – bottom right: Arum Lily Frog (*Hyperolius horstockii*), Sand Toad (*Vandijkophrynus angusticeps*), Mountain Rain Frog (*Breviceps montanus),* Banded Stream Frog (*Strongylopus bonaespei*) and Tradouw Mountain Toadlet (*Capensibufo tradouwi*).

5.2. Reptiles

The Western Cape Province hosts 155 reptile species of which 22 are endemic and 21 species are either threatened or near-threatened (Turner & Villiers, 2017).

Approximately 71 reptile species have a distribution range that includes the project area. Of these 42 species have been confirmed within the same QDS of the project area and 24 have been recorded in the study area (ReptileMap, 2022; iNaturalist 2022). Gondwana have recorded 26 reptiles, this includes two tortoise species, one terrapin, 10 lizard species and 13 snake species (Annexure 4).

No threatened or near-threatened reptile species have a distribution which includes the project area.

One WC endemic species has a distribution which includes the project area, the Little Karoo Dwarf Chameleon (*Bradypodion gutturale*) and is listed as least concern (Figure 5.2). Suitable habitat is present within the proposed development footprint and this species is considered highly likely to occur in the project area (Table 5.2). This species is considered well protected in South Africa (Tolley, *et al*., 2019) and the loss of the habitat within the proposed development footprint is not expected to impact of the viability of this species.

Table 5.2: WC Endemic reptile species likelihood of occurrence.

Common name	Threat status		Habitat requirements	Likelihood of occurrence
	SARCA	IUCN		
Little Karoo Dwarf Chameleon *Bradypodion gutturale*	LC	LC	This species occurs from Worcestor to Uniondale and is associated with fynbos, renosterveld and karroid vegetation (Tolley, 2022; Tolley, 2018).	High This species has been recorded at seven locations within Gondwana and the proposed runway contains suitable habitat for this species.
	WC Endemic			

Figure 5.2: Distribution of endemic reptile species in relation to the project site (Tolley, 2022)

5.3 Mammals

The Western Cape hosts approximately 172 mammal species of which 24 species are threatened, 13 species are near threatened, eight endemic and ten near endemic species (Birss, 2017).

The project area falls with the distribution of 82 mammal species of which 59 have been recorded in the QDS (3421BB,3321DD). Gondwana have 49 known mammal species (Annexure 4).

Four threatened mammal species that occur in the Reserve have access to the project area, this includes Cheetah (VU), Bontebok (VU), White Rhino (NT), and Grey Rhebok (NT). None were observed in the project area during the site visit, and if they occur it is, most likely be transientl. None are expected to be solely dependent on the project area. There was evidence of Rhino activity as a midden was found in the western section.

In addition to the above SCC, one endangered, two vulnerable and five near threatened mammal species have a distribution which includes the project area (Table 5.3).

Only one species, the Fynbos Golden Mole, , although not observed during the field survey, has a high likelihood of occurrence in the project area given its wide habitat tolerance, however, the likelihood of it solely relying on the entire project site is low. Two species (African Striped Weasel and Spectacled Dormouse) have a moderate likelihood of occurrence within the project area and the likelihood that the project will have a direct impact on these species' habitat is low.

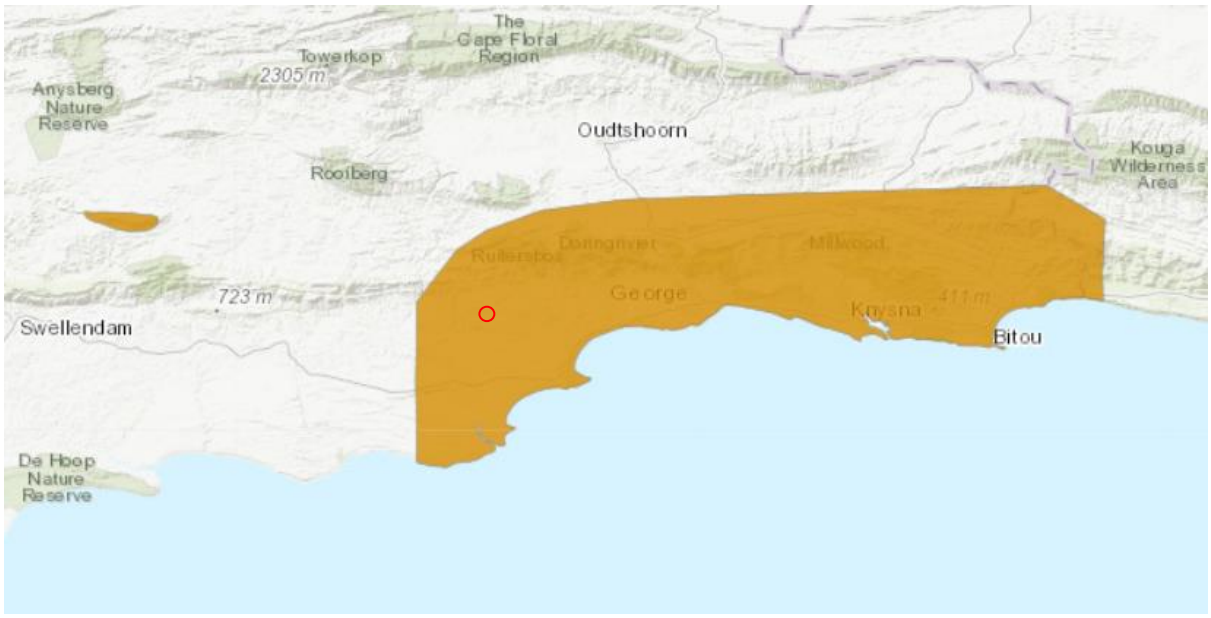


Figure 5.3: Distribution Range of the Long-tailed Forest Shrew (*Myosorex longicaudatus*) *(EN)* in relation to the project area (red circle) (Baxter et al., 2020)

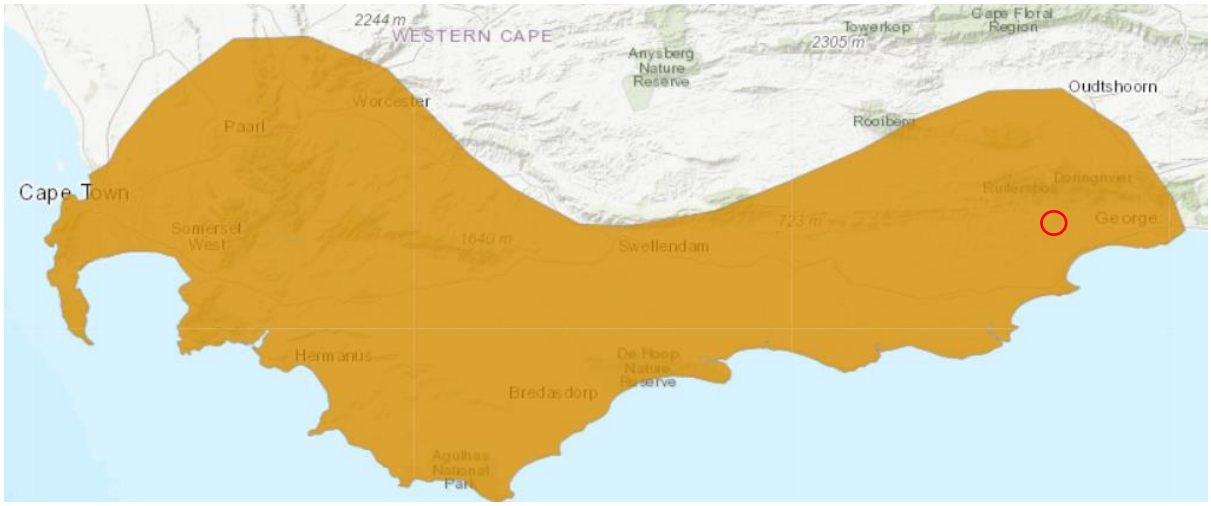


Figure 5.4: Distribution Range of the African Marsh Rat (*Dasymys capensis*) in relation to the project area (red circle)

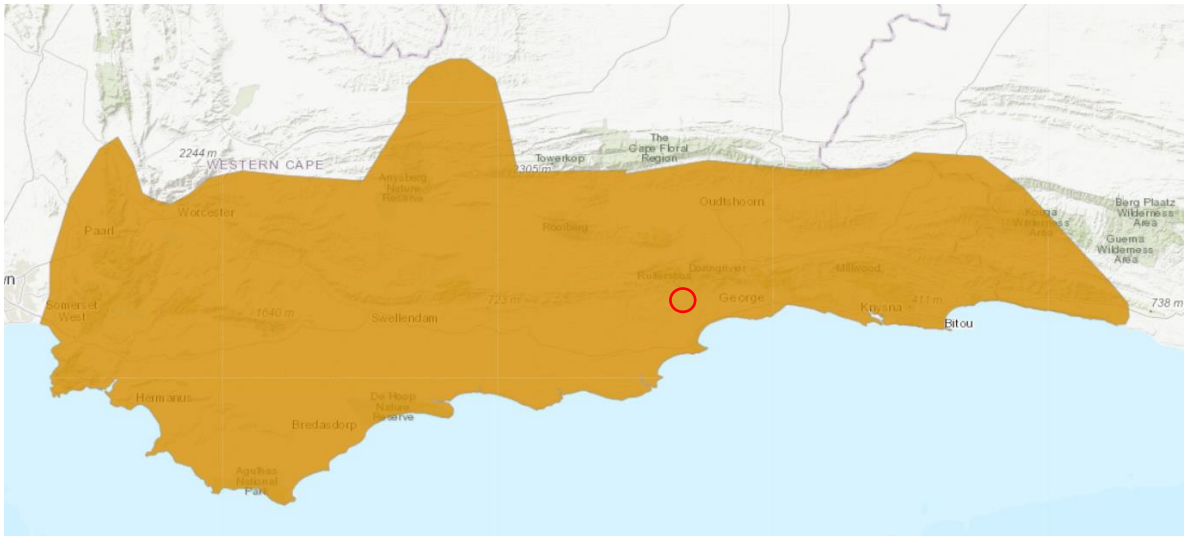


Figure 5.5: Distribution Range of the Fynbos Golden Mole (*Amblysomus corriae)* in relation to the project area (red circle) (Bronner. & Mynhardt, 2015).

Table 5.3: SCC with a distribution that includes the project area

Species name	Conservation status (Child et al., 2019)	Habitat	Likelihood of occurrence
Long-tailed Forest Shrew *Myosorex longicaudatus*	EN	This species is restricted to pristine primary forest, forests edges, fynbos and moist grassland habitat along deep valleys and south facing slopes. Its longer tails suggests an arboreal lifestyle. This endemic species is known from 5-6 locations. EOO: 2214-5000 AOO: 582-691 (Baxter *et al*,. 2016, Baxter et al., 2020)	Low No forest habitat exists within the project area but may occur in the Reserve itself.
Species 8	VU	Inhabits forested and wooded habitats, including primary and secondary forests, gallery forests, dry forest patches, coastal scrub farmland and regenerating forest. Within the assessment region, they occur mainly within scarp and coastal forests, thickets or dense coastal bush although they can occupy modified habitats or degraded forest and thicket, even on the edge of urban centres. They frequent forest glades and open areas but need dense underbrush to rest or take cover. They are selective foragers which mainly feed on fruit, dicots and a small percentage of monocots. (Venter et al., 2016)	Low No forest habitat exists within the project area but may occur in the Reserve itself.
Leopard *Panthera pardus*	VU	Densely wooded and rocky areas are preferred habitat although across its distribution it has a wide habitat tolerance (grassland savannah, coastal scrub, shrubland and semidesert) (Swanepoel, *et al*., 2016; Stein, *et al*., 2020).	Low This species is unlikely to occur within the project area. This species could use the nature reserve area for passage and hunting but has not been recorded as a permanent inhabitant.

African Marsh Rat *Dasymys capensis*	VU	Inhabits well vegetated and wet habitats including forests, savanna, grassland and swampland habitats (Pillay, et al., 2016).	Low There is no habitat within the project area for this species.
Fynbos Golden Mole *Amblysomus corriae*	NT	AOO: 256 km^2 EOO: 71,900 km^2 Inhabits Renosterveld and Fynbos sandy soils and soft loams as well as afromontane forest, moist savanna, plantations and transformed area such as agricultural areas, golf courses and gardens. Only known from 16 Locations in the Western Cape. It has been recorded in the adjoining reserve. (Bronner. & Mynhardt, 2015).	High Has a high likelihood of occurring in the project area.
Serval *Leptailurus serval*	NT	This species depends on vegetation boarding water sources such as wetlands, marshland, rank grass and vleis as well as well-watered savannah with long-grass. Servals prey on small mammals, birds, reptiles, fish, and rarely invertebrates. Their main diet consists of Vlei Rats (*Otomys sp.*) and Striped Mice (*Rhabdomys pumilio*). (Thiel, 2019; Ramesh, *et al*., 2016)	None Although the distribution of this species includes the project area however there are no recent records for the Western Cape and is recorded as extinct on the IUCN.
African Clawless Otter *Aonyx capensis*	NT	0-3000m asl Provided freshwater (0.5–1.5 m deep) is available this species can occur in a variety of habitats. Permanent habitation is dependent on the availability of prey and shelter and females may exhibit territoriality in these areas. Although this species can tolerate high levels of pollution, eutrophication, and disturbance (traffic, dogs, etc) in developed areas this is only in moderation. (Jacques, Reed-Smith, & Somers, 2021; Okes, et al., 2016).	Low This species has been recorded in the reserve and has a low likelihood of occurring in the project area due to lack of habitat availability.

African Striped Weasel *Poecilogale albinucha*	NT	0-2300m asl Wide habitat tolerance including fynbos, lowland rainforest, semi-desert grassland, pine plantations and agricultural fields but mainly found in savanna. (Stuart, Stuart, & Do Linh San, 2015)	Moderate This species wide habitat tolerance suggests it may occur in the project area but has not been recorded by the Reserve.
Spectacled Dormouse *Graphiurus ocularis*	NT	Inhabits sandstone crevices in Shrubland areas (Cassola, 2016).	Moderate May occur in the rock piles in the project area but it is considered unlikely.

5.4 Birds

The South African Bird Atlas Project (SABAP2) have recorded 167 bird species in the same pentad (3400_2150) within which the project site occurs, and the reserve have recorded 189 species (Annexure 4).

Two bird species of conservation concern where highlighted in the DFFE Screener, namely the Denham's Bustard (*Neotis denhami*) and Knysna Warbler *(Bradypterus sylvaticus*) listed as vulnerable. This is due to the project area having suitable mapped habitat within the distribution range of these species. Denham's Bustard has a moderate likelihood of occurrence in the project area and the Knysna Warbler has a Low likelihood of occurrence in the project area (Table 5.4).

Seven additional SCC have a distribution which includes the project area and have been recorded in same pentad (3400_2150) within which the project site occurs, the likelihood of occurrence is presented in Table 5.5 below. Two have a high likelihood, three have a moderate and two a low likelihood of occurring in the project are.

Table 5.5: Bird SCC and the likelihood of occurrence in the project area

Species	Threat Status	Latest SABAP2 record	Recorded in the Reserve	Likelihood of occurrence in the project area
Buttonquail Fynbos *Turnix hottentottus*	EN	Dec 2015		Low *The project area does not offer suitable habitat.*
Black Harrier *Circus maurus*	EN	June 2022	X	Moderate *The project area does not offer suitable breeding habitat. However, it could offer foraging ground as its prey (birds and rodents) likely occur in the area.*
Secretarybird *Sagittarius serpentarius*	VU	June 2021	X	Moderate *The project area does not offer suitable breeding habitat and could offer foraging ground.*
Striped Flufftail *Sarothrura affinis*	VU	September 2015	X	Moderate *The project area could offer foraging ground and the wetland just east could offer suitable breeding habitat*
Protea Canary *Crithagra leucoptera*	NT	June 2016		High *The project area offers suitable habitat*
Agulhas Long-billed Lark *Certhilauda brevirostris*	NT	July 2022	X	High *The project area offers suitable habitat*
Knysna Woodpecker *Campethera notata*	NT	Feb 2016		Low *The nearest known records to the project area are ±16km southwest and 12km north of the project area. Only alien trees exist in the project area and although this could offer habitat it is unlikely.*

Table 5.4: DFFE Bird SCC and the likelihood of occurrence in the project area

Species	Threat Status	Habitat Requirements	Likelihood of Occurrence
Denham's Bustard (*Neotis denhami*)	VU	EOO 20,700,000 km^2 3,000 m asl This species inhabits grasslands, shrubland, woodlands, scrub plains, dried marsh, sour grassveld, agricultural fields and pastures as well as *Acacia*-studded dunes. It preys on insects and small vertebrates and feeds on plant material. (BirdLife International, 2016)	High This species has been recorded in the reserve and the latest record on SABAP2 is from March 2022. This species could use the project area for both breeding and foraging, however, there is ample habitat available to this species in the reserve. The project requires 0.12% of the 10,000ha reserve.
Knysna Warbler *(Bradypterus sylvaticus*)	VU	EOO: 123,000km2 (11-100 locations) Population: 2,500-9,999 This species inhabits dense understorey vegetation along riverbanks in fynbos forest patches, riverine woodland and afromontane forest and has even adapted to thickets of non-native brambles (e.g. Rubus) Breeds from August and December coinciding with the greatest abundance of invertebrate species. (BirdLife International, 2016).	Low The project area occurs just outside of one of the four subpopulations (Tsitsikamma to George) (east of Klien-Brak River) and this species is restricted to remnant forest patches within this range. This species was recorded on iNaturalist in Groot Brak in Feb 2020 which could suggest a range expansion. This species is unlikely to occur in the project area due to the lack of habitat availability.

6. SENSITIVITY ASSESSMENT

6.1. Protected Areas and National Protected Area Expansion Strategy

The project site does not fall within a formally protected area or a National Protected Area Expansion Strategy (NPAES) site although it does occur within the Gouritz Cluster Biosphere Reserve (GCBR). The Biosphere Reserve is the largest biosphere reserve in South Africa and covers 3,187,893 ha. UNESCO define biosphere reserves as *'learning places for sustainable development'.*

6.2. 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), the western portion of the project site occurs within an ESA 1 (Figure 6.1). The reason layer indicates that the spatial planning unit in which the project site occurs was designated as an ESA for the following reasons:

- Bontebok Extended Distribution Range
- South Outeniqua Sandstone Fynbos (VU)
- Swellendam Silcrete Fynbos (EN)
- Watercourse protection – Southern Coastal Belt

Comment has been provided on how the development will impact the features associated with the site being listed as an ESA.

Table 6.1: Reasons for the site occurring within an ESA and comment on the conditions specific to the project site

Reason	Comment specific to the site
Bontebok Extended Distribution Range	The project site is small and will have a minimal impact on Bontebok that are present in the area.
South Outeniqua Sandstone Fynbos	This vegetation type is not present within the project site and will therefore not be impacted.
Swellendam Silcrete Fynbos (EN)	The project site will result in the permanent loss of approximately 0.04 ha and long-term loss of 12.64 ha of degraded Swellendam Silcrete Fynbos. This equates to 3% of the remaining extent of this vegetation type. However, given that the seedbank will remain intact, it is anticipated that the site can be rehabilitated back to its original state and the overall impact will be of low significance (refer to chapter 7).
Watercourse protection – Southern Coastal Belt	Based on the topography of the site and the natural infiltration that will occur within the brushcut areas, project infrastructure is unlikely to have a negative impact on adjacent watercourses.

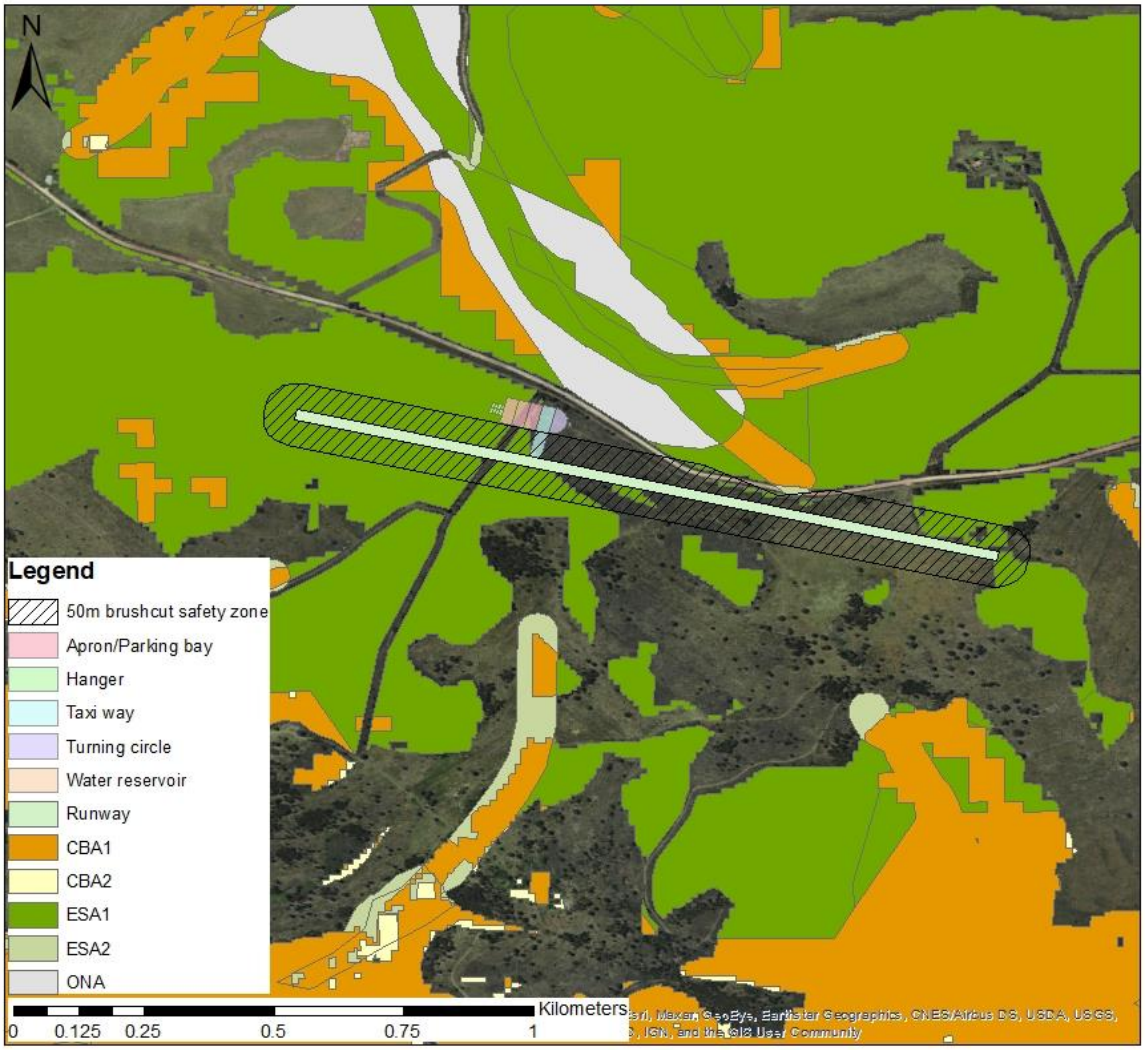


Figure 6.1: The project site in relation to identified CBAs and ESAs

6.3. Sensitivity Assessment

Based on a combination of the desktop assessment and field survey, it has been determined that the western side of the project area has an overall SEI of high due to the likely occurrence of plant SCC and the vegetation type being listed as Endangered. In contrast, eastern portion, which is degraded has an SEI of low (Table 6.2). The SEI of the project area to faunal species with a **High likelihood of occurrence** was assessed. The SEI for the NT Fynbos Golden Mole, Protea Canary and Agulhas Long-billed Lark was found to be Low and the SEI for the VU Denham's Bustard was found to be Medium.

For areas of medium and low sensitivity, the Species Environmental Guideline Document states that project activities are acceptable provided they are followed by appropriate restoration activities. For areas of high sensitivity, avoidance mitigation is required followed by minimisation mitigation to limit the amount of habitat impacted. Limited development of low impact is acceptable and offset mitigation may be required for high impact activities.

Table 6.2: Evaluation of Site Ecological Importance (SEI) of habitat and SCC

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)		Receptor Resilience	SEI
Degraded Swellendam Silcrete Fynbos	**Very High** Highly likely presence of one EN species and three VU species. The vegetation type is listed as Endangered	**Medium** Medium (>5ha but <20ha) of semi-intact area with good habitat connectivity with functional ecosystem corridors.	**High**	**Medium** Habitat will recover slowly (more than ten years) to restore >70% of original species composition.	**High**
Degraded Grassy Fynbos	**High** Confirmed presence of one EN plant species.	**Medium** Evidence of past disturbance.	**Medium**	**High** Habitat can recover relatively quickly to its current state which is degraded and of low species diversity.	**Low**
Near Threatened Fynbos Golden Mole, Protea Canary & Agulhas Long-billed Lark	**Medium** Highly likely presence of NT species	**Medium** Semi-intact area with good habitat connectivity.	**Medium**	**High** Species have a high likelihood of returning to site once disturbance or impact has been removed.	**Low**
Denham's Bustard	**High**	**Medium**	**Medium**	**Medium**	**Medium**

Habitat / Species	Conservation Importance (CI)	Functional Integrity (FI)		Receptor Resilience	SEI
	Highly likely presence of one VU species	Semi-intact area with good habitat connectivity.		Species have a high likelihood of returning to site once disturbance or impact has been removed.	

Figure 6.2: Site Ecological Importance for the project site.

6.4. DFFE Environmental Risk Screener

6.4.1. Animal Species Theme

Based on the results from the national Department of Forestry, Fisheries and Environment (DFFE) Screening Tool for the site, the proposed project area falls within an area with an overall Medium Animal Species Theme based on the presence of *Neotis denhami* (Table 6.3).

The Animal species theme assigns sensitivity ratings to each species. The Knysna Warbler and Sensitive Species 8 were assigned a Medium sensitivity and Denham's Bustard a High sensitivity. The field survey confirmed there is no suitable habitat for the Knysna Warbler and Sensitive Species 8 within the project area and therefore the specialist disagrees with the Medium sensitivity and suggests it should be Low sensitivity for these two species.

The DFFE Screener Animal Species Theme rates the project area as High sensitivity for the Denham's Bustard. The SEI for the Denham's Bustard is Medium (refer to section 6.3 for calculations), and as such the specialist disagrees with the DFFE rating of High. The DFFE Screener Animal Species Theme should be Medium Sensitivity based on the SEI score of the Denham's Bustard. Based on this, a full Terrestrial Biodiversity Impact Assessment was undertaken.

Table 6.2: Threatened species identified by the DFFE Screener

Common name	Scientific Name	Species sensitivity (DFEE Screening)	Threat Status (Martin *et al*., 2015)	SEI of Project area to species
Species 8	Species 8	Medium	VU	Low
Denham's Bustard	*Neotis denhami*	High	VU	Medium
Knysna Warbler	*Bradypterus sylvaticus*	Medium	VU	Low

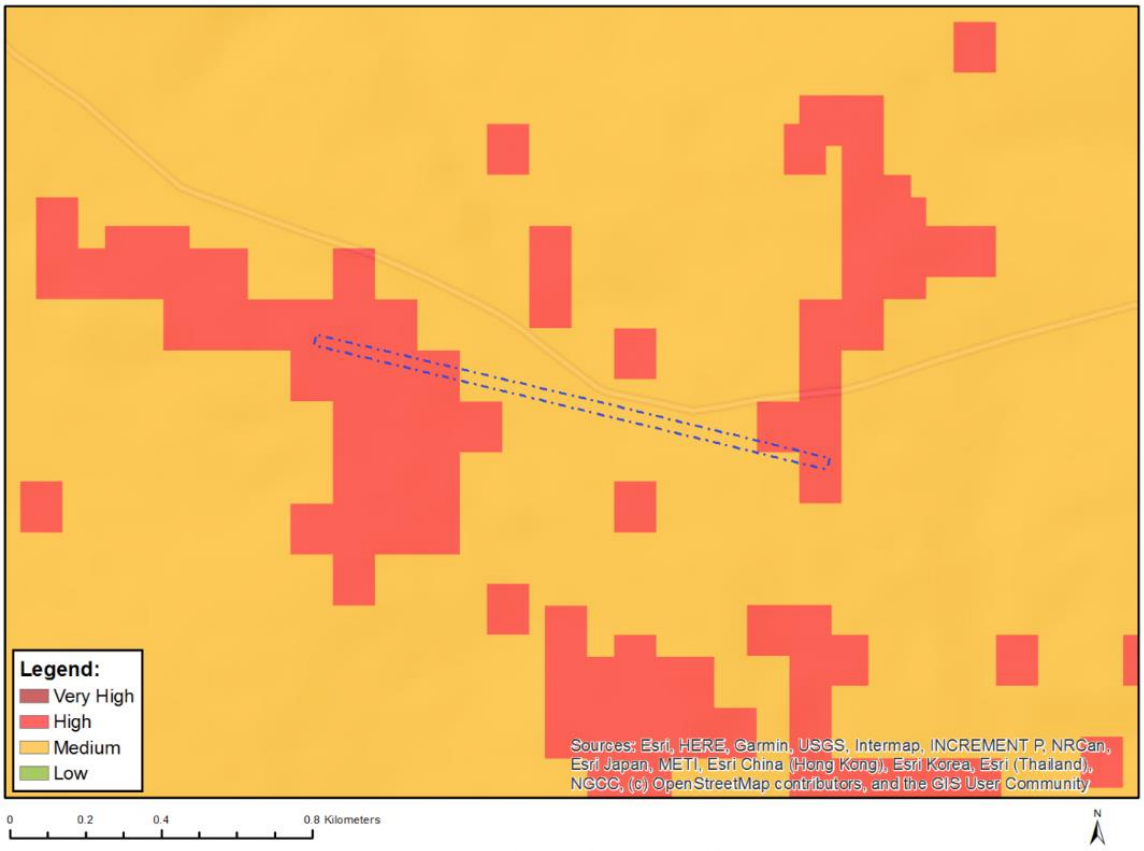


Figure 6.3: DFFE Sensitivity map for the Animal Species Theme

6.4.2. Plant Species Theme

The national Department of Forestry, Fisheries and Environment (DFFE) Screening Tool for the site indicates the proposed project area falls within an area with a medium Plant Species Theme with a small section in the east occurring in an area of low sensitivity. This is based on the likely presence of 30 threatened plant species.

The field survey confirmed there is suitable habitat for four of these species of conservation concern to occur within the impacted area but their presence was not confirmed during the field survey . As such, the specialist agrees that the plant species theme is of medium sensitivity due to the high likelihood of occurrence of these four species. Based on this, a full Terrestrial Biodiversity Impact Assessment was undertaken.

6.4.3. Terrestrial Biodiversity Theme

The national Department of Forestry, Fisheries and Environment (DFFE) Screening Tool for the site indicates that the proposed project area falls within an area with a very high Terrestrial Biodiversity Theme based on it occurring within an Ecological Support Area and a Critically Endangered Ecosystem.

A field survey combined with a desktop assessment was undertaken for the project site to verify or dispute these findings. An outcome of the field survey is to assess the SEI for the site using the accepted methodology outlined on the Species Environmental Assessment Guideline (2021) document. The SEI score takes into account the conservation importance, receptor resilience and

functional integrity to give an overall sensitivity score. Section 6.3 provide this assessment and based on these findings, the specialist is of the opinion that the Terrestrial Biodiversity Theme should be high rather than very high for the Swellendam Silcrete Fynbos that occurs within the western portion of the site and low for the degraded grassy fynbos that occurs on the eastern portion of the site.

7. IMPACT ASSESSMENT

The clearing of vegetation (0.04 ha) for the hangar and transformation of vegetation for the construction of the landing strip and associated infrastructure could result in the following impacts:

- The direct loss of vegetation types and associated plant species, including species of conservation concern.
- The direct loss of faunal habitats.
- Transformation of vegetation resulting in breaks in habitat leading to habitat fragmentation and edge effects.
- The clearing of vegetation and subsequent disturbance to the soil, and therefore seed bank, for the construction of the 400m^2 hangar which could lead to some infestation of alien invasive plant species and other ruderal species.
- A tractor-pulled brushcutter will be used to create the landing strip safe zone and brushcut/rolled for the landing strip, apron/parking area, turning circle and taxiway. The clearing of vegetation and removal of soil to create the hanger will be done by a tractor back actor and a small concrete mixer will be used to mix concrete. Ambient noise levels will temporarily increase and could result in some faunal species vacating the area permanently while others may return or new individuals may reinhabit the area. It is expected that dust emissions will be negligible.
- The movement of construction machinery within the site, may cause unintentional mortalities of faunal species. An ECO will be on site to monitor during construction.
- The operation of the runway will create a disturbance experienced by fauna and may unintentionally cause the mortality of some fauna species.

The spatial extent, temporal scale and impact significance will vary for each impact and these have thus been individually assessed in Table 7.1 below.

Table 7.1: Assessment of impacts associated with the construction, operation and decommissioning of the landing strip and associated infrastructure

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
CONSTRUCTION PHASE														
Impact 1: Loss of degraded Swellendam Silcrete Fynbos	Preferred Alternative (Permanent Loss of Swellendam Silcrete Fynbos)	The clearing of vegetation for the construction of the landing strip and associated infrastructure will result in the permanent loss of approximately 0.04 ha of degraded Swellendam Silcrete Fynbos. . The extent of vegetation that will be permanently lost is 0.01% of the remaining extent. Given how small the area to be impacted will be i.e. it will result in the permanent loss of 0.01% of this vegetation type, which is listed as Endangered and is degraded, the overall impact will be of low significance.	Negative	Direct	Moderate	Localised	Permanent	Definite	Irreversible	Resource could be partially lost	Difficult	LOW-	• Construction vehicles and machinery must not encroach into identified 'no-go' areas or areas outside the project footprint. • Topsoil (20 cm, where possible) must be collected and stored in an area of low (preferable) and medium sensitivity and used to rehabilitate impacted areas that are no longer required during the operational phase (e.g. laydown areas). • Only indigenous species must be used for rehabilitation. • Lay down areas must be located within areas of low sensitivity. • Employees must be prohibited from making open fires during the construction phase. • Employees must be prohibited from collecting plants. It is recommended that spot checks of pockets and bags are done on a regular basis to ensure that no unlawful harvesting of plant species is occurring.	LOW-

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
	Preferred Alternative (Long Term Loss of Swellendam Silcrete Fynbos)	The transformation of vegetation for the construction of the landing strip and associated infrastructure will result in the long term loss of 8.8 ha of degraded Swellendam Silcrete Fynbos. . The extent of vegetation that will be lost over the long term is 2.25% of the remaining extent. It is likely that the area that is brush cut can return to its original composition if rehabilitated as the seed bank will likely remain intact. The long term loss of 2.25% of this vegetation type, which is listed as Endangered and is degraded, will have an overall impact of moderate significance. This impact can be reduced to low if the mitigation measures are implemented.	Negative	Direct	Moderate	Localised	Long Term	Probable	Reversible	Resource could be partially lost	Achievable	MODERATE	• An alien invasive management plan must form part of the EMPr. • Plant translocation to adjacent suitable habitat may only be done for species that are not range restricted and for populations that have not been quantified as regionally significant. • In such cases that this is not feasible, any requirement for translocation must be discussed with Cape Nature prior to translocation taking place. • The vegetation in the safe zone will be brushcut during the construction and operational phases. The vegetation should be allowed to return to its natural state once the infrastructure has been decommissioned. Active rehabilitation of the site may be required. • It is recommended that the surrounding vegetation within the project site is managed and rehabilitated to increase species diversity and richness to counteract the impact of the loss of vegetation due to the transformation of vegetation within the landing strip boundary. This would include removing alien invasive plant species, rehabilitating degraded areas and implementing a controlled burning regime for this area. It is recommended that an area at least ten times the size of the area to be impacted (i.e. 88 ha) of Swellendam Silcrete Fynbos, is set aside and rehabilitated. It is recommended that the plant species diversity and richness of the proposed set aside area and the brushcut safe zone on Portion 1 of Farm 172, are monitored by a botanical specialist during the first 20 years of the operational phase of the project or until the botanist confirms that monitoring is no longer required. It is recommended that at a minimum of five fixed points are monitored within the set aside area and a minimum of five within the safe zone area. Monitoring should occur every second year between year 1 and 6 to establish baseline conditions that account for climatic variation. Monitoring can then be adjusted to every five years from year 6 to year 20. During the first six years, the botanical specialist will need to identify suitable key indicator species representative of near-intact fynbos and their presence/absence monitored. It is also recommended that the presence/absence and density of alien invasive plant species are monitored within this area. The botanical specialist can advise on whether monitoring should continue after year 20 as well as provide input on whether the frequency of the proposed monitoring can be adjusted, based on the results of the survey. It is possible that less frequent monitoring events are suitable. If the landing strip is decommissioned and the transformed area rehabilitated back to its current state, as confirmed by a botanical specialist, then the monitoring can cease since this vegetation has been returned to its natural state and there is no net loss.	LOW-

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
	Cumulative	There are no other known developments of a similar nature in the area and as such the cumulative impact has not been assessed.	N/A									N/A		N/A
	No-Go Impact	If the project did not proceed, the vegetation would remain intact with limited impacts occurring. The no-go alternative is thus low.	Negative	Direct	Low	Localised	Long Term	Probable	Reversible	Resource could be partially lost	Difficult	LOW-	N/A	N/A
Impact 2: Loss of Degraded Grassy Fynbos	Preferred Alternative	The transformation of vegetation for the construction of the landing strip and associated infrastructure will result in the long term loss of 6.32 ha of degraded Grassy Fynbos. . This vegetation type is not listed as threatened and has a low species diversity and as such the impact will be low.	Negative	Direct	Low	Localised	Long Term	Probable	Reversible	Resource could be partially lost	Achievable	LOW-	Refer to impacts listed under impact 1.	LOW-
	Cumulative	There are no other known developments of a similar nature in the area and as such the cumulative impact has not been assessed.	N/A									N/A		N/A
	No-Go Impact	If the project did not proceed, the vegetation would remain intact with limited impacts occurring. The no-go alternative is thus low.	Negative	Direct	Low	Localise d	Long Term	Probabl e	Reversib le	Resourc e could be partially	Achieva ble	LOW-	N/A	N/A
Impact 3: Loss of Plant Species of Conservation Concern	Preferred Alternative	One EN species three VU species have a high likelihood of occurrence within the project site. If these species are present, the impact will be of high significance. However, if the recommended mitigation measures are implemented, the impact can be reduced to moderate significance.	Negative	Direct	Moderate	Study Area	Long Term	May Occur	Reversible	Resource could be partially lost	Achievable	HIGH-	All mitigation measures listed under impact one must be implemented.	MODERATE-
	Cumulative	There are no other known developments of a similar nature in the area and as such the cumulative impact has not been assessed.	N/A									N/A	N/A	N/A
	No-Go Impact	If the project did not proceed, the vegetation would remain intact with limited impacts occurring and no SCC will be lost. The no-go alternative is thus low +.	Positive	Direct	Slightly Beneficial	Local	May Occur	Definite	Reversible	Resource will not be impacted prese	Achievable	LOW+	• N/A	N/A

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
Impact 4: Loss of Faunal Species of Conservation Concern	Preferred Alternative	One VU and three NT species have a high likelihood of occurrence within the project site. If these species are present, the impact will be of high significance. However, if the recommended mitigation measures are implemented, the impact can be reduced to moderate significance.	Negative	Direct	Moderate	Study Area	Long Term	May Occur	Reversible	Resource could be partially lost	Achievable	MODERATE -	• Gondwana Private Nature Reserve wildlife management must be consulted to provide input into the procedure that must be followed should an animal be on the runway, and at risk of collision, during take-off or landing. • The runway must be checked regularly for nests and nest must be cleared from the runway to prevent birds from laying eggs. o Should a nest with eggs or chicks of a bird SCC be found the nest with >2m buffer must be demarcated and must be avoided. A protocol must be in place to notify planes, in advance, to approach their landing and/or take off to avoid these. o If the SCC nest cannot be avoided (i.e. no space to land a plane without impacting the nest) an ornithologist must be appointed to relocate the nest and chicks. Note a permit may be required. o If the SCC nest cannot be avoided, in the case of an emergency flight (fire, medical etc.) proof of emergency must be made available if requested by authorities. • In addition to all mitigations listed above a clause must be included in contracts for ALL personnel working on site stating that: "*no wild animals will be hunted, killed, poisoned or captured. No wild animals will be imported into, exported from or transported in or through the province. No wild animals will be sold, bought, donated and no person associated with the development will be in possession of any live wild animal, carcass or anything manufactured from the carcass*." A clause relating to fines, possible dismissal and legal prosecution must be included should any of the above transgressions occur. • During construction of the runway it is recommended that the removal of large established trees that host raptors may only be removed outside of breeding season and may only be done when birds are not nesting and rearing young. • Project activities must remain within the designated footprint. •	MODERATE-
	Cumulative	There are no other known developments of a similar nature in the area and as such the cumulative impact has not been assessed.	N/A									N/A	• N/A	N/A
	No-Go Impact	If the project did not proceed, the vegetation would remain intact with limited impacts occurring and no SCC will be lost. The no-go alternative is thus low+.	Positive	Direct	Slightly Beneficial	Local	May Occur	Definite	Reversible	Resource will not be impacted prese	Achievable	LOW+	• N/A	N/A

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
Impact 5: Loss of Faunal Habitat	Preferred Alternative	The project will definitely result in the permanent loss faunal habitat. The vegetation, soil and rocky areas provides habitat to multiple faunal groups that depend on it for shelter, breeding and foraging. The significance of this loss will be High to those faunal species.	Negative	Direct	Moderate	Localised	Permanent	Definite	Reversible	Resource could be partially lost	Difficult	MODERATE-	• Ideally, any rocks and stumps must be moved into adjacent habitat and rockeries and stumperies created to provide habitat for faunal species. • Construction vehicles and machinery must not encroach into adjacent habitat and must remain within the footprint of the project.	MODERATE-
	Cumulative	There are no other known developments of a similar nature in the area and as such the cumulative impact has not been assessed.	N/A									N/A		N/A
	No-Go Impact	If the project did not proceed, the habitat would remain intact with limited impacts occurring and will likely continue to increase restore itself.	Positive	Direct	Moderate	Study Area	Permanent	Probable	Reversible	Resource will not be partially lost	Achievable	LOW +	• Continue Alien clearing program	LOW +
Impact 6: Disruption of Ecosystem Function and Process	Preferred Alternative	Fragmentation is one of the most important impacts on vegetation as it creates breaks in previously continuous vegetation, causing a reduction in the gene pool and a decrease in species richness and diversity. This impact occurs when more and more areas are cleared, resulting in the isolation of functional ecosystems, which results in reduced biodiversity and reduced movement due to the absence of ecological corridors. The solar landing strip has been positioned on the edge of natural habitat, adjacent to an existing road to the north. Although the addition of this infrastructure will increase habitat fragmentation, this will be minimal given the small footprint of the site and because the movement of faunal species and seed dispersal is unlikely to be affected. The significance of the impact will be low.	Negative	Direct	Slight	Localised	Long Term	Probable	Irreversible	Resource could be partially lost	Difficult	LOW-	In addition to the mitigation measures listed under impact 1, the following should be implemented: • Rehabilitate laydown areas • Use existing access roads and upgrade these where necessary.	LOW-
	Cumulative	There are no other known developments of a similar nature in the area and as such the cumulative impact has not been assessed.	N/A									N/A		N/A
	No-Go Impact	If the project does not go ahead, the vegetation would remain intact and there will be limited impacts to ecosystem function and process. The impact associated with this will be negligible.	Negligible									Negligible	• N/A	N/A

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
Impact 7: Disturbance to faunal species	Preferred Alternative	According to the applicant no earth moving or ground levelling will be required. Only brush cutting and compacting. Faunal species may be disturbed during construction due to increased noise levels and vibrations from construction machinery. Faunal Species that vacate the immediate area, may return following completion of construction or new individuals or species may inhabit the area. There is ample habitat available in areas adjacent to the project area.	Negative	Direct	Moderate	Localised	Short Term	Definite	Reversible	Resource could be partially lost	Difficult	MODERATE-	• Slow moving species, such as tortoises, that may be in harms way during construction, must be moved and placed out of harm's way in habitat immediately adjacent to the project area within the reserve. • Vehicles and machinery must meet best practice standards this will minimise noise and vibrations. • Staff and contractors' vehicles must comply with speed limits of maximum of 40km/hr • Project must start and be completed within the minimum timeframe. i.e. may not be started and left incomplete.	LOW -
	Cumulative	There are no other known developments of a similar nature in the area and as such the cumulative impact has not been assessed.	Negligible									N/A	N/A	N/A
	No-Go Impact	If the project does not go ahead, there will be minimal disturbance.	Negligible									N/A	Continue to limit access to the area.	N/A
Impact 8: Mortality of faunal species	Preferred Alternative	Faunal species and individuals susceptible to mortality during the clearing of vegetation and soil compacting are those that will not move away during the initial disturbance this includes slow moving species (tortoises), hibernating species (depending on the time of year) and immobile individuals such as infant birds and rodents. The increase in vehicles entering and exiting the area increases the chance of roadkill, especially at night. Persecution of faunal species perceived as dangerous are often killed out of fear e.g., snakes	Negative	Direct	Moderate	Localised	Permanent	May Occur	Reversible	Resource could be partially lost	Difficult	MODERATE-	• ECO (or relevant person) to walk ahead of clearing construction machinery and move slow moving species, e.g. tortoises, out of harms way and into suitable neighbouring habitat. • If possible, any reptile, amphibian or mammal species that may die as a result of construction and if somewhat intact should be kept in a plastic bag in the freezer and labelled with the gps co-ord until Gondwana can donate it to a museum or relevant tertiary institute. • A snake handler should be on call to provide removal and relocation service should any snakes be found on site or entering neighbouring homes. • Speed restrictions of 40km/hr must be adhered to for all vehicles to reduce the impact of killed fauna on the project roads. • Induction material must iterate that faunal species are to be avoided and staff and/or contractor may possess any wild animal found in and immediately surrounding the project area alive or dead i.e., no hunting, trapping or capturing of naturally occurring terrestrial vertebrate species.	LOW -
	Cumulative	There are no other known developments of a similar nature in the area and as such the cumulative impact has not been assessed.	Negligible									N/A	N/A	N/A
	No-Go Impact	If the project does not go ahead, there will be no risk of faunal mortalities by human activities.	Negligible									N/A	N/A	N/A
Operational Phase														

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
Impact 9: Infestation of Alien Plant Species	Preferred Alternative	If laydown areas and roads are not rehabilitated, these disturbed areas can become places for alien invasive species to become established and if left unmitigated these species can spread and establish themselves in intact vegetation, resulting in the displacement of indigenous species and possible local extinctions of SCC. Black Wattle is already a problem in the general area and there are individuals present within the PAOI. Unmitigated, the significance of the impact will be moderate but this can be reduced to low if mitigation measures are implemented.	Negative	Direct	Moderate	Study Area	Permanent	Definite	Reversible	Resource could be partially lost	Achievable	MODERATE-	• The site must be checked regularly for the presence of alien invasive species. When alien invasive species are found, immediate action must be taken to remove them. • The black wattle currently noted on site must be removed and disposed of. • An alien invasive management plan must be incorporated into the EMPr.	LOW-
	Cumulative	There are no other known developments of a similar nature in the area and as such the cumulative impact has not been assessed.	N/A									Negligible		Negligible
	No-Go Impact	If the project does not go ahead, the vegetation would remain intact and the infestation and spread of alien invasive species will continue. The impact associated with this will be low negative.	Positive	Direct	Moderate	Local	May Occur	Definite	Reversible	Resource will not be impacted prese	Achievable	LOW-	• N/A	N/A
Impact 10: Disturbance to faunal species	Preferred Alternative	Faunal species will be disturbed during operation. The landing of planes will create increased noise levels and vibrations.	Negative	Direct	Moderate	Localised	Permanent	Definite	Reversible	Resource could be partially lost	Difficult	MODERATE-	• Vehicles and planes must meet best practice standards this will minimise noise and vibrations. • Staff and contractors' vehicles must comply with speed limits of maximum of 40km/hr •	LOW-
	Cumulative	There are no other known developments of a similar nature in the area and as such the cumulative impact has not been assessed.	N/A									Negligible	• N/A	Negligible
	No-Go Impact	If the project does not go ahead, there will be minimal disturbance.	Negligible									N/A	• N/A	N/A
Decommissioning Phase														

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
Impact 11: Loss of Indigenous Vegetation	Preferred Alternative	The decommissioning of the landing strip will likely disrupt some vegetation that has re-established around the areas that were disturbed during the construction phase. The loss of vegetation is likely to be limited given the small footprint of the project infrastructure.	Negative	Direct	Slight	Localised	Permanent	Probable	Reversible	Resource could be partially lost	Difficult	LOW-	• Construction vehicles and machinery must not encroach into identified 'no-go' areas or areas outside the project footprint. • Topsoil (20 cm, where possible) must be collected and stored in an area of low sensitivity and used to rehabilitate impacted areas that are no longer required during the operational phase (e.g. laydown areas). • Only indigenous species must be used for rehabilitation. • Lay down areas must not be located within any sensitive features. • Employees must be prohibited from making open fires during the construction phase. • Employees must be prohibited from collecting any plants. • An alien invasive management plan must for part of the EMPr if one doesn't already exist.	LOW-
Impact 12: Disturbance to faunal species	Preferred Alternative	As with the construction phase, the decommissioning phase will also require heavy machinery and the disruption of faunal habitat. Impacts will therefore be similar to that of the construction phase	Negative	Direct	Moderate	Localised	Short Term	Definite	Reversible	Resource could be partially lost	Difficult	MODERATE-	• Vehicles and machinery must meet best practice standards this will minimise noise and vibrations. • Staff and contractors' vehicles must comply with speed limits of maximum of 40km/hr • Decommissioning must start and be completed within the minimum timeframe. i.e. may not be started and left incomplete.	LOW -

8. CONCLUSIONS AND RECOMMENDATIONS

8.1. Conclusions

The project site is located within two distinct vegetation types. The eastern portion was previously disturbed and the returning specie are comprised of predominantly grasses, interspersed with some indigenous species. The overall diversity is generally low and the SEI for this area is low.

The western portion is comprised of degraded Swellendam Silcrete Fynbos which is listed as Endangered and has a high likelihood of having at SCC present. The SEI for this vegetation type is listed as high. The construction of the hanger will result in the permanent loss of 0.01% of the remaining extent of Swellendam Silcrete Fynbos and the remaining infrastructure will result in the long term loss (20-40 years) of 2.25% of this vegetation type. Provided the seedbank remains intact, and because the area to be impacted is relatively small and the surrounding vegetation will remain intact, recruitment is likely to occur once brushcutting and rolling comes to an end. It is highly likely that 70% of the species currently within the site, will return. Given that the project will only permanently affect 0.01% of this Endangered vegetation type, the impact associated with this loss is of medium significance.

The DFFE screening report listed the site as having a high sensitivity for the Animal Species Theme, a medium sensitivity for the Plant Species Theme and a very high sensitivity for the Terrestrial Biodiversity Theme. Based on the results of the sensitivity assessment, which is based on data from the field survey, the specialist is of the opinion that the Animal and Plant Species Themes are medium sensitivity and the Terrestrial Biodiversity Theme is high for the western portion of the site and low for the eastern portion of the site (refer to Figure 6.2) rather than very high.

Thirteen impacts were identified for the project, ten of which are of low significance after mitigation measures have been implemented and two of which are of moderate significance.

8.2. Recommendations

It is recommended that the following conditions are included in the Final EMPr as well as the conditions of the Environmental Authorisation (EA), if granted:

- All necessary plant permits must be obtained prior to the commencement of any construction activities. Species requiring permits include:
    - *Bobartia macrospatha*
    - *Erica quadrangularis*
    - *Erica discolor*
    - *Lampranthus elegans*
    - *Leucadendron rubrum*
    - *Leucadendron salignum*
    - *Moraea setifolia*
    - *Protea neriifolia*
    - *Romulea flava*
    - *Romulea rosea*
- Alien species occurring within and directly adjacent (within 50m of the landing strip) to the site must be removed;

- Where feasible existing access roads must be used and all service infrastructure must be located within the same servitude and preferably along the access road.
- It is recommended that the surrounding vegetation within the project site is managed and rehabilitated to increase species diversity and richness to counteract the impact of the loss of vegetation due to the transformation of vegetation within the landing strip boundary. This would include removing alien invasive plant species, rehabilitating degraded areas and implementing a controlled burning regime for this area. It is recommended that an area at least ten times the size of the area to be impacted (i.e. 88 ha) of Swellendam Silcrete Fynbos, is set aside and rehabilitated.

  It is recommended that the plant species diversity and richness of the proposed set aside area and the brushcut safe zone on Portion 1 of Farm 172, are monitored by a botanical specialist during the first 20 years of the operational phase of the project or until the botanist confirms that monitoring is no longer required. It is recommended that at a minimum of five fixed points are monitored within the set aside area and a minimum of five within the safe zone area. Monitoring should occur every second year between year 1 and 6 to establish baseline conditions that account for climatic variation. Monitoring can then be adjusted to every five years from year 6 to year 20. During the first six years, the botanical specialist will need to identify suitable key indicator species representative of near-intact fynbos and their presence/absence monitored. It is also recommended that the presence/absence and density of alien invasive plant species are monitored within this area. The botanical specialist can advise on whether monitoring should continue after year 20 as well as provide input on whether the frequency of the proposed monitoring can be adjusted, based on the results of the survey. It is possible that less frequent monitoring events are suitable.

  If the landing strip is decommissioned and the transformed area rehabilitated back to its current state, as confirmed by a botanical specialist, then the monitoring can cease since this vegetation has been returned to its natural state and there is no net loss.

- Gondwana Private Nature Reserve wildlife management must be consulted to provide input into the procedure that must be followed should an animal be on the runway, and at risk of collision, during take-off or landing.
- If the runway is rolled and checked daily, it is unlikely that any birds of SCC will build a nest and lay eggs on the runway. However, in the unlikely event that there are nests with chicks on the runway, the following mitigation measures must be implemented:
    - In the unlikely event that a nest with eggs or chicks of a bird SCC be found, the nest with >2m buffer must be demarcated and must be avoided. A protocol must be in place to notify planes, in advance, to approach their landing and/or take off to avoid these. Timeframes from laying to hatching are 23-25 days plus 7 weeks till fledgeling.
    - If the SCC nest cannot be avoided, in the case of an emergency flight (fire, medical etc.) proof of emergency must be made available if requested by authorities.
- In addition to all mitigations listed above a clause must be included in contracts for ALL personnel working on site stating that: "*no wild animals will be hunted, killed, poisoned or captured. No wild animals will be imported into, exported from or transported in or through the province. No wild animals will be sold, bought, donated and no person associated with the development will be in possession of any live wild animal, carcass or anything manufactured*

from the carcass." A clause relating to fines, possible dismissal and legal prosecution must be included should any of the above transgressions occur.

- It is recommended that the removal of large established trees that host raptors may only be removed outside of breeding season and may only be done when birds are not nesting and rearing young.

8.3. Ecological Statement and Opinion of the Specialist

Provided the recommended mitigation measures are implemented, the specialist is of the opinion that the development can proceed, provided the recommendations contained in this report are implemented.

9. REFERENCES

Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland. 2014. Edited by Michael F. Bates, William R. Branch, Aaron M. Bauer, Marius Burger, Johan Marais, Graham J. Alexander & Marienne S. de Villiers. SANBI, Pretoria

Baxter, R., Willows-Munro, S. & Taylor, P. 2020. Myosorex longicaudatus. The IUCN Red List of Threatened Species 2020: e.T14108A22286725. https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T14108A22286725.en. Accessed on 11 December 2022.

BirdLife International. 2016. Neotis denhami. The IUCN Red List of Threatened Species 2016: e.T22691905A93327715. https://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T22691905A93327715.en. Accessed on 11 December 2022.

BirdLife International. 2016. Bradypterus sylvaticus. The IUCN Red List of Threatened Species 2016: e.T22714480A94418244. https://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T22714480A94418244.en. Accessed on 11 December 2022.

Bronner, G. & Mynhardt, S. 2015. Amblysomus corriae. The IUCN Red List of Threatened Species 2015: e.T62006A21284863. https://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T62006A21284863.en. Accessed on 11 December 2022.

Buys, M.H., Helme, N.A. & Raimondo, D. 2006. Lobostemon muirii Levyns. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/07

Cassola, F. 2016. Graphiurus ocularis (errata version published in 2017). The IUCN Red List of Threatened Species 2016: e.T9488A115518531. https://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T9488A22221430.en. Accessed on 11 December 2022.

Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. 2016. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa

Goldblatt, P. & Raimondo, D. 2006. Gladiolus engysiphon G.J.Lewis. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/11

FitzPatrick Institute of African Ornithology (2022). ReptileMAP Virtual Museum. Accessed at https://vmus.adu.org.za/?vm=ReptileMAP on 2022-10-03

FitzPatrick Institute of African Ornithology (2022). FrogMAP Virtual Museum. Accessed at https://vmus.adu.org.za/?vm=FrogMAP on 2022-10-03

FitzPatrick Institute of African Ornithology (2022). MammalMAP Virtual Museum. Accessed at https://vmus.adu.org.za/?vm=MammalMAP on 2022-10-03

Helme, N.A. & Raimondo, D. 2005. Relhania garnotii (Less.) K.Bremer. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/07

Helme, N.A. & Raimondo, D. 2006. Romulea jugicola M.P.de Vos. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/07

Helme, N.A. & Raimondo, D. 2006. Ruellia pilosa L.f. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/07

Helme, N.A. & Raimondo, D. 2019. Lachenalia nervosa Ker Gawl. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/11

Helme, N.A. & von Staden, L. 2012. Elegia squamosa Mast. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/07

Helme, N.A., Raimondo, D., Milton, S.J. & Vlok, J.H. 2019. Pelargonium denticulatum Jacq. National

Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/11
Kurzweil, H., Bytebier, B. & Victor, J.E. 2011. Disa bodkinii Bolus. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/11
IUCN SSC Amphibian Specialist Group. 2013. Hyperolius horstockii. The IUCN Red List of Threatened Species 2013: e.T56142A18374911. https://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T56142A18374911.en. Accessed on 11 December 2022.
IUCN SSC Amphibian Specialist Group. 2013. Vandijkophrynus angusticeps. The IUCN Red List of Threatened Species 2013: e.T54573A3016485. https://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T54573A3016485.en. Accessed on 11 December 2022.
IUCN SSC Amphibian Specialist Group. 2013. Breviceps montanus. The IUCN Red List of Threatened Species 2013: e.T57715A3062218. https://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T57715A3062218.en. Accessed on 11 December 2022.
IUCN SSC Amphibian Specialist Group. 2013. Capensibufo tradouwi. The IUCN Red List of Threatened Species 2013: e.T54801A3020160. https://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T54801A3020160.en. Accessed on 11 December 2022.
IUCN SSC Amphibian Specialist Group. 2013. Strongylopus bonaespei. The IUCN Red List of Threatened Species 2013: e.T58764A3073063. https://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T58764A3073063.en. Accessed on 11 December 2022.
Jacques, H., Reed-Smith, J. & Somers, M.J. 2021. Aonyx capensis. The IUCN Red List of Threatened Species 2021: e.T1793A164575819. https://dx.doi.org/10.2305/IUCN.UK.2021-3.RLTS.T1793A164575819.en. Accessed on 02 November 2022.
Manyama, P.A. 2007. Erica unicolor J.C.Wendl. subsp. mutica E.G.H.Oliv. & I.M.Oliv. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/07
Minter LR, Burger M, Harrison JA, Braack HH, Bishop PJ & Kloepfer D (eds). 2004. Atlas and Red Data book of the frogs of South Africa, Lesotho and Swaziland. SI/MAB Series no. 9. Smithsonian Institution, Washington, D.C
Pillay N, Taylor P, Baxter R, Jewitt D, Pence G, Child MF. 2016. A conservation assessment of Dasymys spp. In Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa
Raimondo, D. & von Staden, L. 2018. Psoralea trullata C.H.Stirt. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/07
Raimondo, D. & Zikishe, V. 2012. Diosma passerinoides Steud. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/07
Raimondo, D., Goldblatt, P. & von Staden, L. 2018. Freesia fergusoniae L.Bolus. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/07
Rebelo, A.G; Boucher, C.; Helme, N.; Mucina, L.; Rutherford, M.C. 2006. Fynbos Biome IN The vegetation of South Africa, Lesotho and Swaziland. Strelitzia. 19. South African National Biodiversity Institute, Pretoria.
Rebelo, A.G., Mtshali, H. & von Staden, L. 2006. Leucospermum formosum (Andrews) Sweet. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/07
Rebelo, A.G., Mtshali, H. & von Staden, L. 2006. Mimetes splendidus Salisb. ex Knight. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/07
Red List of terrestrial Ecosystems of South Africa. (2021). SANBI and DFFE.
South African National Biodiversity Institute (SANBI). 2020. *Species Environmental Assessment*

Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. Version 2.1 2021.

Schutte-Vlok, A.L. & Raimondo, D. 2006. Amphithalea axillaris Granby. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/04

Schutte-Vlok, A.L. & Raimondo, D. 2007. Aspalathus zeyheri (Harv.) R.Dahlgren. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/04

Stein, A.B., Athreya, V., Gerngross, P., Balme, G., Henschel, P., Karanth, U., Miquelle, D., Rostro-Garcia, S., Kamler, J.F., Laguardia, A., Khorozyan, I. & Ghoddousi, A. 2020. Panthera pardus (amended version of 2019 assessment). The IUCN Red List of Threatened Species 2020: e.T15954A163991139. https://dx.doi.org/10.2305/IUCN.UK.2020-1.RLTS.T15954A163991139.en. Accessed on 11 December 2022.

Stuart, C., Stuart, M. & Do Linh San, E. 2015. Poecilogale albinucha. The IUCN Red List of Threatened Species 2015: e.T41662A45215258. https://dx.doi.org/10.2305/IUCN.UK.2015-4.RLTS.T41662A45215258.en. Accessed on 11 December 2022.

Taylor, P.J. 2016. Dasymys incomtus (errata version published in 2017). The IUCN Red List of Threatened Species 2016: e.T6269A115080446. https://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T6269A22436584.en. Accessed on 02 November 2022.

Tolley, K.A. 2022. Bradypodion gutturale. The IUCN Red List of Threatened Species 2022: e.T42679297A197415603. https://dx.doi.org/10.2305/IUCN.UK.2022-1.RLTS.T42679297A197415603.en. Accessed on 11 December 2022.

Trinder-Smith, T. & Raimondo, D. 2006. Agathosma microcarpa (Sond.) Pillans. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/04

Turner, R.C., Oliver, E.G.H. & Helme, N.A. 2007. Erica stylaris Spreng. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/07

Venter J, Seydack A, Ehlers-Smith Y, Uys R, Child MF. 2016. A conservation assessment of Philantomba monticola. In Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.

Victor, J.E. & Hutchinson, S.L. 2012. Acmadenia macropetala (P.E.Glover) Compton. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/04

Vlok, J.H. & Raimondo, D. 2006. Acrolophia lunata (Schltr.) Schltr. & Bolus. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/04

Vlok, J.H. & Raimondo, D. 2006. Acrolophia ustulata (Bolus) Schltr. & Bolus. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/04

Vlok, J.H. & Raimondo, D. 2006. Eulophia platypetala Lindl. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/11

Vlok, J.H. & Raimondo, D. 2006. Muraltia cliffortiifolia Eckl. & Zeyh. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/07

Vlok, J.H., Helme, N.A. & Raimondo, D. 2006. Aspalathus longifolia Benth. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/04

Vlok, J.H., Raimondo, D. & von Staden, L. 2008. Gladiolus vaginatus F.Bolus. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/11

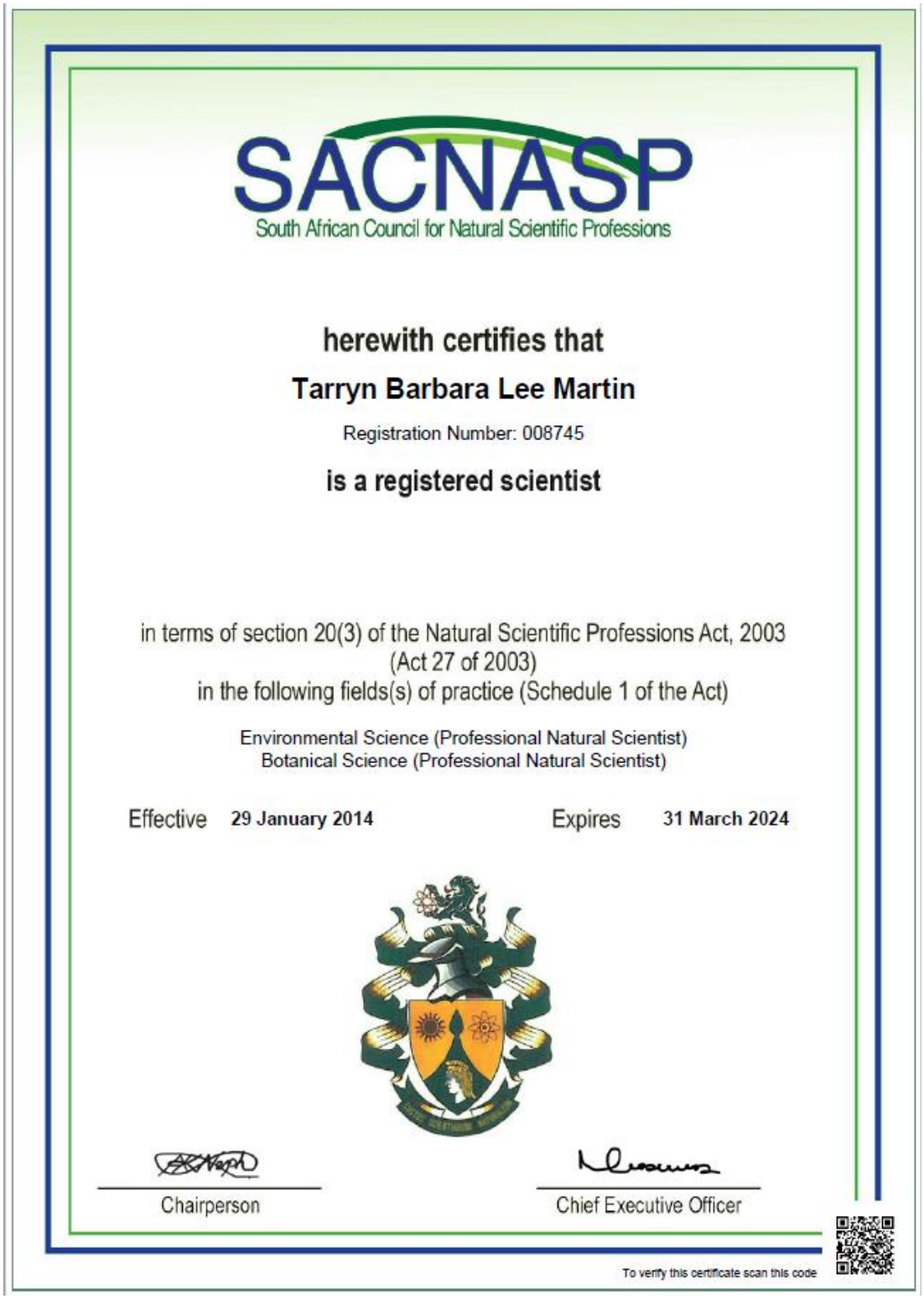
Vlok, J.H., Raimondo, D. & von Staden, L. 2011. Nemesia elata K.E.Steiner. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/07

Vlok, J.H., Raimondo, D. & von Staden, L. 2014. Tulista kingiana (Poelln.) G.D.Rowley. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/11

von Staden, L. & Liltved, W.R. 2006. Pachites bodkinii Bolus. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/07

von Staden, L. 2018. Hermannia lavandulifolia L. National Assessment: Red List of South African Plants version 2020.1. Accessed on 2022/11/07

APPENDIX 1: 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 fields(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 2024**

Chairperson

Chief Executive Officer

To verify this certificate scan this code

RHODES UNIVERSITY

THIS IS TO CERTIFY THAT

TARRYN BARBARA LEE MARTIN

WAS THIS DAY AT A CONGREGATION OF THE UNIVERSITY
ADMITTED TO THE DEGREE OF

MASTER OF SCIENCE

IN

BOTANY

WITH DISTINCTION

VICE CHANCELLOR

DEAN OF THE FACULTY OF SCIENCE

REGISTRAR

GRAHAMSTOWN
10 APRIL 2010

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

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Amber Leah Jackson
Registration number: 100125/12

is registered as a

Candidate Natural 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 I of the Act)

Environmental Science **15 August 2012**

15 August 2012
Pretoria

President

Executive Director

University of Cape Town • iYunivesithi yaseKapa • Universiteit van Kaapstad

we certify that

Amber Leah Jackson

was admitted to the degree of

Master of Philosophy

in Environmental Management

on 9 June 2011

Vice-Chancellor

Registrar

APPENDIX 2: 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	• 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 C_3 and C_4 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 Counsellor, 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, PA.; Archibald, S.; Martin, T and Osborne, C. Fire ecology of C_3 and C_4 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 C_4 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 Pilivili 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 biodeiveristy 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	• 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 Pogramme (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)

- 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

APPENDIX 3: SPECIES OF CONSERVATION CONCERN

Table A3: List of SCC with a low and moderate likelihood of occurrence

Family	Scientific Name	Red List Status	Description	Likelihood of Occurrence
ERICACEAE	*Erica unicolor subsp. mutica*	EN	This species is known from less than five locations, occuring between Mossel Bay to Herbetsdale and George (Manyama, 2007). It is associated with lowlands and lower south and north-facing slopes in fynbos. This species was confirmed to occur on site.	High
RUTACEAE	*Diosma passerinoides*	VU	This species is known from 25 subpopulations from Robertson and Caledon to Bredasdorp, Albertinia and eastwards to Baviaanskloof (Raimondo and Zikishe, 2012). It occurs in renosterveld on dry clay soils and is associated with patches of silcrete. There are records of this species south of the project site and as such the likelihood of occurrence is high.	High
IRIDACEAE	*Freesia fergusoniae*	VU	This species is known from fewer than 20 locations where It occurs from Swellendam to Oudtshoorn and Mossel Bay (Raimondo *et al.,* 2018). It is associated with clay soils in renosterveld. The likelihood of occurrence within the project site is high.	High
	Sensitive species 800	VU	This species occurs from the Cape Peninsula to Knysna and is associated with limestone and clay loam soils in fynbos, renosterveld and coastal lowlands (Vlok *et al.,* 2008). There are records of this species within close proximity of the site and as such the likelihood of occurrence is High.	High
RUTACEAE	*Acmadenia macropetala*	VU	This species has an EOO of 3125km2 and is known from between eight and ten locations between Bredasdorp and Cloete's Pass near the Outeniqua Mountains. It is associated with quartz outcrops on shale hills. The likelihood of occurrence within the project site is low.	Low
RUTACEAE	*Agathosma microcarpa*	VU	This species has an EOO of 7000km2 and occurs in small isolated populations from Poteberg to Mossel Bay. It occurs in renosterveld and is associated with rocky outcrops on dolomitic soils. The likelihood of occurrence within the project site is low.	Low
FABACEAE	*Aspalathus longifolia*	VU	Aspalathus longifolia is known from less than ten locations in the Langeberg Mountains and from Garcia's Pass to Gourits River. It is associated with shale bands on renosterveld-fynbos ecotones on northern slopes. The likelihood of occurrence within the project site is low.	Low

FABACEAE	*Aspalathus zeyheri*	VU	This species has an EOO of 5200km2 and is known from 11 severely fragmented subpopulations from Swellendam and Potberg to Riversdale. It is associated with renosterveld, occuring on hard clay soils. The likelihood of occurrence within the project site is low.	Low
RESTIONACEAE	*Elegia squamosa*	EN	Elegia squamosa occurs from Malmesbury to the Cape Peninsula, Bredasdorp and eastwards to Mossel Bay. It is associated with seasonally damp clay flats and lower slopes that have heavier soils. The likelihood of occurrence within the project site is low.	Low
ERICACEAE	*Erica stylaris*	VU	Erica stylaris is known from ten locations netween Mossel Bay and Humansdorp. It is associated with fynbos, occuring on moist slopes. The likelihood of occurrence within the project site is low.	Low
PROTEACEAE	*Leucospermum formosum*	EN	This species is known from three extant populations and has an EOO of 2689km2 and an EOO of 57km2. It occurs between the Riviersonderend Mountains and Outeniqua Mountains and is associated with wet south-facing slopes. The likelihood of occurrence within the project site is low.	Low
PROTEACEAE	*Mimetes splendidus*	EN	This species occurs from Langeberg to Tsitsikamma Mountains and has an EOO of 2255km2 and a small AOO of 51km2. It is associated with moist, south-facing slopes on peaty soils. The likelihood of occurrence within the project site is low.	Low
SCROPHULARIACEAE	*Nemesia elata*	VU	This species is known from at least 6 locations within its range which is between Swellendam and George in the Langeberg and Outeniqua Mountains. It is associated with moist, steep slopes in gorges and ravines. The likelihood of occurrence within the project site is Low.	Low
ORCHIDACEAE	*Pachites bodkinii*	RARE	This species is widespread with an EOO of 40 235km2. It occurs on the Cape Peninsula and Groot Winterhoek as far east as the Outeniqua Mountains. It is associated with mountain summits and moist south-facing slopes along marsh edges. The likelihood of occurrence within the project site is low.	Low
FABACEAE	*Psoralea trullata*	RARE	This species is widespread occuring between the Langeberg, Tsitsikamma, Langkloof, Outeniqua and Great Winterhoek Mountains. It is associated with damp, sheltered places on steep rocky slopes and ledges. The likelihood of occurrence within the project site is low.	Low
ACANTHACEAE	*Ruellia pilosa*	VU	This species is known from ten locations between Swellendam and Mossel Bay and is associated with renosterveld slopes. The likelihood of occurrence within the project site is Low.	Low

	Sensitive species 1277	Rare	This montane species has only been recorded eight times. It occurs between the Cape Peninsula and Riversdale and is associated with rocky south-facing slopes and mountain summits on well drained peaty sandstone soils. The likelihood of occurrence within the project site is low.	Low
	Sensitive species 492	Rare	This species occurs between Herbetsdale and Cloete's pass and is associated with sand soils near mountain streams. The likelihood of occurrence within the project site is low.	Low
	Sensitive species 516	EN	This species is known from between four and seven small locations between Mossel Bay and Herbetsdale to the Groot Brak River. It is associated with renosterveld on the slopes of low hills. The likelihood of occurrence within the project site is low.	Low
	Sensitive species 700	VU	This species is known from less than ten locations and occurs on the lower foothills of the Langeberg Mountains. It is associated with clay loam at the interface of shale and sandstone strata. The likelihood of occurrence within th project site is low.	Low
	Sensitive species 763	VU	This species occurs from Riversdale to Port St. Johns and is associated with dry coastal renosterveld and grassy places in coastal forest. The likelihood of occurrence within the project site is low.	Low
	Sensitive species 980	EN	This species is thought to be extant at four of its known locations. It occurs from Swellendam to Bredasdorp and eastwards to George and is associated with seasonally damp sandy flats and on east- and south-facing shale slopes. The likelihood of occurrence within the project site is low.	Low
ORCHIDACEAE	*Acrolophia lunata*	EN	Acrolophia lunata has an EOO of 4260km2 and is known from less than five extant locations between Swellendam and the Kouga Mountains. This species is associated with mesic fynbos from sea level to 750m. The likelihood of occurrence within the project site is medium.	Medium
ORCHIDACEAE	*Acrolophia ustulata*	VU	Acrolophia ustulata is known from fewer than five locations from the Cape Peninsula to Robinson Pass. It is associated with arid fynbos on rocky acidic sandstone derived soil. The likelihood of occurrence within the project site is medium.	Medium

FABACEAE	*Amphithalea axillaris*	Rare	This species occurs in the Langeberg and Outeniqua Mountains as small, isolated subpopulations of less than 5 individuals. It is associated with montane fynbos on sandy soils. The likelihood of occurrence within the project site is medium.	Medium
MALVACEAE	*Hermannia lavandulifolia*	VU	This species is widespread occuring from Worcestor to the Overberg and extending along the southern Cape coastal lowlands up to Plettenberg Bay. It is associated withrenosterveld and valley thicket, occuring on clay slopes. The lieklihood of occurrence within the site is Medium.	Medium
BORAGINACEAE	*Lobostemon muirii*	RARE	This species is known from six sites and occurs on the Langeberg Mountains between Phesantefontein and Witboois River. It is associated with sandy, north-facing mountain slopes. The likelihood of occurrence within the project site is medium.	Medium
POLYGALACEAE	*Muraltia cliffortiifolia*	VU	This species is known from less than five locations between Rooiberg and the area between Riversdale and Mossel Bay. It is associated with arid fynbos. The likelihood of occurrence within the project site is Medium	Medium
ASTERACEAE	*Relhania garnotii*	VU	This species occurs from Agulhas to Mossel Bay and is associated with lowland shale areas, especially in areas of silcrete. The likelihood of occurrence within the project site is Medium.	Medium
IRIDACEAE	*Romulea jugicola*	VU	This species has an EOO of 7400km2 and is known from less than 10 locations between Kammanassie and Outeniqua Mountains to Potberg. It is associated with stony foothills on clay soils in renosterveld. The likelihood of occurrence within the project site is Medium.	Medium

APPENDIX 4: FAUNAL SPECIES OF GONDWANA

GONDWANA
PRIVATE GAME RESERVE

Species Lists
Vertebrates

Group	Common Name	Scientific name
Amphibians	Bronze Cacao, Dwarf dainty frog	Cacosternum boettgeri
Amphibians	Knysna Spiny Reed Frog* (EN)	Afrixalus knysnae
Amphibians	Cape river frog	Amietia fuscigula
Amphibians	Mountain rain frog	Breviceps montanus
Amphibians	Eastern Rose's rain frog	Breviceps rosei spp vansoni
Amphibians	Painted Reed Frog	Hyperolius marmoratus
Amphibians	Raucus Toad	Sclerophrys capensis
Amphibians	Striped Stream Frog	Strongylopus fasciatus
Amphibians	Gray's stream frog	Strongylopus grayii
Amphibians	Delalande sand frog	Tomopterna delalandii
Amphibians	African clawed frog (common platana)	Xenopus laevis

Group	Common Name	Scientific name
Reptiles	Cape legless Skink	Acontias meleagris
Reptiles	Southern Rock agama	Agama atra
Reptiles	Puff adder	Bitis arietans
Reptiles	Brown house snake	Boaedon capensis
Reptiles	Robertson dwarf chameleon	Bradypodion gutturale
Reptiles	Rhombic night adder	Causus rhombeatus
Reptiles	Cape snake lizard	Chamaesaura anguina
Reptiles	Angulate tortoise	Chersina angulata
Reptiles	Cape Girdled lizard	Cordylus cordylus
Reptiles	Boomslang	Dispholidus typus
Reptiles	Common slugeater	Duberria lutrix
Reptiles	Parrot-beaked tortoise	Homopus areolatus
Reptiles	Spotted harlequin snake	Homoroselaps lacteus
Reptiles	Olive night snake	Lycodonomorphus inornatus
Reptiles	Cape cobra	Naja nivea
Reptiles	Cradock Thick-toed Gecko	Pachydactylus geitje
Reptiles	Spotted sand lizard	Pedioplanis lineoocellata
Reptiles	Cape Terrapin	Pelomedusa galeata
Reptiles	Green Water Snake	Philothamnus hoplogaster
Reptiles	Sundevall se Graafneusslang	Prosymna sundevalli
Reptiles	Cross marked sand snake	Psammophis crucifer
Reptiles	Rhombic skaapsteker	Psammophylax rhombeatus
Reptiles	Leopard tortoise	Stigmochelys pardalis
Reptiles	Longtail Whip lizard	Tetradactylus tetradactylus
Reptiles	Cape skink	Trachylepis capensis
Reptiles	Red sided skink	Trachylepis homalocephala

Group	Common Name	Scientific name
Mammals	Aardvark	Orycteropus afer
Mammals	Aardwolf	Proteles cristatus
Mammals	African wild cat	Felis lybica
Mammals	Black-backed jackal	Lupulella mesomelas
Mammals	Blue wildebeest	Connochaetes taurinus
Mammals	Bontebok	Damaliscus pygargus
Mammals	Brown hyena	Parahyaena brunnea
Mammals	Burchell's zebra	Equus quagga burchellii
Mammals	Bush pig	Potamochoerus larvatus koiropotamus
Mammals	Bushbuck	Tragelaphus scriptus sylvaticus
Mammals	Cape buffalo	Syncerus caffer
Mammals	Cape genet	Genetta tigrina
Mammals	Cape grysbok	Raphicerus melanotis
Mammals	Cape mountain zebra	Equus zebra zebra
Mammals	Caracal	Caracal caracal
Mammals	Chacma baboon	Papio ursinus
Mammals	Cheetah	Acinonyx jubatus
Mammals	Common duiker	Sylvicapra grimmia
Mammals	Common mole-rat	Cryptomys hottentotus
Mammals	Egyptian free-tailed bat	Tadarida aegyptiaca
Mammals	Eland	Tragelaphus oryx
Mammals	Elephant	Loxodonta africana
Mammals	Four stripped field-mouse	Rhabdomys pumilio
Mammals	Fynbos Golden Mole*	Amblysomus corriae
Mammals	Gemsbok	Oryx gazella
Mammals	Giraffe	Giraffa camelopardalis
Mammals	Greater Kudu	Tragelaphus strepsiceros
Mammals	Grey climbing mouse	Dendromus melanotis
Mammals	Grey rhebok	Pelea capreolus
Mammals	Hippopotamus	Hippopotamus amphibius
Mammals	Honey Badger	Mellivora capensis
Mammals	House Mouse	Mus musculus
Mammals	Impala	Aepyceros melampus
Mammals	Klipspringer	Oreotragus oreotragus
Mammals	Large grey mongoose	Herpestes ichneumon
Mammals	Lion	Panthera leo
Mammals	Porcupine	Hystrix africaeaustralis
Mammals	Red hartebeest	Alcelaphus buselaphus
Mammals	Rock dassie	Procavia capensis
Mammals	Sable	Hippotragus niger
Mammals	Scrub hare	Lepus saxatilis
Mammals	Small grey mongoose	Herpestes pulverulenta
Mammals	Small spotted genet	Genetta felina
Mammals	Springbok	Antidorcas marsupialis
Mammals	Striped Polecat	Ictonyx striatus
Mammals	Vervet monkey	Chlorocebus pygerythrus
Mammals	Water Mongoose	Atilax paludinosus
Mammals	Waterbuck	Kobus ellipsiprymnus
Mammals	White rhino	Ceratotherium simum

GONDWANA
PRIVATE GAME RESERVE

Species Lists
Vertebrates

Group	Common Name	Scientific name
Birds	Black Sparrowhawk	Accipiter melanoleucus
Birds	Rufous-breasted Sparrowhawk	Accipiter rufiventris
Birds	African Goshawk	Accipiter tachiro
Birds	Little sparrowhawk	Accipiter minullus
Birds	White-throated swift	Aeronautes saxatalis
Birds	Half-collared kingfisher	Alcedo semitorquata
Birds	Egyptian Goose	Alopochen aegyptiaca
Birds	African Black Duck	Anas sparsa
Birds	Yellow-billed duck	Anas undulata
Birds	Sombre Greenbul	Andropadus importunus
Birds	Orange-breasted Sunbird	Anthobaphes violacea
Birds	African Pipit	Anthus cinnamomeus
Birds	Plain Backed Pipit	Anthus leucophrys
Birds	Long Billed Pipit	Anthus similis
Birds	Bar-throated apalis	Apalis thoracica
Birds	Narina trogon	Apaloderma narina
Birds	Little Swift	Apus affinis
Birds	Common Swift	Apus apus
Birds	African Black Swift	Apus barbatus
Birds	White Rumped Swift	Apus caffer
Birds	Horus Swift	Apus horus
Birds	Verreaux's eagle	Aquila verreauxii
Birds	Grey Heron	Ardea cinerea
Birds	Black-headed Heron	Ardea melanocephala
Birds	Purple heron	Ardea purpurea
Birds	Cape batis	Batis capensis
Birds	Hadeda Ibis	Bostrychia hagedash
Birds	Victorin's Warbler	Cryptillas victorini
Birds	Spotted eagle-owl	Bubo africanus
Birds	Cape eagle owl	Bubo capensis
Birds	Cattle egret	Bubulcus ibis
Birds	Red-billed Oxpecker	Buphagus erythrorynchus
Birds	Spotted thick-knee	Burhinus capensis

GONDWANA
PRIVATE GAME RESERVE

Species Lists
Vertebrates

Group	Common Name	Scientific name
Birds	Water thick-knee	Burhinus vermiculatus
Birds	Jackal Buzzard	Buteo rufofuscus
Birds	Forest Buzzard	Buteo trizonatus
Birds	Steppe Buzzard	Buteo buteo ssp. vulpinus
Birds	Red Capped Lark	Calandrella cinerea
Birds	Green-backed camaroptera	Camaroptera brachyura
Birds	Black Cuckooshrike	Campephaga flava
Birds	Fiery-necked Nightjar	Caprimulgus pectoralis
Birds	Burchell's Coucal	Centropus superciliosus ssp. Burchellii
Birds	Karoo Scrub Robin	Cercotrichas coryphaeus
Birds	White-fronted Plover	Charadrius marginatus
Birds	Three Banded Plover	Charadrius tricollaris
Birds	Olive Bushshrike	Telophorus olivaceus
Birds	Diederik Cuckoo	Chrysococcyx caprius
Birds	Klaas's Cuckoo	Chrysococcyx klaas
Birds	White Stork	Ciconia ciconia
Birds	Black Stork	Ciconia nigra
Birds	Black harrier	Circus maurus
Birds	Zitting Cisticola	Cisticola juncidis
Birds	Neddicky	Cisticola fulvicapilla
Birds	Grey Backed Cisticola	Cisticola subruficapilla
Birds	Cloud Cisticola	Cisticola textrix
Birds	Levaillants Cisticola	Cisticola tinniens
Birds	Speckled Mousebird	Colius striatus
Birds	African Olive (Rameron) Pigeon	Columba arquatrix
Birds	Speckled pigeon	Columba guinea
Birds	European Roller	Coracias garrulus
Birds	Familiar Chat	Oenanthe familiaris
Birds	White-necked Raven	Corvus albicollis
Birds	Pied Crow	Corvus albus
Birds	Cape Crow	Corvus capensis
Birds	Malachite Kingfisher	Corythornis cristatus
Birds	Cape robin-chat	Cossypha caffra

Group	Common Name	Scientific name
Birds	Common quail	Coturnix coturnix
Birds	Yellow canary	Crithagra flaviventris
Birds	Streaky Headed Seed Eater (Canary)	Crithagra gularis
Birds	Protea Seed Eater (Canary)	Crithagra leucoptera
Birds	Yellow-fronted Canary	Crithagra mozambica
Birds	Brimstone Canary	Crithagra sulphurata
Birds	Cape siskin	Crithagra totta
Birds	Common Cuckoo	Cuculus canorus
Birds	Red-chested cuckoo	Cuculus solitarius
Birds	Grey Sunbird	Cyanomitra veroxii
Birds	Common House Martin	Delichon urbicum
Birds	Cardinal woodpecker	Chloropicus fuscescens
Birds	Fork-tailed Drongo	Dicrurus adsimilis
Birds	Little Egret	Egretta garzetta
Birds	Black-winged kite	Elanus caeruleus
Birds	Tractrac Chat	Emarginata tractrac
Birds	Cape Bunting	Emberiza capensis
Birds	Common waxbill	Estrilda astrid
Birds	Swee Waxbill	Estrilda melanotis
Birds	Yellow bishop	Euplectes capensis
Birds	Southern Red Bishop	Euplectes orix
Birds	Southern Black Korhaan	Eupodotis afra
Birds	Amur Falcon	Falco amurensis
Birds	Lanner Falcon	Falco biarmicus
Birds	Peregrine falcon	Falco peregrinus
Birds	Rock kestrel	Falco rupicolus
Birds	Red-knobbed Coot	Fulica cristata
Birds	Large-billed Lark	Galerida magnirostris
Birds	Moorhen	Gallinula chloropus
Birds	Ground woodpecker	Geocolaptes olivaceus
Birds	Blue Crane	Grus paradisea
Birds	Brown-hooded Kingfisher	Halcyon albiventris
Birds	African fish eagle	Heliaeetus vocifer

Group	Common Name	Scientific name
Birds	Booted eagle	Hieraaetus pennatus
Birds	Greater striped swallow	Cecropis cucullata
Birds	Pearl Breasted Swallow	Hirundo dimidiata
Birds	Rock Martin	Ptyonoprogne fuligula
Birds	Barn Swallow	Hirundo rustica
Birds	Greater Honeyguide	Indicator indicator
Birds	Pied Starling	Lamprotornis bicolor
Birds	Southern boubou	Laniarius ferrugineus
Birds	Fiscal Shrike Common fiscal	Lanius collaris
Birds	Red-backed Shrike	Lanius collurio
Birds	Cape Longclaw	Macronyx capensis
Birds	Grey-headed Bushshrike	Malaconotus blanchoti
Birds	Giant Kingfisher	Megaceryle maxima
Birds	Pale chanting goshawk	Melierax canorus
Birds	Reed Cormorant	Microcarbo africanus
Birds	Yellow-billed Kite	Milvus aegyptius
Birds	Cape Clapper Lark **	Mirafra apiata
Birds	Cape Rock Thrush	Monticola rupestris
Birds	Cape Wagtail	Motacilla capensis
Birds	African Dusky Flycatcher	Muscicapa adusta
Birds	Greater Double-collared Sunbird	Nectarinia afra
Birds	Amethyst (African Black) Sunbird	Chalcomitra amethystina
Birds	Southern Double-collared Sunbird	Nectarinia chalybea
Birds	Malachite sunbird	Nectarinia famosa
Birds	Denham's Bustard	Neotis denhami
Birds	Helmeted Guineafowl	Numida meleagris
Birds	Black-crowned night heron	Nycticorax nycticorax
Birds	Namaqua dove	Oena capensis
Birds	Capped wheatear	Oenanthe pileata
Birds	Black headed oriole	Oriolus larvatus
Birds	Osprey	Pandion haliaetus
Birds	Southern grey-headed sparrow	Passer diffusus
Birds	Cape Sparrow	Passer melanurus

Group	Common Name	Scientific name
Birds	Great White Pelican	Pelecanus onocrotalus
Birds	European honey Buzzard	Pernis apivorus
Birds	Terrestrial Brownbul	Phyllastrephus terrestris
Birds	Willow Warbler	Phylloscopus trochilus
Birds	African Spoonbill	Platalea alba
Birds	Spur-winged goose	Plectropterus gambensis
Birds	Cape Weaver	Ploceus capensis
Birds	Southern masked weaver	Ploceus velatus
Birds	Martial eagle	Polemaetus bellicosus
Birds	African harrier-hawk	Polyboroides typus
Birds	Karoo Prinia	Prinia maculosa
Birds	Cape sugarbird	Promerops cafer
Birds	Black saw-wing	Psalidoprocne pristoptera
Birds	Red-necked Spurfowl	Pternistis afer
Birds	Cape Spurfowl	Pternistis capensis
Birds	Cape Bulbul	Pycnonotus capensis
Birds	Red-billed Quelea	Quelea quelea
Birds	Banded Martin	Neophedina cincta
Birds	Sand Martin	Riparia riparia
Birds	Secretary Bird	Sagittarius serpentarius
Birds	Striped Flufftail	Sarothrura affinis
Birds	African Stonechat	Saxicola torquata
Birds	Grey winged spurfowl	Scleroptila afra
Birds	Red-winged Francolin	Scleroptila levaillantii
Birds	Hamerkop	Scopus umbretta
Birds	Cape canary	Serinus canicollis
Birds	Fiscal Flycatcher	Melaenornis silens
Birds	Cape grassbird	Sphenoeacus afer
Birds	Laughing dove	Spilopelia senegalensis
Birds	Cape turtle dove	Streptopelia capicola
Birds	Red-eyed Dove	Streptopelia semitorquata
Birds	African Ostrich	Struthio camelus
Birds	European Starling	Sturnus vulgaris

Group	Common Name	Scientific name
Birds	Layard's warbler/tit-babbler	Curruca layardi
Birds	Long Billed Crombec	Sylvietta rufescens
Birds	Little grebe	Tachybaptus ruficollis
Birds	Alpine swift	Apus melba
Birds	Knysna turaco	Tauraco corythaix
Birds	Southern Tchagra	Tchagra tchagra
Birds	Bokmakierie	Telophorus zeylonus
Birds	African Paradise Flycatcher	Terpsiphone viridis
Birds	Sacred Ibis	Threskiornis aethiopicus
Birds	African Crested-Flycatcher	Trochocercus cyanomelas
Birds	Olive Thrush	Turdus olivaceus
Birds	Hottentot Buttonquail	Turnix hottentottus
Birds	Tambourine Dove	Turtur tympanistria
Birds	Barn Owl	Tyto alba
Birds	African Hoopoe	Upupa epops africana
Birds	Red-faced Mousebird	Urocolius indicus
Birds	Blacksmith Lapwing	Vanellus armatus
Birds	Crowned Lapwing	Vanellus coronatus
Birds	Black-winged Lapwing	Vanellus melanopterus
Birds	Pin-tailed whydah*	Vidua macroura
Birds	Black Crake	Zapornia flavirostra
Birds	Cape White Eye	Zosterops pallidus
Birds	Agulhas Cape Clapper Lark *	
Birds	Agulhas Long Billed Lark	