

APPENDIX 9

TERRESTRIAL ECOLOGY IMPACT ASSESSMENT PART A



SCIENTIFIC TERRESTRIAL SERVICES

Faunal and Avifaunal Assessment

AS PART OF THE ENVIRONMENTAL IMPACT ASSESSMENT
AUTHORISATION PROCESS FOR THE PROPOSED CAPE
WINELANDS AIRPORT DEVELOPMENT, FISANTEKRAAL,
WESTERN CAPE PROVINCE

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Report reference: STS 210082



Part of the SAS Environmental Group of Companies

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EXECUTIVE SUMMARY

Scientific Terrestrial Services (STS) was appointed to conduct a Faunal and Avifaunal assessment on portions of the farms, Portions 3, 4 and RE of Farm 474, Joostenbergs Kloof, Portions 23, 10 and the RE of the Farm 724 Joostenbergs Vlake, and Portion 7 of Farm 942, Kliprug, near Cape Town, Western Cape Province.

During the field assessment, three broad floral habitat units were identified for the study area, namely:

- 1. Renosterveld Habitat:** This habitat unit is associated with the last remaining fragments of natural vegetation. In most cases grazing, Alien Invasive Plant (AIP) proliferation and edge effects have reduced the habitat potential for many fauna, however, these remaining fragments are more species rich from a floral perspective and thus offer habitat of varied structure and floral diversity suitable for many fauna;
- 2. Freshwater Habitat:** The Freshwater Habitat includes wetlands identified on site as per the wetland specialist report. Different faunal community compositions were supported within the habitat unit. The wetland offers unique habitat in terms of the saturated nature but has been heavily modified due to agricultural activities.
- 3. Modified Habitat:** This habitat unit includes areas where vegetation has been significantly degraded or is entirely absent because of crop cultivation and ploughing, buildings (for housing and agriculture), historic airport development and Alien Invasive Plant (AIP) stands. Some pockets of severely invaded portions (by Port Jackson) of this unit provide valuable shelter for fauna, and some areas were particularly abundant in avifauna. Forage for fauna and avifauna is anticipated to be intermittent within the habitat as a result of monoculture cultivation and the homogeneity of the remaining unit.
- 4. Artificial impoundments and Agricultural Drains:** These artificial features within the study area are/were used to store/convey water primarily for agricultural purposes. These are not considered to be natural features, though the artificial impoundments may provide seasonal surface water localities for avifauna, notably waterfowl. The agricultural drains do not contain permanent water and are not considered important from an avifaunal perspective.

Species diversity and habitat integrity:

For the mammal, herpetofauna, invertebrate and avian assessment, mostly commonly occurring species were observed, only a single SCC, *Grus paradiseus* (Blue crane) was observed. As the study area largely is cultivated land with reduced primary productivity and floral richness most secretive and rare fauna have emigrated to areas with more suitable natural vegetation and as a result a largely intermediate to moderately low diversity of mammals, invertebrates, herpetofauna and avifauna were observed. It is inferred that fauna will range throughout the study area to meet their dietary needs and in most cases will not be restricted to particular unit. The remaining portions of Renosterveld habitat, although highly fragmented, provided habitat for breeding and foraging for most common fauna and are considered of intermediate sensitivity. The Freshwater habitat provides habitat to species which select for areas of increased soil saturation, though it is noted that the wetland has been cultivated which will affect the overall habitat provisioning to species. As a result of previous vegetation clearing and agriculture the Modified Habitat is considered of moderately low sensitivity, however, as it makes up the vast majority of the site it is anticipated to be utilized for foraging by most faunal species within the study area.

Conservation significance of the study area:

The results of the online National Web-Based Environmental Screening Tool (2023) indicate the Terrestrial Biodiversity Sensitivity Theme for the study to be of very high sensitivity. The high sensitivity regions are a result of 'the presence of CBA 1's, CBA 2's, critically endangered ecosystems and an endangered ecosystem.

Species of Conservation Concern (SCC):

The National Web-based Environmental Screening Tool for the study area indicates that the Animal Species Theme for the southern parts of the study area was of high sensitivity whereas the remainder of the study area was of medium sensitivity.



Several SCC potentially utilise the study area on a permanent or temporary bases. These species are: *Psammophis leightoni* (Cape Sand Snake) and *Bradypodion pumilum* (Cape Dwarf Chameleon), *Phoenicopterus roseus* (Greater Flamingo), *Phoenicopterus minor* (Lesser Flamingo), *Circus ranivorus* (African Marsh Harrier), *Circus maurus* (Black harrier), *Falco biarmicus* (Lanner Falcon), *Sagittarius serpentarius* (Secretarybird), *Aquila verreauxii* (Verreaux's Eagle), *Pelecanus onocrotalus* (Great White Pelican) and *Oxyura maccoa* (Maccoa Duck). *Grus paradiseus* (Blue crane) was observed within the study area and is known to breed within a kilometre of the study area. Should any of the above listed species burrows or nests be detected a suitably qualified specialist is to be contacted in order to determine the best way forward. In some instances it will be the necessary to obtain the relevant permits from the competent authorities if any of these species or nests thereof will be disturbed.

Impact Assessment

The proposed airport development will result in large scale habitat loss, though much of this habitat is considered to be of decreased sensitivity. Subsequently, the perceived impacts are expected to have a low to very low impact significance to faunal species in the study area. Impacts to avifaunal species were more variable, as avifauna are able to more readily move between and utilise the study area and surrounds. The agricultural areas also provided important, albeit artificial, foraging habitat for avifaunal SCC, notably *Grus paradiseus* (Blue crane). Provided mitigation measures are implemented, impact significance to avifauna is expected to range from medium to very low significance.

Concluding Remarks:

From a faunal and avifaunal ecological perspective, the sensitivity of the habitat units varies from moderately low (Modified habitat) to intermediate within the Renosterveld and Freshwater Habitat. The highly fragmented nature the indigenous vegetation limits the conservation potential of the study area within the highly modified landscape. Although SCC do utilise the study area, the notable habitat degradation as a result of historic impacts from the existing airport and agricultural activities is clearly evident. *Grus paradiseus* (Blue crane) do breed east of the study area and will forage within the study area, as such, the development and airport activities may pose a threat to this species in terms of lost foraging grounds and potential bird strikes.

Based on the results of the site assessment and the overall impact significance scores, it is the opinion of the specialist that this project may be approved, provided that all management and mitigation measures as stipulated in the reports (Part B and C) are adhered to.





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**FAUNAL AND AVIFAUNAL ASSESSMENT AS PART OF
THE ENVIRONMENTAL IMPACT ASSESSMENT
AUTHORISATION PROCESS FOR THE PROPOSED CAPE
WINELANDS AIRPORT DEVELOPMENT, FISANTEKRAAL,
WESTERN CAPE PROVINCE**

Prepared for

PHS Consulting (Pty) Ltd.

July 2023

Part A: Background Information

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DOCUMENT GUIDE

The table below provides a guide to the reporting of biodiversity impacts as they relate to 1) Government Notice No. 320 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on **Terrestrial Biodiversity** as published in Government Gazette 43110 dated 20 June 2020, and 2) Government Notice No. 1150 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on **Terrestrial Plant and Animal Species** as published in Government Gazette 43855 dated 30 June 2020.

Theme-Specific Requirements as per Government Notice No. 320 Terrestrial Biodiversity Theme – Very High Sensitivity Rating as per Screening Tool Output		
No.	SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS	Section in report/Notes
2	Terrestrial Biodiversity Specialist Assessment	
2.1	The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with expertise in the field of terrestrial biodiversity.	Part A – C: Cover Page Part A: Appendix E
2.2	The assessment must be undertaken on the preferred site and within the proposed development footprint.	Part A: Section 1
2.3	The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects:	
2.3.1	A description of the ecological drivers or processes of the system and how the proposed development will impact these;	Part B: Section 3 (fauna) Part C: Section 3 (avifauna)
2.3.2	Ecological functioning and ecological processes (e.g., fire, migration, pollination, etc.) that operate within the preferred site;	Part B: Section 3 (fauna) Part C: Section 3 (fauna)
2.3.3	The ecological corridors that the proposed development would impede including migration and movement of flora and fauna;	Part A: Section 3 (desktop analysis) Part B: Section 3 (fauna) Part C: Section 3 (avifauna)
2.3.4	The description of any significant terrestrial landscape features (including rare or important flora-faunal associations, presence of Strategic Water Source Areas (SWSAs) or Freshwater Ecosystem Priority Area (FEPA) sub catchments;	Part A: Section 3 (desktop analysis) Part B: Section 3 (fauna) Part C: Section 3 (avifauna) <i>*For descriptions on the presence of FEPAs, please refer to the Freshwater Biodiversity Assessment</i>
2.3.5	A description of terrestrial biodiversity and ecosystems on the preferred site, including: <ul style="list-style-type: none"> a) main vegetation types; b) threatened ecosystems, including listed ecosystems as well as locally important habitat types identified; c) ecological connectivity, habitat fragmentation, ecological processes and fine scale habitats; and d) species, distribution, important habitats (e.g. feeding grounds, nesting sites, etc.) and movement patterns identified; 	Part A: Section 3 (desktop analysis) Part B: Section 3 (fauna) Part C: Section 3 (avifauna)
2.3.6	The assessment must identify any alternative development footprints within the preferred site which would be of a “low” sensitivity as identified by the screening tool and verified through the site sensitivity verification; and	NA
2.3.7	The assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:	
2.3.7.1	Terrestrial Critical Biodiversity Areas (CBAs), including: <ul style="list-style-type: none"> a) <i>the reasons why an area has been identified as a CBA;</i> b) <i>an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation;</i> c) <i>the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to the remaining extent of the ecosystem type(s);</i> 	Part A: Section 3 (desktop analysis) Part B: TBC Part C: TBC



	<ul style="list-style-type: none"> d) <i>the impact on ecosystem threat status;</i> e) <i>the impact on explicit subtypes in the vegetation;</i> f) <i>the impact on overall species and ecosystem diversity of the site; and</i> g) <i>the impact on any changes to threat status of populations of species of conservation concern in the CBA;</i> 	
2.3.7.2	<p>Terrestrial Ecological Support Areas (ESAs), including:</p> <ul style="list-style-type: none"> a) <i>the impact on the ecological processes that operate within or across the site;</i> b) <i>the extent the proposed development will impact on the functionality of the ESA; and</i> c) <i>loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration and movement of flora and fauna;</i> 	
2.3.7.3	<p>Protected areas as defined by the National Environmental Management Protected Areas Act, 2004 including-</p> <ul style="list-style-type: none"> a) <i>an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan;</i> 	Part A: Section 3 (desktop analysis)
2.3.7.4	<p>Priority areas for protected area expansion, including-</p> <ul style="list-style-type: none"> a) <i>the way in which in which the proposed development will compromise or contribute to the expansion of the protected area network;</i> 	Part A: Section 3 (desktop analysis)
2.3.7.5	<p>SWSAs including:</p> <ul style="list-style-type: none"> a) <i>the impact(s) on the terrestrial habitat of a SWSA; and</i> b) <i>the impacts of the proposed development on the SWSA water quality and quantity (e.g. describing potential increased runoff leading to increased sediment load in water courses);</i> 	Not Applicable
2.3.7.6	<p>FEPA sub catchments, including-</p> <ul style="list-style-type: none"> a) <i>the impacts of the proposed development on habitat condition and species in the FEPA sub catchment;</i> 	<i>*For descriptions on the presence of FEPAs, please refer to the Freshwater Biodiversity Assessment (SAS 202148, 2021)</i>
2.3.7.7	<p>Indigenous forests, including:</p> <ul style="list-style-type: none"> a) <i>impact on the ecological integrity of the forest; and</i> b) <i>percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.</i> 	Not Applicable
2.4	The findings of the assessment must be written up in a Terrestrial Biodiversity Specialist Assessment Report.	
	Part B: Results of the Faunal Assessment as well as conclusions on Terrestrial Biodiversity as it relates to vegetation communities.	
	Part C: Results of the Avifaunal Assessment as well as conclusions on Terrestrial Biodiversity as it relates to faunal communities.	
3	Terrestrial Biodiversity Specialist Assessment 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;	Part A: Appendix E
3.1.2	A signed statement of independence by the specialist;	Part A: Appendix E
3.1.3	A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Part B: Section 1.3 (flora) Part C: Section 1.3 (fauna)
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;	Part A: Appendix C Part B: Appendix A
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;	Part B: Section 1.3 (fauna) Part C: Section 1.3 (avifauna)
3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	Part B: Section 4 (fauna) Part C: Section 4 (avifauna)
	Impact Assessment Requirements	Part B: Section 5 (flora) Part C: Section 5 (fauna)
	3.1.7 Additional environmental impacts expected from the proposed development;	



	<p>3.1.8 Any direct, indirect and cumulative impacts of the proposed development;</p> <p>3.1.9 The degree to which impacts and risks can be mitigated;</p> <p>3.1.10 The degree to which the impacts and risks can be reversed;</p> <p>3.1.11 The degree to which the impacts and risks can cause loss of irreplaceable resources;</p> <p>3.1.12 Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);</p>	
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;	Not Applicable to this report
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	<p>Part A: Executive summary</p> <p>Part B: Section 5 (fauna)</p> <p>Part C: Section 5 (avifauna)</p>
3.1.15	Any conditions to which this statement is subjected.	<p>Part B: Section 5</p> <p>Part C: Section 5</p>
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.	Not Applicable to this report
3.3	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	Not Applicable to this report



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GLOSSARY OF TERMS

Most definitions are based on terms and concepts elaborated by Richardson *et al.* (2011), Hui and Richardson (2017) and Wilson *et al.* (2017), with consideration to their applicability in the South African context, especially South African legislation [notably the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), and the associated Alien and Invasive Species Regulations, 2020].

Alien species (syn. exotic species; non-native species)	A species that is present in a region outside its natural range due to human actions (intentional or accidental) that have enabled it to overcome biogeographic barriers.
Biological diversity or Biodiversity (as per the definition in NEMBA)	The variability among living organisms from all sources including, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems.
Biome - as per Mucina and Rutherford (2006); after Low and Rebelo (1998).	A broad ecological spatial unit representing major life zones of large natural areas – defined mainly by vegetation structure, climate, and major large-scale disturbance factors (such as fires).
Bioregion (as per the definition in NEMBA)	A geographic region which has in terms of section 40(1) been determined as a bioregion for the purposes of this Act;
Critical Biodiversity Area (CBA)	A CBA is an area considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation, and ridges.
Corridor	A dispersal route or a physical connection of suitable habitats linking previously unconnected regions.
Disturbance	A temporal change, either regular or irregular (uncertain), in the environmental conditions that can trigger population fluctuations and secondary succession. Disturbance is an important driver of biological invasions.
Ecoregion	An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region".
Endangered	Organisms in danger of extinction if causal factors continue to operate.
Endemic species	Species that are only found within a pre-defined area. There can therefore be sub-continental (e.g., southern Africa), national (South Africa), provincial, regional, or even within a particular mountain range.
Ecological Support Area (ESA)	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
Ground-truth	Ground truth is a term used in various fields to refer to information provided by direct observation (i.e., empirical evidence) as opposed to information provided by inference.
Habitat (as per the definition in NEMBA)	A place where a species or ecological community naturally occurs.
Important Bird and Biodiversity Area (IBA)	The IBA Programme identifies and works to conserve a network of sites critical for the long-term survival of bird species that: are globally threatened, have a restricted range, are restricted to specific biomes/vegetation types or sites that have significant populations.
Indigenous vegetation (as per the definition in NEMA)	Vegetation occurring naturally within a defined area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.
Integrity (ecological)	The integrity of an ecosystem refers to its functional completeness, including its components (species) its patterns (distribution) and its processes.
Invasive species	Alien species that sustain self-replacing populations over several life cycles, produce reproductive offspring, often in very large numbers at considerable distances from the parent and/or site of introduction, and have the potential to spread over long distances.
Listed alien species	All alien species that are regulated in South Africa under the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004), Alien and Invasive Species Regulations, 2020.



Least Threatened	Least threatened ecosystems are still largely intact.
Native species (syn. indigenous species)	Species that are found within their natural range where they have evolved without human intervention (intentional or accidental). Also includes species that have expanded their range as a result of human modification of the environment that does not directly impact dispersal (e.g., species are still native if they increase their range as a result of watered gardens but are alien if they increase their range as a result of spread along human-created corridors linking previously separate biogeographic regions).
Red Data listed (RDL) species	According to the Red List of South African plants (http://redlist.sanbi.org/) and the International Union for Conservation of Nature (IUCN), organisms that fall into the Extinct in the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU) categories of ecological status.
Species of Conservation Concern (SCC)	The term SCC in the context of this report refers to all RDL and IUCN listed threatened species as well as protected species of relevance to the project.



LIST OF ACRONYMS

AICP	Alien and Invasive Control Plans
BGIS	Biodiversity Geographic Information Systems
CARA	Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)
CBA	Critical Biodiversity Area
CWA	Cape Winelands Airport
DEA	Department of Environmental Affairs
DFFE	Department of Forestry, Fisheries and the Environment
DWS	Department of Water and Sanitation
E-GIS	Environmental Geographical Information Systems
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EN	Endangered
ESA	Ecological Support Area
GIS	Geographic Information System
GN	Government Notice
GPS	Global Positioning System
Ha	Hectare
IBA	Important Bird Area
IUCN	International Union for the Conservation of Nature
MAMSL	Meters Above Mean Sea Level
MAP	Mean Annual Precipitation
MAPE	Mean Annual Potential for Evaporation
MASMS	Mean Annual Soil Moisture Stress
MAT	Mean Annual Temperature
MFD	Mean Frost Days
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA	National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004)
NPAES	National Protected Areas Expansion Strategy
PRECIS	Pretoria Computer Information Systems
QDS	Quarter Degree Square (1:50,000 topographical mapping references)
SABAP 2	Southern African Bird Atlas 2
SACAD	South Africa Conservation Areas Database
SANBI	South African National Biodiversity Institute
SanParks	South African National Parks
SAPAD	South Africa Protected Area Database
STS	Scientific Terrestrial Services CC
SWSA	Strategic Water Source Areas
TOPS	Threatened or Protected species (in terms of NEMBA)
VEGMAP	The National Vegetation Map Project
VU	Vulnerable
WSA	Water Source Area



1 INTRODUCTION

Scientific Terrestrial Services (Pty) Ltd (STS) was appointed to conduct a Faunal and Avifaunal Assessment for a proposed Cape Winelands Airport on Portions 3, 4 and RE of Farm 474, Joostenbergs Kloof, Portions 23, 10 and the RE of the Farm 724 Joostenbergs Vlake, and Portion 7 of Farm 942, Kliprug, to determine if any constraints from a faunal or avifaunal perspective may hinder possible future development. This report discusses the findings in relation to portions of the above listed farm portions which henceforth referred to as the “study area”. The study area is located approximately 13 km northeast of the suburb of Durbanville, City of Cape Town District Municipality near Fisantekraal, Western Cape Province. More specifically, the study area is situated north of the R312, to the east of R302 and to the west of R304 (Figure 1 and 2).

The study area has been subject to historical mining and agricultural activities, and more currently, activities associated with the existing Cape Winelands Airport. The existing airport, confined to the southern portion of the study area, is a former South African Air Force airfield built circa 1943 and is currently operational as a general flying airfield used for flight training, aircraft maintenance, private charter flights, hangarage for private plane owners, and the sale of aviation fuel.



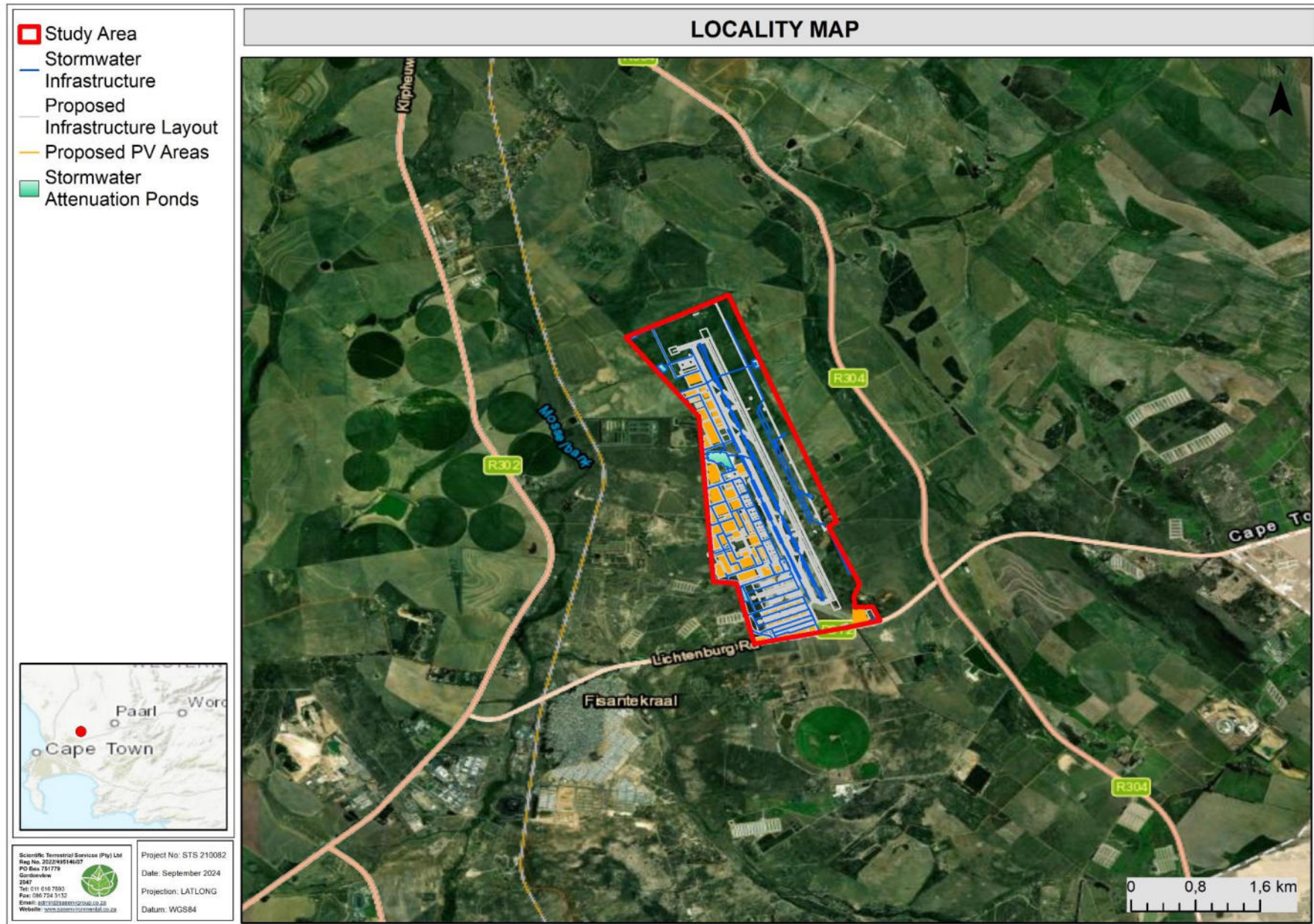


Figure 1: Digital satellite image depicting the study area and study area in relation to surrounding areas.



1.1 Scope of Work

Specific outcomes in terms of Part A of the report are as follows:

- Compile a desktop assessment with all relevant information as presented by SANBI's Biodiversity Geographic Information Systems (BGIS) website (<http://bgis.sanbi.org>) and the Environmental Geographical Information Systems (E-GIS) website (<https://egis.environment.gov.za/>). The desktop assessment aims to gain background information on the physical habitat and potential floral and faunal ecology associated with the study area;
- To state the indemnity and terms of use of this report (Appendix A) as well as to provide the details of the specialists who prepared the reports (Appendix E);
- To outline the legislative requirements that were considered for the assessment (Appendix B of this report); and
- To provide the methodologies followed relating to the impact assessment and development of the mitigation measures (Appendix C) that was applied in the faunal and avifaunal assessments (Part B and Part C).

1.2 Assumptions and Limitations

The following assumptions and limitations are applicable to this report:

- The biodiversity desktop assessment is confined to the study area and does not include detailed results of the adjacent properties, although the sensitivity of surrounding areas has been included on the relevant maps;
- It is important to note that although all data sources used provide useful and often verifiable, high-quality data, the various databases used do not always provide an entirely accurate indication of the actual site characteristics within the study area at the scale required to inform an environmental process. However, this information is useful as background information to the study and, based on the desktop results; sufficient decision making can take place with regards to the proposed development; and
- Field assessments were undertaken during summer from the 14th to the 16th February 2022 and also during winter from the 16th and 17 of August 2022. The field assessments aimed to determine the ecological status of the entire study area and to “ground-truth” the results of the desktop assessment (as presented in Parts B and C).



1.3 Legislative Requirements

The following legislative requirements were considered during the assessment:

- The Constitution of the Republic of South Africa, 1996¹;
- The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- Government Notice (GN) No. 320 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity as published in Government Gazette 43110 dated 20 June 2020;
- GN No. 1150 Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant and Terrestrial Animal Species as published in Government Gazette 43855 dated 30 August 2021;
- The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA);
- GN No. R.1020: Alien and Invasive Species Regulations, 2020, in Government Gazette 43735 dated 25 September 2020 as it relates to the NEMBA;
- The Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA);
- The National Forest Act, 1998 (Act No. 84 of 1998, amended 2001) (NFA); and
- GN No. 536 List of Protected Tree Species as published in the Government Gazette 41887 dated 7 September 2018 as it relates to the National Forest Act, 1998 (Act No. 84 of 1998).

The details of each of the above, as they pertain to this study, are provided in Appendix B of this report.

2 PROJECT DESCRIPTION

The proposed CWA development is situated on Portions 3, 4 and RE of Farm 474, Joostenbergs Kloof, Portions 23, 10 and the RE of the Farm 724 Joostenbergs Vlake, and Portion 7 of Farm 942, Kliprug, Fisantekraal, within the City of Cape Town (CoCT) District Municipality. The study area is located approximately 11 km northeast of the suburb of Durbanville and 25 km northeast of the Cape Town International Airport. More specifically, the study area is situated north of the R312, to the east of R302 and to the west of R304 (**Error! Reference source not found.** and **Error! Reference source not found.**). The study area has been subject to historical mining and agricultural activities, and more currently, activities associated with the existing Cape Winelands Airport. The existing airport, confined to the

¹ Since 1996, the Constitution has been amended by seventeen amendments acts. The Constitution is formally entitled the 'Constitution of the Republic of South Africa, 1996'. It was previously also numbered as if it were an Act of Parliament – Act No. 108 of 1996 – but since the passage of the Citation of Constitutional Laws Act, neither it nor the acts amending it are allocated act numbers.



southern portion of the study area, is a former South African Air Force airfield built circa 1943 and is currently operational as a general flying airfield used for flight training, aircraft maintenance, private charter flights, hangarage for private plane owners, and the sale of aviation fuel.

While no site or activity alternatives exist, three development layout alternatives for the proposed CWA exists:

1. A “no-development” option;
2. An initial phased development alternative (alternative 2); and
3. A phased development option (the preferred alternative).

The preferred alternative for the proposed CWA development entails developing the existing airport and adjacent plots of land into a commercial and aviation hub, supporting flight operations domestically as well as regionally, serving as a “reliever” airport to the Cape Town International Airport, with a particular focus on non-aeronautical revenue streams. Four concrete air strips currently exist on site, each of 90 m width and of varying lengths, and referred to as air strips 01-19, 05-23, 14-32 and 03-21 (Figure 3).

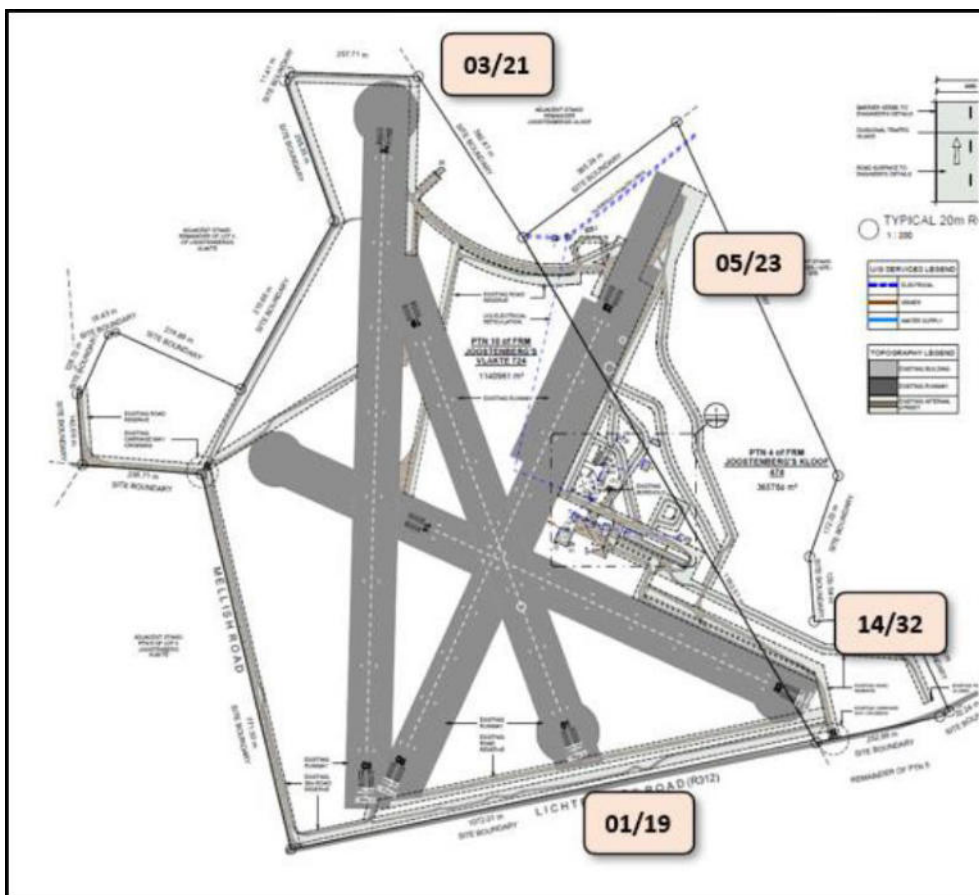


Figure 3: Existing concrete air strips located within the southern portion of the study area.



The most significant differences between the preferred alternative and alternative 2 are the omission of the crosswind runway (airstrip 14-32) from the first phase of the preferred alternative (refer to Figure 3). In addition, layout changes within the study area are also proposed which includes the addition of a solar photo-voltaic (PV) facility in the south-eastern portion of the study area, as well as other technology and design alternatives which were not included in the alternative 2. The risk of the three development alternatives is outlined and discussed in Section 8 below.

The preferred alternative of the CWA development is divided into four precincts – Air Side, Landside, General Aviation and Services, which are all described in detail below. The below project description was provided by the EAP (PHS Consulting, *pers. comm.*).

Airside Precinct Development

During Phase 1, the airport will feature a single runway with an orientation of 01-19 and a length of 3.5 km, designed to accommodate Code 4F instrument operations. This runway will serve all types of operators, including both scheduled commercial and general aviation flights. To enhance efficiency for general aviation, intersection take-off points will be implemented on the runway.

The airside development in Phase 1 will also include various systems such as a CAT III Instrument Landing System, Precision Approach Path Indicators, Glidepath Antennas, Meteorological Systems, Airfield Ground Lighting, and Remote Digital Control Tower Systems. Additional proposed developments for Phases 1 and 2 of the Airside Precinct include:

- **Aircraft Parking Aprons:** Passenger terminal apron, general aviation and Fixed Base Operators (FBO) aprons, isolation pad, cargo apron (Phase 2), and maintenance, repair and overhaul (MRO) apron (Phase 2).
- **Aircraft Parking Stands:** These will range from International Civil Aviation Organization (ICAO) Code B to Code F. The development anticipates 11 Multiple Aircraft Ramp System stands (equivalent to 21 Code C stands), some of which will have passenger boarding bridges and will be capable of accommodating up to Code F aircraft. Additional remote stands will be provided, accessible by bus or on foot. One Code E cargo aircraft stand and two Code E MRO stands are also planned.
- **Airside Service Roads and Security:** Service roads will be built to facilitate vehicle access to airport assets. A security fence will be erected in accordance with aviation security standards.



- **Electricity Supply:** The bulk electricity supply will be terminated within the CWA site at a connection point comprising an Eskom local substation, housed in a secure enclosure measuring approximately 5 000 mm by 4 000 mm.

Landside Precinct Development

Phase 1 and 2 of the Landside Precinct will include several key developments:

- **Passenger Terminal Building (PTB):** (Phase 1) The PTB will serve as the hub for airport operations, bridging airside and landside areas, and will be designed to handle both domestic and international passengers, with a capacity of 5.2 million passengers per annum. The design will comply with ICAO Annexes and the International Air Transport Association Airport Development Reference Manual (12th edition, May 2022). The building will include specialized facilities for check-in, bag drop, security screening, and customs and immigration for international traffic. A Very Important Person (VIP) processing facility will provide direct access to the airside for government officials, VIPs, and Commercially Important Persons.
- **Commercial Developments:** (Phases 1 and 2) Approximately 350 000 m² of lettable area will be available for various commercial uses. The terminal precinct will feature a terminal plaza with hotels, an aviation museum, hangars, aviation clubs, a training centre, workshops, logistics, warehousing, and light manufacturing.
- **Additional Developments:** Petrol service station, hotel, internal road system, drop-and-go facilities, car rental services, parking (multi-storey and at-grade), pedestrian walkways, substations, billboards, droneport, vertiports, gardens, public transport facilities (Phase 2), and car park/ vertical take-off and landing facilities (Phase 2).

General Aviation Precinct

The General Aviation Precinct for Phases 1 and 2, including business aviation, will be located on the southern side of the airport. Facilities for FBOs will be situated along a dedicated taxi lane providing direct access to the main runway via a parallel taxiway. The precinct will also feature a general aviation kerbside refuelling station for AV-gas at the southernmost corner and a clubhouse with airside views and adjacent grass parking for visiting aircraft. Helicopter operations will be conducted from dedicated Final Approach and Take-Off areas.

Proposed developments for the General Aviation Precinct in Phases 1 and 2 include:

- FBO hangars;
- General aviation hangars;
- Clubhouse area;
- Final Approach and Take-Off infrastructure;
- AVGAS station;



- Substation; and
- Remote digital control tower.

Services Precinct

Key airport support facilities are located within the Services Precinct, primarily on the western side of the airport, accessible via the secondary landside road system. These facilities include aircraft rescue and firefighting services, airport maintenance, ground support equipment staging, cargo handling, aircraft MRO, and aircraft fuel facilities. The precinct also accommodates renewable energy installations such as solar PV, wind energy, and a biodigester.

Planned developments for Phases 1 and 2 of the Services Precinct include:

- **Fuel Facilities:** A bulk fuel depot, general aviation kerbside refuelling station, commercial/retail service station (Phase 1), and an underground fuel line from the bulk depot to the aprons (Phase 2).
- **Aircraft Rescue and Fire Fighting:** (Phase 1) Positioned near the runway centre to ensure rapid response within the required ICAO standards of two to three minutes.
- **Cargo Facility:** (Phase 1) Located airside, near the passenger terminal building, to handle both belly cargo and full freighter aircraft. Initially, full freighter aircraft will use the main apron, with a dedicated freighter stand added as traffic increases.
- **Airport Maintenance Facilities:** (Phase 1) Located in the Services Precinct, with access to both airside and landside.
- **GSE Staging Areas:** (Phase 1) Located close to the main apron, with two designated areas for parking.
- **MRO Facility:** (Phase 1) Positioned in the northern part of the airport, with a widebody aircraft parking position, associated hangar, and additional space for more aircraft.
- **Catering Building:** (Phase 2) Located in the northern area, with direct access to both airside and landside.
- **Renewable Energy:** (Phases 1 and 2) Provision for solar PV, bio-digester, and wind energy.
- **Airport Operations Centre:** (Phase 1) A multi-storey building with space for key airport support services, government offices, and an air traffic control centre.
- **Air Traffic Control Centre:** (Phase 1) Located on the upper floors of the Airport Operations Centre.
- **Additional Developments:** (Phases 1 and 2) Potable water reservoir, groundwater treatment infrastructure, water pump station, solid waste storage, wastewater treatment works (WWTW), substation, and cargo apron (Phase 2).



The proposed layout of Phase 1 and Phase 2 of the development (preferred alternative) is indicated in Figure 4 and Figure 5.

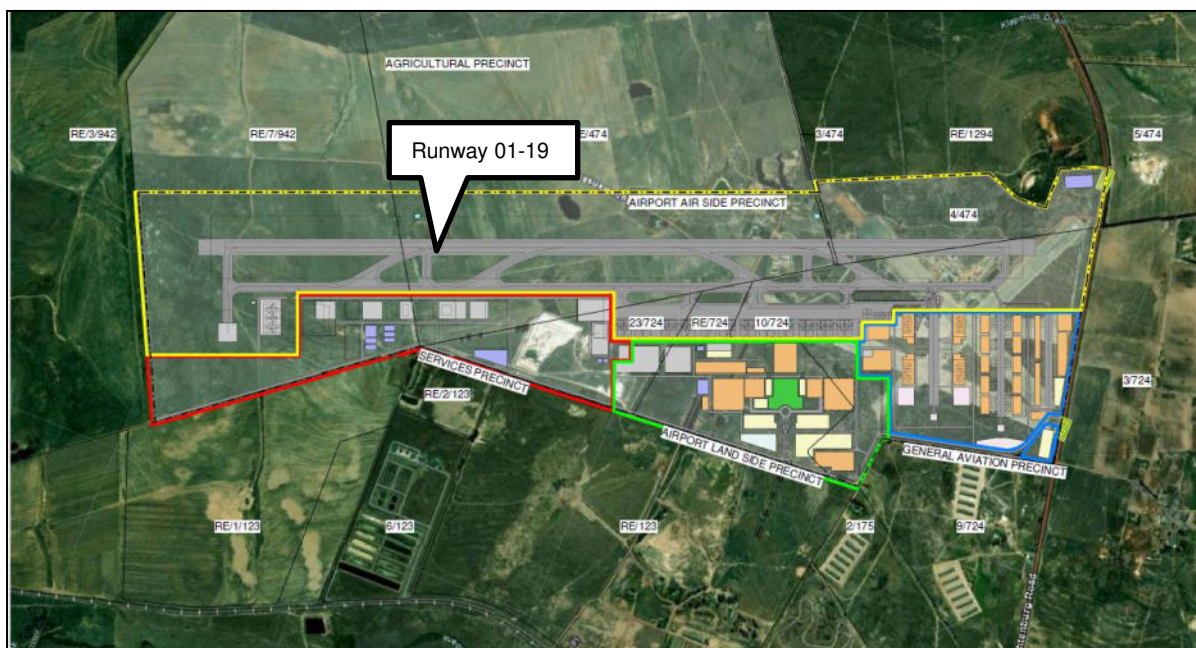


Figure 4: Proposed layout of the CWA development during Phase 1 of the preferred alternative.

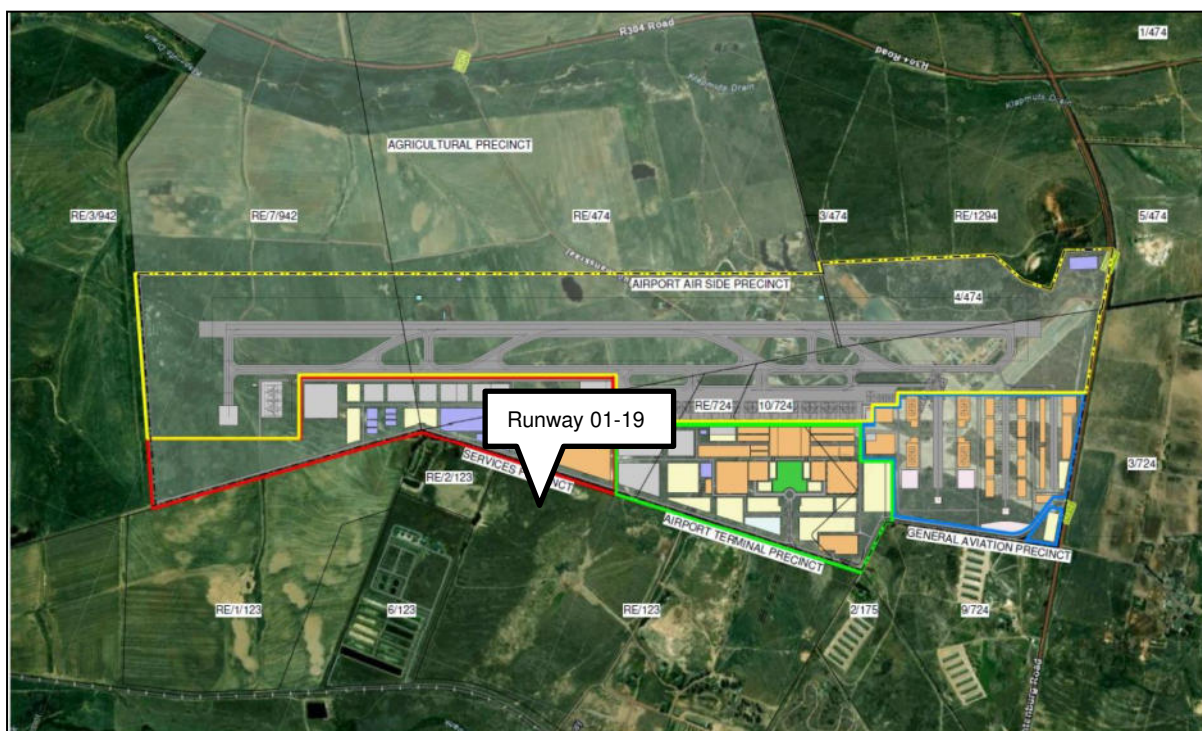


Figure 5: Proposed layout of the CWA development during Phase 2 of the preferred alternative.



The following is of note regarding the bulk service requirements for the proposed CWA development:

Water Supply and Reticulation:

- There is very limited nearby council watermains in the vicinity and there are no existing municipal potable pipelines in close proximity to the study area, the closest supply point is in the Fisantekraal Settlement booster pumpstation, approximately 3 km away from the study area;
- The existing buildings are currently serviced through boreholes; and
- The strategy of water supply to the CWA development in the short to medium term is one of a phased approach which includes the continued use of groundwater in the short-term until such time that sufficient supply is available from municipal supply from the Muldersvlei and / or Spes Bona reservoirs. It is still being determined whether the booster pumpstation has sufficient capacity to supply the proposed CWA development, as described below:
 - Phase 1: an on-site borehole solution, is currently being considered for the proposed CWA development as a short term solution, with the inclusion of the use of a water treatment plant to treat water abstracted from the boreholes to SANS 241 standard. According to Zutari (2024a), these boreholes have been drilled;
 - Phase 2: connection to the municipal supply in Lichtenberg Road, initially through the trunk main connected to the Spes Bona reservoir, and then directly to the Muldersvlei reservoir once available.

Sewer Reticulation and Treatment:

- Existing infrastructure is serviced through septic tanks; and
- The nearest Waste Water Treatment Works (WWTW), i.e., the Fisantekraal WWTW, is 3 km from the study area. A few options are being investigated in terms of connecting the sewer reticulation and treatment of the proposed CWA development to the Fisantekraal WWTW. This includes:
 - Option 1: constructing a pumpstation and associated rising main to pump the sewage; and
 - Option 2: constructing an onsite package sewerage treatment plan to treat sewage on site.



Stormwater:

- It is proposed that stormwater be managed through a network of underground pipes that carry stormwater to dry stormwater and attenuation ponds. Various catchment and attenuation options are being considered for the proposed CWA development;
- The quarry located within the northern portion of the study area is currently being investigated for use as a stormwater retention facility for the proposed CWA development; and
- It is proposed that the western precinct be reshaped so that most of the stormwater flows towards the quarry.

It is proposed that eight dry stormwater attenuation ponds will be constructed within the CWA development footprint, to which stormwater from the development will be directed. The size of the dry stormwater attenuation ponds will range between 350 m³ and 10 800 m³. The quarry will be converted into a wet pond, with a capacity of 95 000 m³.

Electricity:

The bulk mains electrical supply to the CWA development will be connected to the Eskom Grid as described below.

The connection will be completed using two feeders which will be routed to the site using 66 000 V feeder cables. The final routing of the Eskom connection is yet to be determined. The bulk electricity supply will terminate within the CWA development in two high voltage substations, one in the southwest corner of the airport, and one in the mid-west portion. The connection points will comprise an Eskom high voltage substation, Consumer Substations fitted with 66000:11000 Volt Step-Down Power Transformers, and Medium Voltage Power Distribution Systems.

Numerous primary energy sources are considered to be used at the CWA development. The first option is to construct a bio-digester plant using chicken manure and/ or sewage effluent (refer to Figure 5 for the location of the bio-digester). The bio-digester plant will be designed to provide 1-MW of continuous power through the creation of biogas which is accumulated into a bladder system and converted into electricity. Approximately 30 tons of chicken manure is required per day, which will be diluted with sewerage used from the CWA development. Other waste sources can at a later stage be included in the bio-digester. The second alternative is to use PV systems (with a combined capacity of 1000 kW) combined with battery storage to provide electricity to the CWA development. It is intended that municipal electricity supply will be used as a backup source of power in the event of plant failure or maintenance to



the primary plant. It is currently proposed that the bio-digester plant and PV system is utilised in unison to provide electricity to the CWA development. A wind power turbine generator plant is also being considered, although the location of the wind turbine plant is yet to be determined. Non-renewable and renewable secondary backup power supply is also being investigated. Lighting and security services will also be installed for the airport boundary, aprons, parking areas, airport entrances, etc. These are explained in more detail below.

- Boundary Lighting including Entrance and Parking Areas:
 - LED luminaires will be fitted on 6 m high concrete poles at 30 m centres around the entire site. The designed lighting level will be 30-lux; and
 - A series of 30 kVA mini-substations will be provided around the site, allowing for site-wide distribution at 11 000 V and 400 V three phase power supplies for local street lighting connections.
- Apron Lighting:
 - EWO R-System R4 floodlights will be fitted on 28 m masts with integrated pulley system (to raise/lower mast-top flood lighting mounting) with a high-mast vehicle barrier around each mast light pole. The designed lighting level for the apron aircraft parking will be 30-lux; and
 - A mini-substation will be provided for the apron lighting system, allowing for connection to the site-wide distribution at 11 000 V, and 400 V three phase power supplies for local mast lighting connections.
- Airfield Side: Boundary & Apron Security Services:
 - A hybrid daylight/thermal imaging camera system will be installed for the security envelope, allowing for automatic intruder alert monitoring.
 - Outdoor rated horn speakers and fixed lighting/CCTV camera masts will be installed allowing for Security Control voice instructions to Security Staff and Intruders. The CCTV cameras will be mounted on concrete poles (for image stability) and connected to the monitoring/image storage headend using a dedicated fibre-optic cable network. The field cameras will be powered using the Boundary Lighting Electrical Network, and intruders monitored between the illuminated boundary fencing and the airfield runways using the thermal imaging. The CCTV will be linked to the Boundary Electric Fence Monitoring System, such that Security Control Room Operators automatically have TV Monitoring of the affected security breach;
 - An electric Fence and associated monitoring system will be provided by the Security Fence Installer Specialist; and
 - Security services will be installed at the vehicle entry/exit control to the Cape Winelands Airport Road entrances.



Traffic services:

Existing access to the properties is via the Lichtenberg Road (R312). Various options are being considered for future access to the CWA development, taking into consideration the surrounding proposed developments of Greenville Garden City to the south, and Bella Riva to the west. Various access opportunities to the road network system are available for the site west of the runway. These include the existing Melish Road (OP 6/8) connection onto Lichtenberg Road, the future Class 3 Lucullus Road extension and the future Class 3 Melish Road extension through Bella Riva. Site access for any development east of the runway could potentially be from Lichtenberg Road (R312) or via Koelenhof Road (R304) over private property. Internal roads will be designed to accommodate pedestrian and bicycle traffic.

Additional infrastructure not included in the Engineering Services report (Zutari, 2024a) includes potential open space areas, a maintenance road along the eastern boundary of the study area and two fences, one along the perimeter of the study area and the other along the perimeter of the runway.

3 ASSESSMENT APPROACH

Maps and digital satellite images were generated prior to the field assessment to determine broad habitats, vegetation types and potentially sensitive sites. Relevant databases and documentation that were considered during the desktop assessment of the study area included ²:

- 2010 National Protected Area Expansion Strategy (NPAES) (Government of South Africa, 2010; DEA & SANBI, 2009), including the below-listed vector datasets:
 - NPAES Focus Areas 2010: National Protected Areas Expansion Strategy: Focus areas for protected area expansion (South African National Parks (SanParks), 2010);
 - NPAES Formal: Polygons of formal protected national parks areas in South Africa (SANParks/SANBI, 2013); and
 - NPAES Protected Areas – Informal: Informal conservation areas in South Africa (SANParks/SANBI, 2012).
- The South African Conservation Areas Database, Quarter 3 (SACAD, 2021);

² Datasets obtained from:

- SANBI BGIS (2019). The South African National Biodiversity Institute - Biodiversity GIS (BGIS) [online]. URL: <http://bgis.sanbi.org> as retrieved in 2019; and
- Department of Environmental Affairs (DEA) Environmental Geographical Information Systems (E-GIS) website. URL: <https://egis.environment.gov.za/>



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- The South African Protected Areas Database, Quarter 3 (SAPAD, 2021);
 - The City of Cape Town Biodiversity Network (2019)
 - The National Vegetation Map Project (VEGMAP), with the below vector dataset used for information on Biomes, Bioregions and Vegetation Type(s):
 - 2018 Final Vegetation Map of South Africa, Lesotho and Swaziland (SANBI 2006–2018; SANBI, 2018a).
 - The National List of Threatened Ecosystems 2011 (SANBI 2011; South Africa, 2011);
 - From the National Biodiversity Assessment (NBA, 2018) Terrestrial Assessment project (Skowno *et al.*, 2019):
 - 2018 Terrestrial ecosystem threat status and protection level - remaining extent (SANBI, 2018b); and
 - 2018 Terrestrial ecosystem threat status and protection level layer (SANBI, 2018c).
 - The Important Bird and Biodiversity Areas (IBA) Programme and vector dataset (BirdLife South Africa, 2015; Marnewick *et al.*, 2015a and 2015b), in conjunction with the South African Bird Atlas Project 2 (SABAP 2);
 - The International Union for Conservation of Nature (IUCN);
 - The National Web-Based Environmental Screening Tool (accessed 2022); and
 - From the 2017 Strategic Water Source Areas (SWSA) project:
 - 2017 SWSA Surface water (Water Research Commission, 2017).



4 RESULTS OF THE DESKTOP ANALYSIS

4.1 Conservation Characteristics of the Study area based on National and Provincial Datasets

The following section contains data accessed as part of the desktop assessment and are presented as a “dashboard” report below (Table 2). The dashboard report aims to present concise summaries of the data on as few pages as possible in order to allow for improved assimilation of results by the reader to take place. Where required, further discussion and interpretation are provided.



Table 1: Summary of the biodiversity characteristics associated with the larger study area [Quarter Degree Square (QDS) 3318DC)].

DESCRIPTION OF THE VEGETATION TYPE(S) RELEVANT TO THE STUDY AREA ACCORDING TO MUCINA & RUTHERFORD (2012; 2018 (BETA-VERSION) (FIGURE 3)				
BIOME		The study area is situated within the Fynbos Biome .		
BIOREGION (FIGURE 6)		The majority of the study area occurs within the West Coast Renosterveld Bioregion and the remaining portions fall within the Southwest Fynbos Bioregion .		
VEGETATION TYPE (FIGURE 7)		The majority of the study area falls within the Swartland Granite Renosterveld and the remaining portions fall within the Cape Flats Sand Fynbos , and the Swartland Shale Renosterveld Vegetation Types .		
		Swartland Granite Renosterveld (FRg2)	Cape Flats Sand Fynbos (FFd5)	Swartland Shale Renosterveld (FRs9)
ALTITUDE (M)		50 - 350	20 – 200	50 – 350
CLIMATE		Mists common in winter. This is the wettest renosterveld unit	Winter-rainfall regime	Winter-rainfall regime
CLIMATE	MAP (mm)	520	576	430
	MAT (°C)	16.3	16.2	17.2
	MFD (Days)	3	3	3
	MAPE (mm)	2087	2034	2257
	MASMS (%)	68	65	70
DISTRIBUTION		Western Cape	Western Cape	Western Cape
GEOLOGY & SOILS		Coarse sandy to loamy soils of a variety of forms ranging from Glenrosa and Mispah, to prisma-cutanic and pedocutanic diagnostic horizons to red-yellow apedal soils—all derived from Cape Granite. The soils can contain a considerable volume of moisture in winter and spring. Land types mainly Fa, Ca, Db and Ac.	Acid, tertiary, deep, grey regic sands, usually white, often Lamotte form. Land types mainly Ga, Hb and Db.	Clay soils derived from Malmesbury Group shales (specifically the Porterville Formation in the north and east and the Moorreesburg Formation in the west). The soils contain prisma-cutanic and pedocutanic diagnostic horizons and Glenrosa and Mispah forms are predominant. Land types mainly Db, Fb and Da.
CONSERVATION		<p>This is a critically endangered vegetation unit of which almost 80 % has already been transformed due to prime quality of the land for agriculture (vineyards, olive orchards, pastures) and also by urban sprawl. Hence the conservation target of 26 % remains unattainable. Only very small portions (0.5%) enjoy statutory protection. Alien grasses are particularly pervasive, the most important being <i>Lolium multiflorum</i>, <i>Avena fatua</i> and <i>Bromus diandrus</i> (Musil <i>et al.</i> 2005). Alien woody species include <i>Acacia saligna</i>, <i>Pinus pinaster</i> as well as various species of <i>Eucalyptus</i>.</p> <p>Erosion is considered to be very low, low and moderate.</p>	Critically endangered. Target 30 %. Less than 1 % statutorily conserved. This is the most transformed of the sand fynbos types—more than 80 % of the area has already been transformed (hence the conservation target remains unattainable) by urban sprawl (Cape Town metropolitan area) and for cultivation. Most remaining patches are small pockets surrounded by urban areas. Most of these patches have been identified as ‘Core Conservation Sites’ (Wood <i>et al.</i> 1994). They are mismanaged by mowing, fire protection and by alien plant invasion. Mowing eliminates serotinous and taller species, while fire protection results in a few common thicket species (e.g. <i>Carpobrotus edulis</i> , <i>Chrysanthemoides monilifera</i>), replacing the rich fynbos species. Alien woody species include <i>Acacia saligna</i> , <i>A. cyclops</i> and species of <i>Pinus</i> and <i>Eucalyptus</i> . Dumping and spread of alien grasses (both annual and <i>Pennisetum clandestinum</i>) are also a	<p>This is a critically endangered vegetation unit. Target 26 %, but since 90 % of the area has been totally transformed (mainly for cropland), the target remains unattainable. The remnants are found in isolated pockets, usually on steeper ground. So far only a few patches have been included in conservation schemes (e.g. Elandsberg, Paardenberg). Aliens include <i>Acacia saligna</i> (very scattered over 65 %), <i>A. mearnsii</i> (very scattered over 62 %) as well as several species of <i>Prosopis</i> and <i>Eucalyptus</i>. Alien annual grasses of the genera <i>Avena</i>, <i>Briza</i>, <i>Bromus</i>, <i>Lolium</i>, <i>Phalaris</i> and <i>Vulpia</i> are a primary problem in remnant patches. Other serious aliens include herbs such as <i>Erodium cicutarium</i>, <i>E. moschatum</i>, <i>Echium plantagineum</i> and <i>Petrorhagia prolifera</i>.</p> <p>Erosion is considered to be very low and low.</p>



		<p>major problem. Alien acacias result in elevated nutrient levels and a conversion to <i>Eragrostis curvula</i> grassland and near-annual fires. Some 84 Red Data sand fynbos plant species occur on the remnants within Cape Town. The endemics include six species listed as extinct in the wild, some of which are being reintroduced from botanical gardens.</p> <p>Erosion is considered to be very low.</p>	
<p>VEGETATION & LANDSCAPE FEATURES (DOMINANT FLORAL TAXA IN APPENDIX D)</p>	<p>Moderate foot slopes and undulating plains supporting a mosaic of grasslands/herblands and medium dense, microphyllous shrublands dominated by renosterbos. Groups of small trees and tall shrubs are associated with heuweltjies and rock outcrops. The boundary with FFG 2 Boland Granite Fynbos is diffuse and patchy.</p>	<p>Moderately undulating and flat plains, with dense, moderately tall, ericoid shrubland containing scattered emergent tall shrubs. Proteoid and restioid fynbos are dominant, with asteraceous and ericaceous fynbos occurring in drier and wetter areas, respectively.</p>	<p>Moderately undulating plains and valleys supporting low to moderately tall leptophyllous shrubland of varying canopy cover as well as low, open shrubland dominated by renosterbos. Heuweltjies are a very prominent local feature of the environment, forming 'hummockveld' near Piketberg and giving the Tygerberg Hills their name. Stunted trees and thicket are often associated with the heuweltjies. Disturbed areas are dominated by <i>Athanasia trifurcata</i> and <i>Otholobium hirtum</i>. Patches of <i>Cynodon dactylon</i> 'grazing lawns' also occur in abundance.</p>
<p>CONSERVATION DETAILS PERTAINING TO THE AREA OF INTEREST (VARIOUS DATABASES)</p>		<p>NATIONAL WEB BASED ENVIRONMENTAL SCREENING TOOL (2022)</p>	
<p>NBA (2018):</p> <p>1) ECOSYSTEM THREAT STATUS</p> <p>2) ECOSYSTEM PROTECTION LEVEL</p>	<p>Large portions of the study area fall within the remaining extent of the Endangered Swartland Granite Renosterveld, while small western and eastern portions fall within the Critically Endangered Cape Flats Sand Fynbos and a small southern portion falls within the Critically Endangered Swartland Shale Renosterveld. All of the above mentioned ecosystems are currently Not Protected³ (Figure 8).</p>	<p>The screening tool is intended to allow for pre-screening of sensitivities in the landscape to be assessed within the EA process. This assists with implementing the mitigation hierarchy by allowing developers to adjust their proposed development footprint to avoid sensitive areas</p>	
<p>RED LIST OF ECOSYSTEMS (2022)</p>	<p>According to the RLE dataset (2022), the southern and western portions of the study area is located within a threatened ecosystem, i.e., the Swartland Granite Renosterveld (in line with the NBA). The threat status of this ecosystem remains the same – endangered (trigger criteria: A2b, A3, A3alt, B1(i), B1(iii)) as in the 2018 NBA dataset. Small isolated patches of the study area is located within the threatened ecosystems: Cape Flats Sand Fynbos (CFSF) and Swartland Shale Renosterveld (SSR), both of which are considered critically endangered (trigger</p>	<p>Animal species theme (Figure 9)</p>	<p>For the animal species theme, the study area is considered to have a high and medium sensitivity.</p> <p>The sensitivities were triggered by the potential occurrence of the following species: the avifauna <i>Circus maurus</i> (Black Harrier, EN), <i>Circus ranivorus</i> (African Marsh Harrier, EN), <i>Sagittarius serpentarius</i> (Secretarybird, VU), <i>Pelecanus onocrotalus</i> (Great White</p>

³ Ecosystem types are categorised as “not protected”, “poorly protected”, “moderately protected” and “well protected” based on the proportion of each ecosystem type that occurs within a protected area recognised in the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEMPAA) and compared with the biodiversity target for that ecosystem type.

The ecosystem protection level status is assigned using the following criteria:

- i. If an ecosystem type has more than 100% of its biodiversity target protected in a formal protected area either a or b, it is classified as well protected,
- ii. When less than 100% of the biodiversity target is met in formal a or b protected areas it is classified it as moderately protected,
- iii. If less than 50% of the biodiversity target is met, it is classified it as poorly protected, and
- iv. If less than 5% it is hardly protected.



<p>criteria: B1(i), B1(iii) for CFSF and A3, A3alt and SSR. The RLE dataset further indicates that these ecosystem are endemic to South Africa. Refer to Figure 10.</p> <p>The purpose of listing protected ecosystems is primarily to preserve witness sites of exceptionally high conservation value. The revised list (known as the RLE 2022) is based on assessments that followed the IUCN RLE framework (version 1.1) and covers all 456 terrestrial ecosystem types described in South Africa (Mucina and Rutherford 2006; with updates described in Dayaram et al., 2019). The revised list identifies 120 threatened terrestrial ecosystem types (55 CR, 51 EN and 14 VU types).</p> <p>Following a series of consultations with conservation authorities and the public in 2020/21, the revised list of terrestrial ecosystems that are threatened and in need of protection was the approved by the minister for implementation in august 2022. The revised list was published in the government gazette (gazette number 47526, notice number 2747) and came into effect on 18 November 2022.</p>		<p>Pelican VU), <i>Hydroprogne caspia</i> (Caspian Tern, VU) and <i>Afrotis afra</i> (Southern Black Korhaan, VU). Invertebrates: <i>Pachysoma aesculapius</i>, <i>Conocephalus peringueyi</i>, and <i>Aneuryphymus montanus</i>.</p>
	Terrestrial biodiversity theme	<p>For the Terrestrial Biodiversity Theme, the study area is considered to have a very high sensitivity. The triggered sensitivity features include a CBA 1, CBA 2, a critically endangered ecosystems and an endangered ecosystem.</p>
	STRATEGIC WATER SOURCE AREAS FOR SURFACE WATER (2017)	
	<p>Surface Water Strategic Water Source Area (SWSAs) are defined as areas of land that supply a disproportionate (i.e., relatively large) quantity of mean annual surface water runoff in relation to their size. they include transboundary areas that extend into Lesotho and Swaziland. The Sub-National Water Source Areas (WSAs) are not nationally strategic as defined in the report but were included to provide a complete coverage.</p>	
	Name & Criteria	<p>The study area is not within 10 km of a Surface Water Strategic Water Source Area.</p>
	PROTECTED AREAS	
IBA (2015)	<p>The study area is not located within or near an IBA (within 10 km).</p>	
SAPAD (2021, Q1); SACAD (2021, Q1); NPAES (2009) (Figure 11).	<p>According to the South African Protected Areas Database (SAPAD, 2021)⁴, the South African Conservation Areas Database (SACAD, 2021)⁵ and the National Protected Areas Expansion Strategy (NPAES, 2009), the following protected areas are located within 10km of the study area: Botterblom Nature Reserve, Durbanville Nature Reserve, Uitkamp Wetlad Nature Reserve, Joostenberg Private Nature Reserve (Informal), JN Briers Louw Nature Reserve (formal) and Cape Winelands Biosphere Reserve.</p>	
CITY OF CAPE TOWN BODIVERSITY NETWORK (COCT, 2019) (FIGURE 12)		

⁴ **SAPAD (2020)**: The definition of protected areas follows the definition of a protected area as defined in the National Environmental Management: Protected Areas Act, (Act 57 of 2003). Chapter 2 of the National Environmental Management: Protected Areas Act, 2003 sets out the “System of Protected Areas”, which consists of the following kinds of protected areas - 1. Special nature reserves; 2. National parks; 3. Nature reserves; 4. Protected environments (1-4 declared in terms of the National Environmental Management: Protected Areas Act, 2003); 5. World heritage sites declared in terms of the World Heritage Convention Act; 6. Marine protected areas declared in terms of the Marine Living Resources Act; 7. Specially protected forest areas, forest nature reserves, and forest wilderness areas declared in terms of the National Forests Act, 1998 (Act No. 84 of 1998); and 8. Mountain catchment areas declared in terms of the Mountain Catchment Areas Act, 1970 (Act No. 63 of 1970).

⁵ **SACAD (2020)**: The types of conservation areas that are currently included in the database are the following: 1. Biosphere reserves, 2. Ramsar sites, 3. Stewardship agreements (other than nature reserves and protected environments), 4. Botanical gardens, 5. Transfrontier conservation areas, 6. Transfrontier parks, 7. Military conservation areas and 8. Conservancies.



<p>CRITICAL BIODIVERSITY AREA (CBA): CATEGORY 1B</p>	<p>According to the City of Cape Town Biodiversity Network (2019), portions of the south eastern and northern portions of the study area is classified as a Critical Biodiversity Areas (CBA) Category 1b. CBA 1b's are areas that are considered irreplaceable, usually composing of critically endangered vegetation of high and medium quality. These areas are needed for national targets and any loss is a permanent and irrevocable loss. Appropriate legal conservation status needs to be obtained, natural ecosystems must be maintained, degraded land must be restored to natural and managed so that no further degradation occurs. Loss of habitat will probably result in extinction of some species and the inability to attain conservation targets.</p>
<p>CRITICAL BIODIVERSITY AREA (CBA): CATEGORY 1D</p>	<p>According to the City of Cape Town Biodiversity Network (2019), a small portion of the northern portion of the study area is classified as a Critical Biodiversity Areas (CBA) Category 1d. CBA 1d's are areas that are considered irreplaceable consolidation sites, usually composing of critically endangered vegetation of low / restorable condition. These areas are essential for management consolidation and viability of CBA 1A, 1b and protected sites. These areas are needed for local, national and international significance and are required to make existing remnants ecologically viable. The loss of these areas would result in the loss of higher condition remnants through the degradation of ecological processes and exorbitant intervention ecosystem management costs.</p>
<p>CRITICAL BIODIVERSITY AREA (CBA) CATEGORY 2</p>	<p>According to the COCT Biodiversity Network (2019) the central portion of the southern section of the study area is classified as a Critical Biodiversity Area Category 2. CBA 2's are areas that considered irreplaceable with low condition sites. These areas are critically endangered vegetation of restorable condition. These areas are needed for national targets but not for management consolidation, connectivity or viability of priority biodiversity network sites. Appropriate legal conservation status needs to be obtained, natural ecosystems must be maintained, degraded land must be restored to natural and managed so that no further degradation occurs.</p>

FEPA = Freshwater Ecosystem Priority Area; NBA = National Biodiversity Assessment; NPAES = National Protected Areas Expansion Strategy; SAPAD = South African Protected Areas Database; IBA = Important Bird and Biodiversity Area; MAP – Mean annual precipitation; MAT – Mean annual temperature; MAPE – Mean annual potential evaporation; MFD = Mean Frost Days; MASMS – Mean Annual Soil Moisture Stress (% of days when evaporative demand was more than double the soil moisture supply).



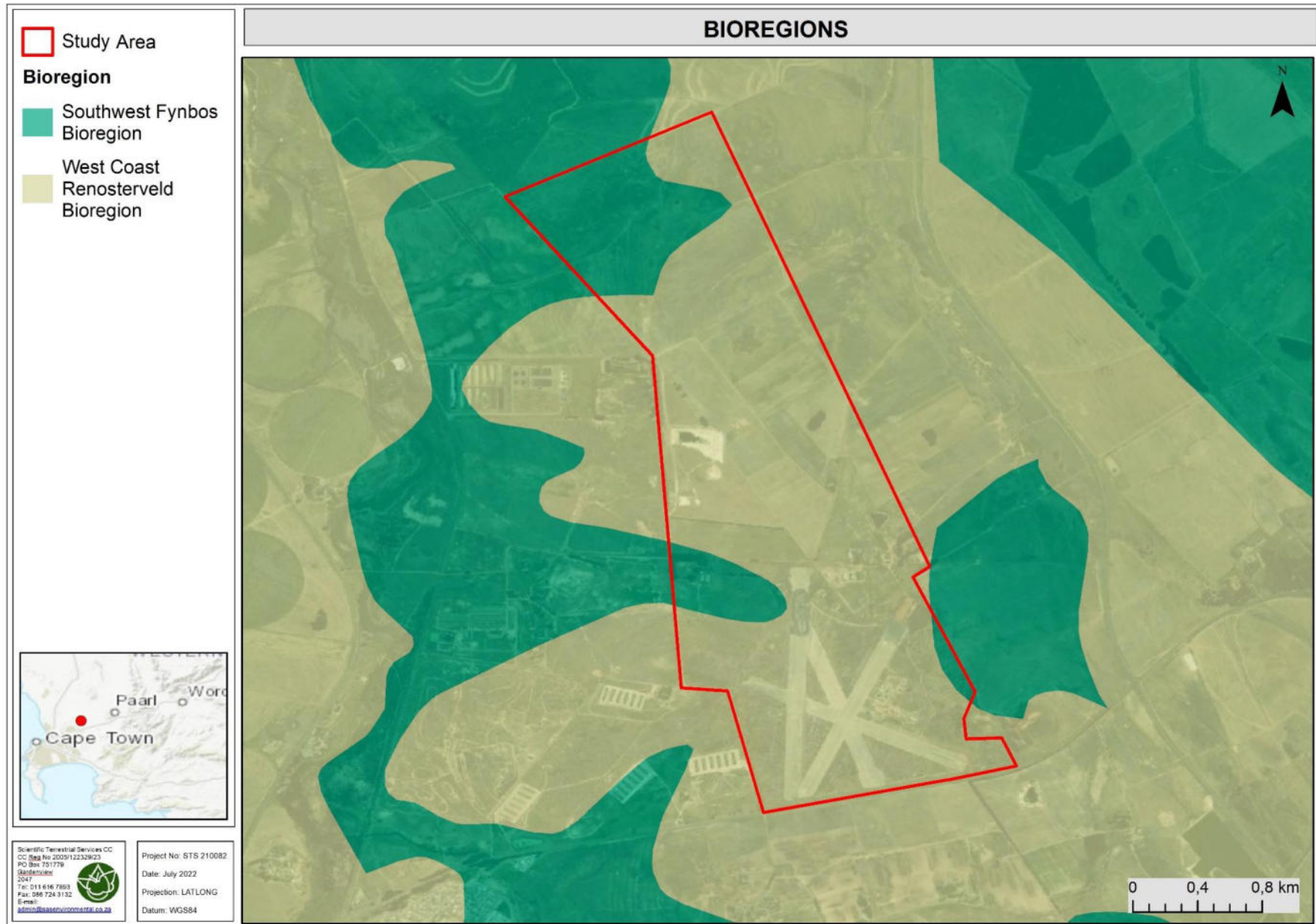


Figure 6: The Bioregions associated with the study area, according to Mucina and Rutherford (2018).



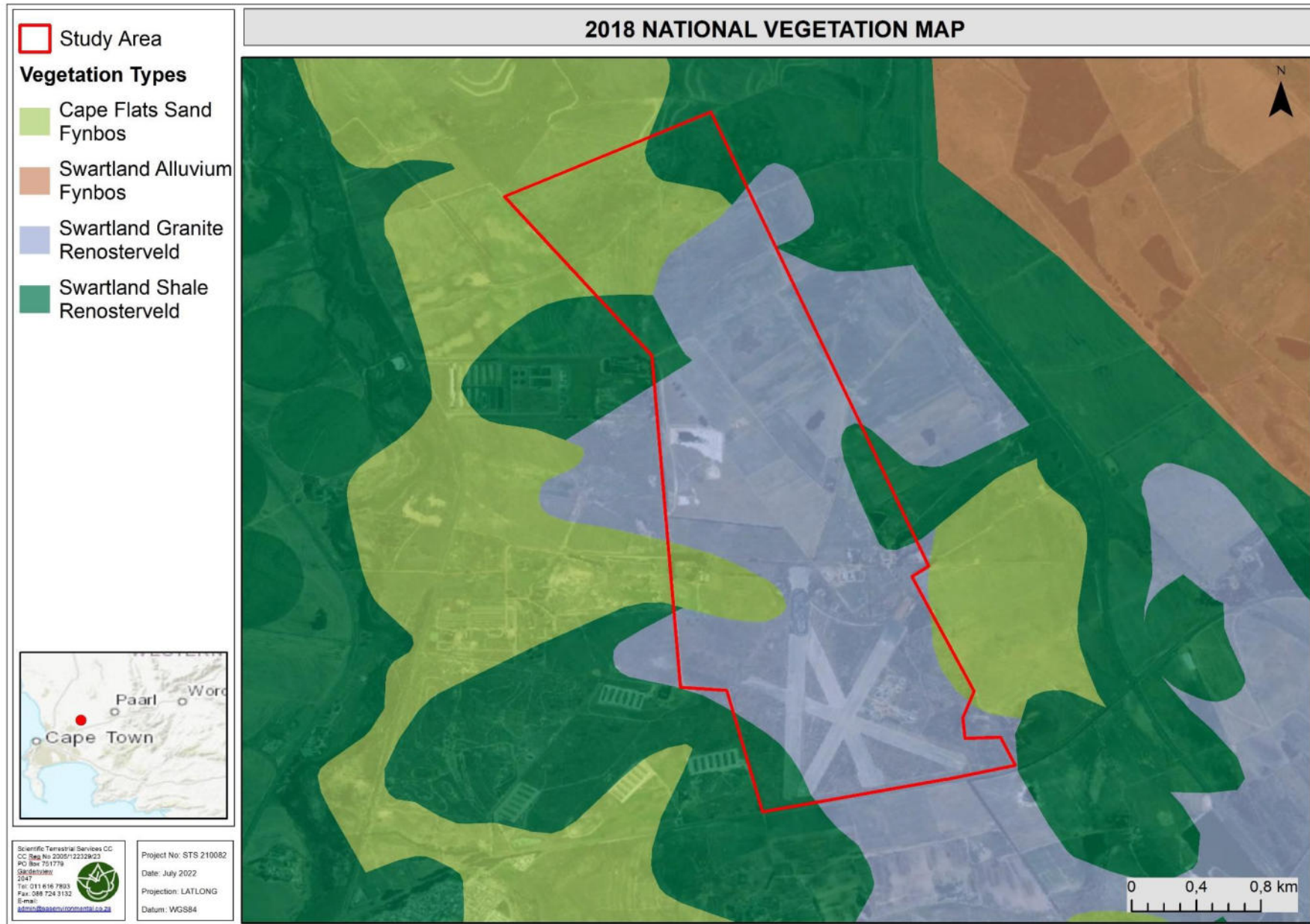


Figure 7: The vegetation types associated with the study area, according to the Mucina and Rutherford (2018).



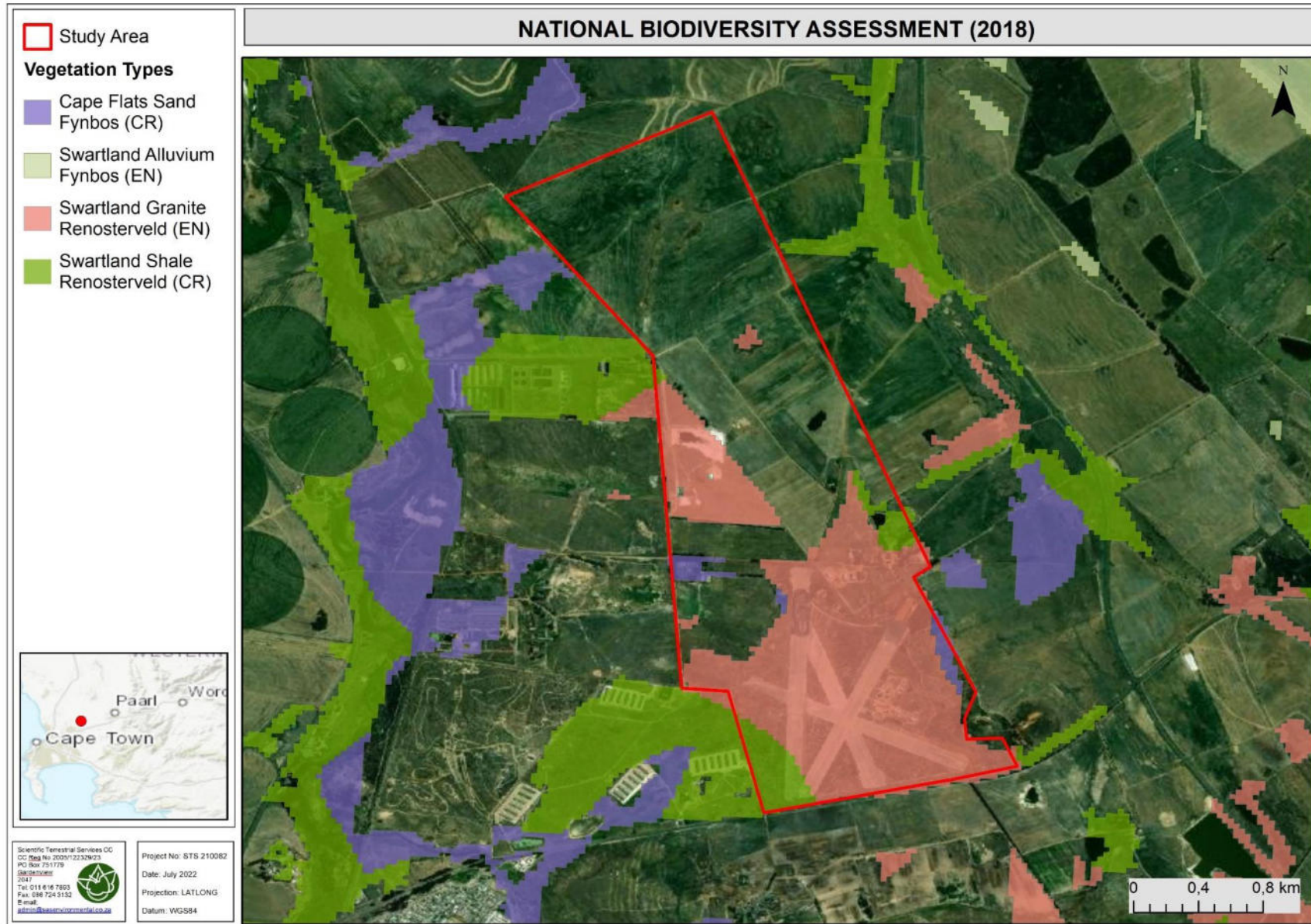


Figure 8: The study area located within the remaining extent of the critically endangered Cape Flats Sand Fynbos, Swartland Shale Renosterveld and the endangered Swartland Granite Renosterveld, according to the National Biodiversity Assessment (NBA, 2018).



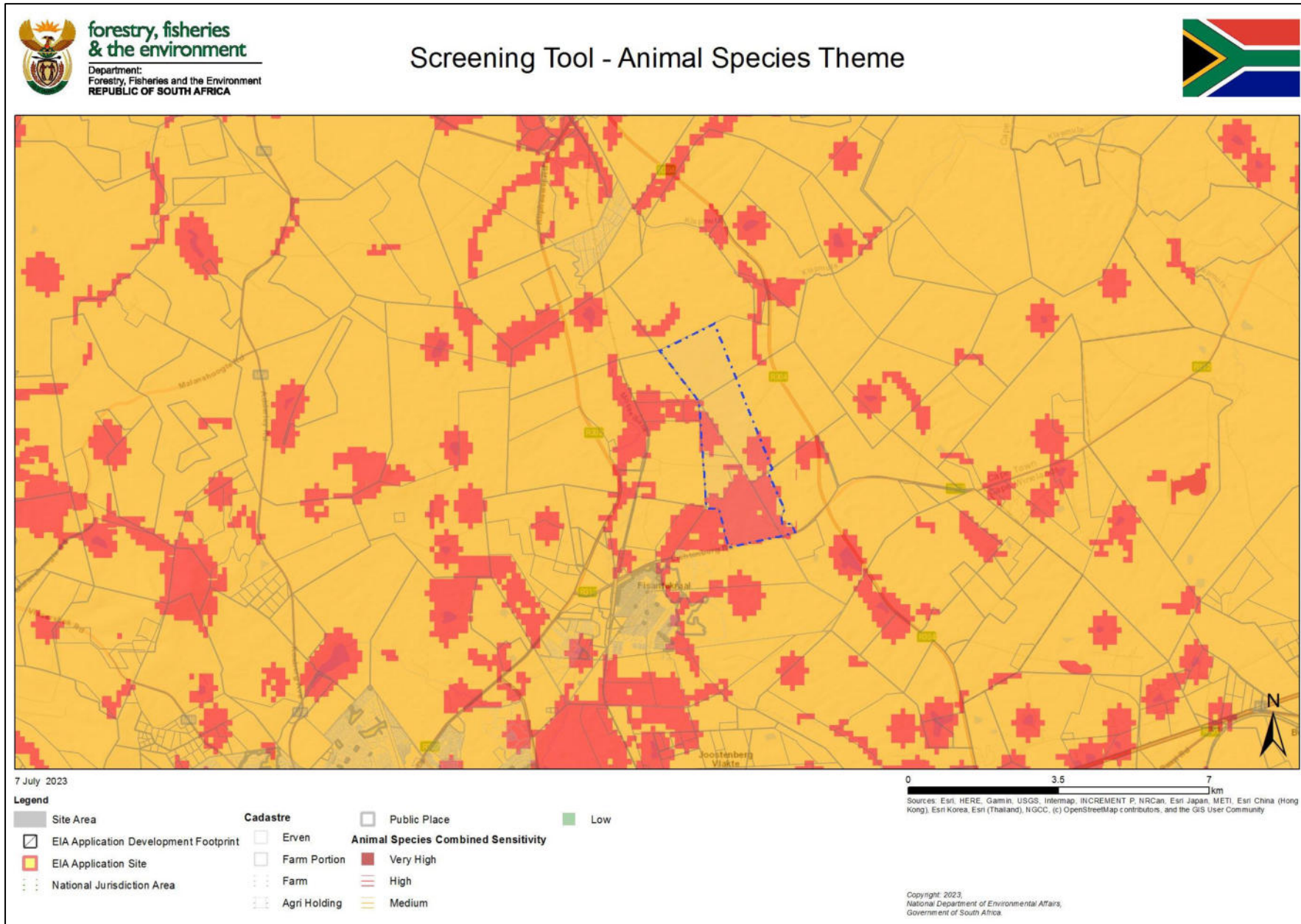


Figure 9: Sensitivity of the Animal Species Theme for the study area, according to the National Web-based Screening Tool (2023).



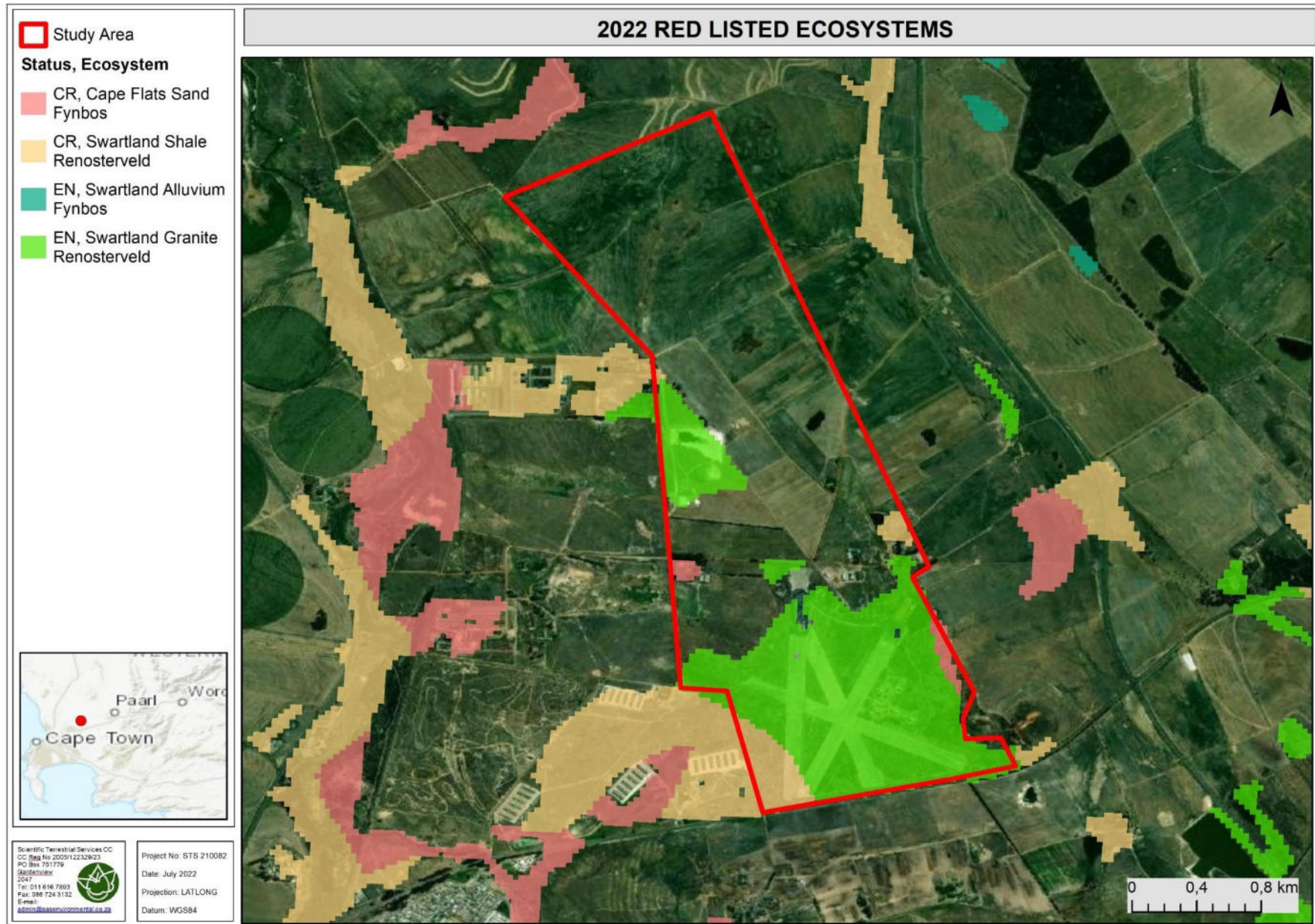


Figure 10: The remaining extent of the threatened ecosystems associated with the study area, based on the National Threatened Ecosystems (2022).



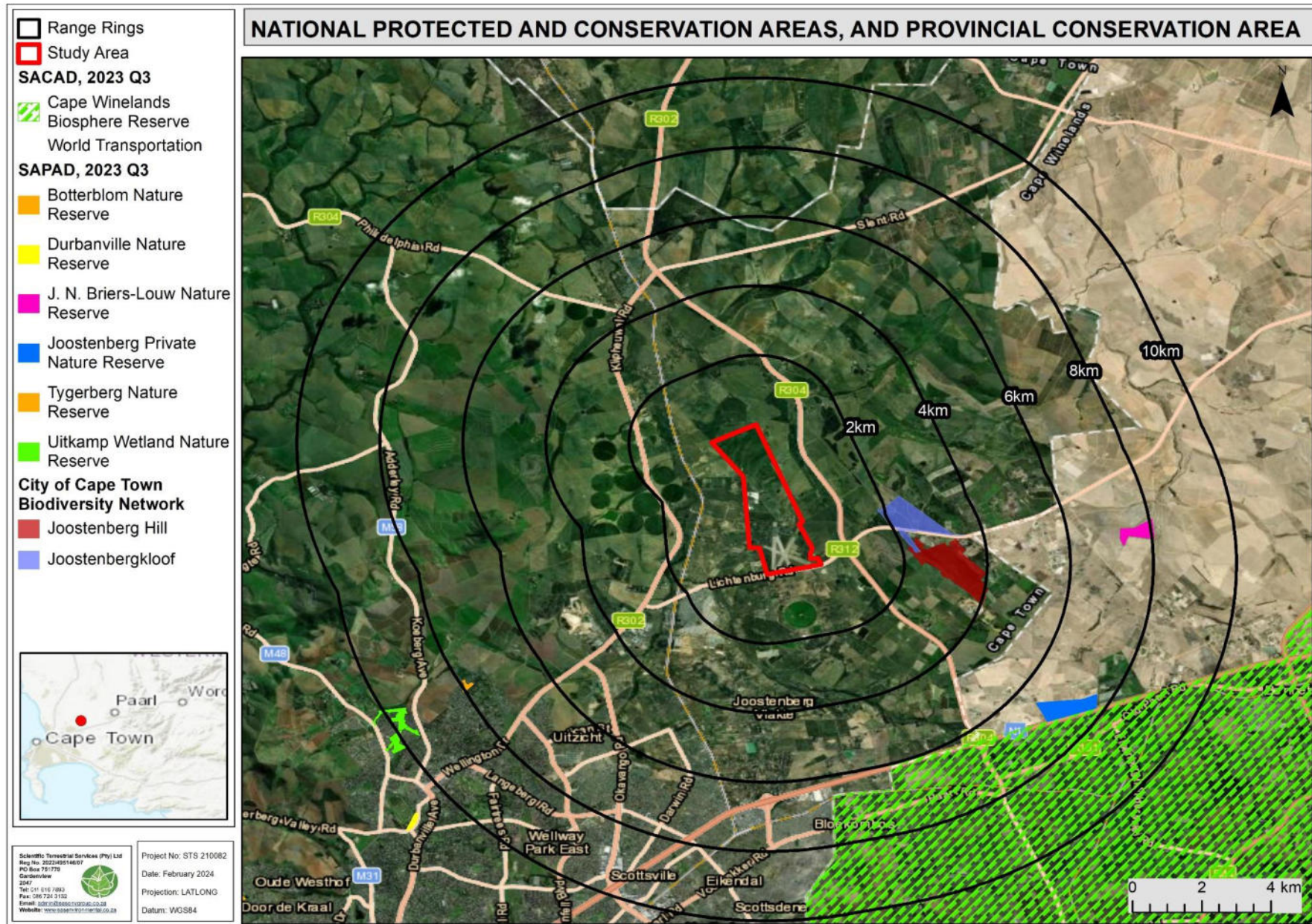


Figure 11: The protected and conservation areas located within a 10 km radius of the study area, (SAPAD, 2021; SACAD, 2021 and NPAES, 2009).



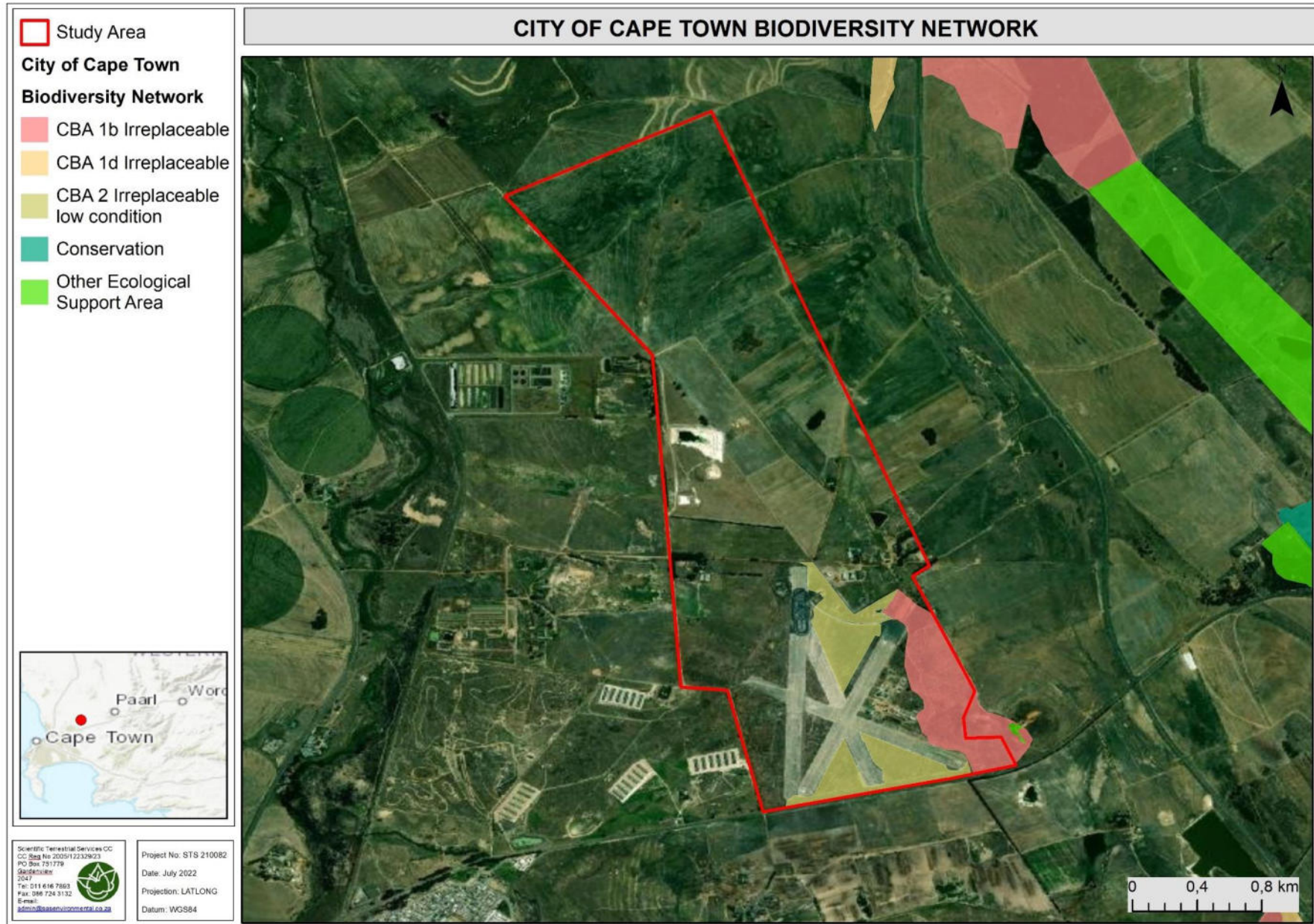


Figure 12: The biodiversity importance of the study area, according to the City of Cape Town Biodiversity Network, 2019.



5 STRUCTURE OF THE BIODIVERSITY REPORT

Part A of this report served to introduce the study area, as well as the general approach to the study. Part A also presents the results of general desktop information reviewed as part of the study including the information generated by the relevant authorities as well as the context of the site in relation to the surrounding anthropogenic activities and ecological character.

Part B presents the results of the faunal field assessment (excluding avifauna), data analyses and discussion of the preliminary findings.

Part C presents the results of the avifaunal field assessment, data analyses and discussion of the preliminary findings.



6 REFERENCES

- Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA)
- Constitution of the Republic of South Africa, 1996
- DEA & SANBI. 2009. National Protected Area Expansion Strategy Resource Document.
- Frisby, A.W., Siebert, S.J., Struwig, M. and Cilliers, D.P., 2019. Plant endemism in Griqualand West, South Africa. *South African Journal of Botany*, 124, pp.127-137.
- Government of South Africa. 2010. National protected area expansion strategy for South Africa 2008. Priorities for expanding the protected area network for ecological sustainability and climate change adaptation. Pretoria, South Africa: The Government of South Africa.
- Hui C, Richardson DM (2017) *Invasion dynamics*. Oxford University Press, Oxford. <https://doi.org/10.1093/acprof:oso/9780198745334.001.0001>
- Marnewick MD, Retief EF, Theron NT, Wright DR, Anderson TA. 2015a. Important Bird and Biodiversity Areas of South Africa. Johannesburg: BirdLife South Africa.
- Marnewick MD, Retief EF, Wright DR, Theron NT. 2015b. South Africa's Important Bird and Biodiversity Areas Status Report 2015. Johannesburg: BirdLife South Africa.
- Mucina, L. and Rutherford, M.C. (2006). The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19., (South African National Biodiversity Institute: Pretoria, South Africa). *Memoirs of the Botanical Survey of South Africa*
- National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA)
- National Web Based Environmental Screening Tool (2022). Accessible online: <https://screening.environment.gov.za/screeningtool/#/pages/welcome>
- Richardson DM, Pyšek P, Carlton JT (2011) A compendium of essential concepts and terminology in invasion ecology. In: Richardson DM (ed) *Fifty years of invasion ecology. The legacy of Charles Elton*. Wiley-Blackwell, Oxford, pp 409–420. <https://doi.org/10.1002/9781444329988.ch30>
- SABAP2, 2014. The South Africa Bird Atlas Project 2 database
- SACAD: Department of Environmental Affairs. (2021). *South Africa Conservation Areas Database (SACAD_OR_2021_Q3)*. Online available: [<http://egis.environment.gov.za>]
- SANBI. 2011. National List of Threatened Ecosystems 2011 [vector geospatial dataset] 2011. Available from the Biodiversity GIS website.
- SANBI 2012. Mining and Biodiversity Guidelines 2012 [Raster] 2012. Available from the Biodiversity GIS website.
- SANBI, 2006-2018. The Vegetation Map of South Africa, Lesotho and Swaziland, Mucina, L., Rutherford, M.C. and Powrie, L.W. (Editors), Online, <http://bgis.sanbi.org/SpatialDataset/Detail/18>, Version 2018.
- SANBI. 2018a. 2018 Final Vegetation Map of South Africa, Lesotho and Swaziland [Vector] 2018. Available from the Biodiversity GIS website.
- SANBI. 2018b. Terrestrial ecosystem threat status and protection level - remaining extent [Vector] 2018. URL: <http://bgis.sanbi.org>
- SANBI. 2018c. Terrestrial ecosystem threat status and protection level layer [Vector] 2018. URL: <http://bgis.sanbi.org>
- SANBI. 2013. Grasslands Ecosystem Guidelines: landscape interpretation for planners and managers. Compiled by Cadman, M., de Villiers, C., Lechmere-Oertel, R. and D. McCulloch. South African National Biodiversity Institute, Pretoria
- SANParks/SANBI. 2013. NPAES Formal [vector geospatial dataset] 2013. Available from the Biodiversity GIS website
- SANParks/SANBI. 2012. NPAES Protected Areas - Informal 2010 [vector geospatial dataset] 2012. Available from the Biodiversity GIS website.
- South Africa. 2011. National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection. *Government Gazette*, 558(34809): 1 – 544, December 9.



- South African National Parks (SANParks). 2010. NPAES Focus Areas 2010 [vector geospatial dataset] 2010. Available from the Biodiversity GIS website.
- SAPAD: Department of Environmental Affairs. (2021). *South Africa Protected Areas Database* (SAPAD_OR_2021_Q3). Online available: [<http://egis.environment.gov.za>].
- Skowno, Andrew & C.J., Poole, & Raimondo, Domitilla & K.J., Sink, & Van Deventer, Heidi & Van Niekerk, Lara & Harris, Linda & Smith-Adao, Lindie & Tolley, Krystal & Zengeya, Tsungai & W.B., Foden, & G.F., Midgley, & Driver, Amanda. 2019. National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report. South African National Biodiversity Institute, an entity of the Department of Environment, Forestry and Fisheries, Pretoria. South Africa. 2011. National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection. Government Gazette, 558(34809): 1 – 544, December 9.
- Van Wyk, A. E., & Smith, G. F. (2001). Regions of floristic endemism in southern Africa: a review with emphasis on succulents. Umdaus press
- Wilson JRU, Gaertner M, Richardson DM et al (2017) Contributions to the national status report on biological invasions in South Africa. *Bothalia* 47:a2207. <https://doi.org/10.4102/abc.v47i2.2207>



APPENDIX A: Indemnity and Terms of Use of this Report

The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by seasonality, time and budgetary constraints relevant to the type and level of investigation undertaken as well as the project program and STS CC and its staff reserve the right to, at their sole discretion, modify aspects of the report including the recommendations if and when new information becomes available from ongoing research or further work in this field or pertaining to this investigation.

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APPENDIX B: Legislative Requirements

The Constitution of the Republic of South Africa, 1996

The environment and the health and well-being of people are safeguarded under the Constitution of the Republic of South Africa, 1996 by way of Section 24. Section 24(a) guarantees a right to an environment that is not harmful to human health or well-being and to environmental protection for the benefit of present and future generations. Section 24(b) directs the state to take reasonable legislative and other measures to prevent pollution, promote conservation, and secure the ecologically sustainable development and use of natural resources (including water and mineral resources) while promoting justifiable economic and social development. Section 27 guarantees every person the right of access to sufficient water, and the state is obliged to take reasonable legislative and other measures within its available resources to achieve the progressive realisation of this right. Section 27 is defined as a socio-economic right and not an environmental right. However, read with Section 24 it requires of the state to ensure that water is conserved and protected and that sufficient access to the resource is provided. Water regulation in South Africa places a great emphasis on protecting the resource and on providing access to water for everyone.

The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)

The National Environmental Management Act, 1998 (Act No.107 of 1998) (NEMA) and the associated Environmental Impact Assessment (EIA) Regulations (GN R326 as amended in 2017 and well as listing notices 1, 2 and 3 (GN R327, R325 and R324 of 2017), state that prior to any development taking place which triggers any activity as listed within the abovementioned regulations, an environmental authorisation process needs to be followed and environmental authorisation obtained. This could follow either the Basic Assessment process or the Environmental Impact Assessment process depending on the nature of the activity and scale of the anticipated impacts

The National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA)

The objectives of this act are (within the framework of NEMA) to provide for:

- The management and conservation of biological diversity within the Republic of South Africa and of the components of such diversity;
- The use of indigenous biological resources in a sustainable manner;
- The fair and equitable sharing among stakeholders of the benefits arising from bio prospecting involving indigenous biological resources;
- To give effect to ratify international agreements relating to biodiversity which are binding to the Republic;
- To provide for cooperative governance in biodiversity management and conservation; and
- To provide for a South African National Biodiversity Institute to assist in achieving the objectives of this Act.

This act alludes to the fact that management of biodiversity must take place to ensure that the biodiversity of the surrounding areas are not negatively impacted upon, by any activity being undertaken, in order to ensure the fair and equitable sharing among stakeholders of the benefits arising from indigenous biological resources.

Furthermore, a person may not carry out a restricted activity involving either:

- a) A specimen of a listed threatened or protected species;
- b) Specimens of an alien species; or
- c) A specimen of a listed invasive species without a permit.



Government Notice number R.1020: Alien and Invasive Species Regulations, 2020 (in Government Gazette 43735), including Government Notice number 1003: Alien and Invasive Species Lists, 2020 (in Government Gazette 43726) as it relates to the NEMBA

NEMBA is administered by the Department of Environmental Affairs and aims to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA. This act in terms of alien and invasive species aims to:

- Prevent the unauthorised introduction and spread of alien and invasive species to ecosystems and habitats where they do not naturally occur;
- Manage and control alien and invasive species, to prevent or minimize harm to the environment and biodiversity; and
- Eradicate alien species and invasive species from ecosystems and habitats where they may harm such ecosystems or habitats.

Alien species are defined, in terms of the NEMBA as:

- (a) A species that is not an indigenous species; or
- (b) An indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention.

Categories according to NEMBA (Alien and Invasive Species Regulations, 2020):

- **Category 1a:** Invasive species that require compulsory control;
- **Category 1b:** Invasive species that require control by means of an invasive species management programme;
- **Category 2:** Commercially used plants that may be grown in demarcated areas, if there is a permit and that steps are taken to prevent their spread; and
- **Category 3:** Ornamentally used plants that may no longer be planted.

The Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA)

Removal of the alien and weed species encountered in the application area must take place in order to comply with existing legislation (amendments to the regulations under the CARA, 1983 and Section 28 of the NEMA, 1998). Removal of AIP and weed species should take place throughout the construction and operation, phases in line with an approved AIP Management Plan.

The National Forest Act, 1998 (Act No. 10 of 1998) (NFA)

According to the department of Department of Forestry, Fisheries and the Environment (DFFE) (previously the Department of Agriculture, Forestry and Fisheries (DAFF)) ©2019 website (<https://www.daff.gov.za/daffweb3/>):

"In terms of the National Forests Act of 1998 certain tree species (types of trees) can be identified and declared as protected. The Department of Water Affairs and Forestry followed an objective, scientific and participative process to arrive at the new list of protected tree species, enacted in 2004. All trees occurring in natural forests are also protected in terms of the Act. Protective actions take place within the framework of the Act as well as national policy and guidelines. Trees are protected for a variety of reasons, and some species require strict protection while others require control over harvesting and utilization."

Applicable sections of the NFA pertaining to the proposed project include the below:

Section 12:

Declaration of trees as protected

- 1) The Minister may declare-
 - a. particular tree,
 - b. a particular group of trees,
 - c. a particular woodland; or
 - d. trees belonging to a particular species,



to be a protected tree, group of trees, woodland or species.

- 2) The Minister may make such a declaration only if he or she is of the opinion that the tree, group of trees, woodland or species is not already adequately protected in terms of other legislation.
- 3) In exercising a discretion in terms of this section, the Minister must consider the principles set out in section 3(3) of the NFA.

Section 15(1):

No person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a licence granted by the Minister or in terms of an exemption from the provisions of this subsection published by the Minister in the Gazette.

Contravention of this declaration is regarded as a first category offence that may result in a person who is found guilty of being sentenced to a fine or imprisonment for a period up to three years, or both a fine and imprisonment.



APPENDIX C: Impact Assessment Methodology

Criteria for specialist assessment of impacts

The specialists are provided with set criteria for undertaking their assessments, to allow for comparative assessment of all issues and impacts. These criteria are detailed in the Terms of Reference to each specialist.

These criteria are drawn from the EIA Regulations published by the Department of Environmental Affairs and Tourism (April 1998) in terms of the Environment Conservation Act, 1989 (Act No. 73 of 1989) and include:

- Nature of the impact:

This is an appraisal of the type of effect the construction, operation, and maintenance of a development would have on the affected environment. This description should include what is to be affected and how.

- Extent of the impact:

The specialist should describe whether the impact will be local (extending only as far as the development site area) or limited to the site and its immediate surroundings; or will have an impact on the region; or will have an impact on a national scale or across international borders.

- Duration of the impact:

The specialist should indicate whether the lifespan of the impact would be short term (0-5 years), medium term (5-15 years), long term (16-30 years) or permanent.

- Intensity:

The specialist should establish whether the impact is destructive or benign and should be qualified as low, medium, or high. The specialist study must attempt to quantify the magnitude of the impacts and outline the rationale used.

- Probability of occurrence:

The specialist should describe the probability of the impact actually occurring and should be described as improbable (low likelihood), probable (distinct possibility), highly probable (most likely) or definite (impact will occur regardless of any prevention measures).

The impacts should also be assessed in terms of the following aspects:

- Legal requirements:

The specialist should identify and list the relevant South African legislation and permit requirements pertaining to the development proposals. He / she should provide reference to the procedures required to obtain permits and describe whether the development proposals contravene the applicable legislation.

- Status of the impact:

The specialist should determine whether the impacts are negative, positive, or neutral ("cost – benefit" analysis). The impacts are to be assessed in terms of their effect on the project and the environment. For example, an impact that is positive for the proposed development may be negative for the environment. It is important that this distinction is made in the analysis.

- Cumulative impact:

Consideration must be given to the extent of any cumulative impact that may occur due to the proposed development. Such impacts must be evaluated with an assessment of similar developments already in the environment. Such impacts will be either positive or negative, and will be graded as being of negligible, low, medium, or high impact.

- Degree of confidence in predictions:

The specialist should state what degree of confidence (low, medium, or high) exists in the predictions based on the available information and level of knowledge and expertise.



Based on a synthesis of the information contained in the above-described procedure, the specialist is required to assess the potential impacts in terms of the following significance criteria:

- No significance: the impacts do not influence the proposed development and/or environment in any way.
- Low significance: the impacts will have a minor influence on the proposed development and/or environment. These impacts require some attention to modification of the project design where possible, or alternative mitigation.
- Moderate significance: the impacts will have a moderate influence on the proposed development and/or environment. The impact can be ameliorated by a modification in the project design or implementation of effective mitigation measures.
- High significance: the impacts will have the “no-go” implication on the development or portions of the development regardless of any mitigation measures that could be implemented. This level of significance must be well motivated.

The EIA process is based on assessment of future impacts and consequences, therefore there is still possibility of uncertainties and unknown areas even though the scientific basis of the specialist studies is sound. Where unknowns and uncertainties exist, it should be indicated, and a conservative approach should be followed when assessing and determining the level of significance.

Table C1: Criteria for evaluation of impacts

CRITERIA	CATEGORY	DESCRIPTION
EXTENT or Spatial influence of impact	Regional (R)	Beyond 5km of the proposed development
	Local (L)	Within 5 km of the proposed development
	Site specific (SS)	On site or within 100 m of the site boundary.
MAGNITUDE of NEGATIVE IMPACT (at the indicated spatial scale)	High (H)	Bio-physical and/ or social functions and/ or processes are <i>severely</i> altered.
	Medium (M)	Bio-physical and/ or social functions and/ or processes are <i>notably</i> altered.
	Low(L)	Bio-physical and/ or social functions and/ or processes are <i>slightly</i> altered.
	Very Low (VL)	Bio-physical and/ or social functions and/ or processes are <i>negligibly</i> altered
	Zero (Z)	Bio-physical and/ or social functions and/ or processes remain <i>unaltered</i> .
MAGNITUDE of POSITIVE IMPACT (at the indicated spatial scale)	High (H)	Bio-physical and/ or social functions and/ or processes are <i>vastly</i> enhanced.
	Medium (M)	Bio-physical and/ or social functions and/ or processes are <i>notably</i> enhanced.
	Low(L)	Bio-physical and/ or social functions and/ or processes are <i>slightly</i> enhanced.
	Very Low (VL)	Bio-physical and/ or social functions and/ or processes are <i>negligibly</i> enhanced.
	Zero (Z)	Bio-physical and/ or social functions and/ or processes remain <i>unaltered</i> .



CRITERIA	CATEGORY	DESCRIPTION
DURATION of impact	Short Term (S)	0-5 years (after construction).
	Medium Term (M)	5-15 years (after construction).
	Long Term (L)	More than 15 years (after construction).
PROBABILITY of occurrence	Definite (D)	>95% chance of the potential impact occurring.
	Probable (Pr)	20% - 95% chance of the potential impact occurring
	Possible (Po)	5% - 20% chance of the potential impact occurring
	Improbable (Im)	<5% chance of the potential impact occurring.
CONFIDENCE levels	Certain (C)	More than adequate amount of information and understanding of the bio-physical and/ or social functions and/ or processes that may potentially influence the impact.
	Sure (S)	Reasonable amount of information and understanding of the biophysical and/ or social functions and/ or processes that may potentially influence the impact.
	Unsure (U)	Limited amount of information and understanding of the bio-physical and/ or social function

Table2: Definition of significance ratings

SIGNIFICANCE RATINGS	LEVEL OF CRITERIA REQUIRED
High (H)	<ul style="list-style-type: none"> High magnitude with a regional extent and long-term duration High magnitude with either a regional extent and medium-term duration or a local extent and long-term duration Medium magnitude with a regional extent and long-term duration.
Medium (M)	<ul style="list-style-type: none"> High magnitude with a local extent and medium-term duration High magnitude with a regional extent and short-term duration or a site-specific extent and long-term duration High magnitude with either a local extent and short-term duration or a site-specific extent and medium-term duration Medium magnitude with any combination of extent and duration except site specific and short term or regional and long term Low magnitude with a regional extent and long-term duration.
Low (L)	<ul style="list-style-type: none"> High magnitude with a site-specific extent and short-term duration Medium magnitude with a site-specific extent and short-term duration Low magnitude with any combination of extent and duration except site specific and short term Very low magnitude with a regional extent and long-term duration.
Very low (VL)	<ul style="list-style-type: none"> Low magnitude with a site-specific extent and short-term duration Very low magnitude with any combination of extent and duration except regional and long term.
Neutral (N)	<ul style="list-style-type: none"> Zero magnitude with any combination of extent and duration



APPENDIX D: Vegetation Types

FRg2 Swartland Granite Renosterveld

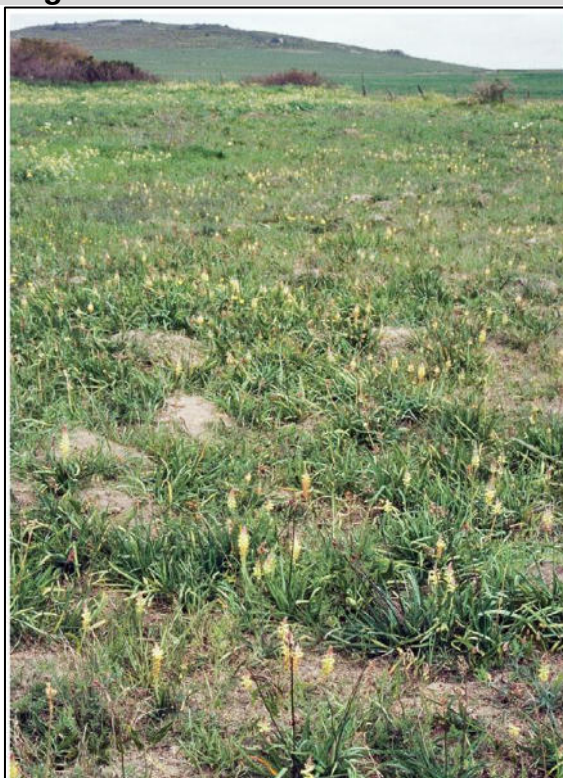


Figure D1: Swartland Granite Renosterveld: Bulb-rich veld dominated by *Lachenalia pustulata* in the Tienie Versveld Flower Reserve near Darling (Western Cape) Image source: Mucina and Rutherford (2006) Figure 4.119, page 191.

Dominant and typical floristic species of Swartland Granite Renosterveld (Mucina & Rutherford, 2012). The table contains the important taxa associated with the vegetation type.

Woody Layer	
Woody Climbers	<i>Cissampelos capensis</i> , <i>Microloma sagittatum</i> .
Tall Shrubs	<i>Euclea racemosa</i> subsp. <i>racemosa</i> ^T (d), <i>Olea europaea</i> subsp. <i>africana</i> ^T (d), <i>Putterlickia pyracantha</i> ^T (d), <i>Rhus laevigata</i> ^T (d), <i>Aspalathus acuminata</i> subsp. <i>acuminata</i> , <i>Chrysanthemoides monilifera</i> , <i>Diospyros glabra</i> ^T , <i>Dodonaea viscosa</i> var. <i>angustifolia</i> , <i>Myrsine africana</i> ^T , <i>Passerina corymbosa</i> , <i>Rhus angustifolia</i> ^T , <i>R. crenata</i> ^T , <i>R. tomentosa</i> ^T , <i>R. undulata</i> ^T , <i>Wiborgia obcordata</i> .
Low Shrubs	<i>Anthospermum aethiopicum</i> (d), <i>Elytropappus rhinocerotis</i> (d), <i>Eriocephalus africanus</i> var. <i>africanus</i> (d), <i>Felicia filifolia</i> subsp. <i>filifolia</i> (d), <i>Maytenus oleoides</i> (d), <i>Salvia lanceolata</i> (d), <i>Anthospermum galioides</i> subsp. <i>galioides</i> , <i>Aspalathus hispida</i> , <i>Asparagus rubicundus</i> , <i>Athanasia trifurcata</i> , <i>Chironia baccifera</i> , <i>Erica paniculata</i> , <i>Galenia africana</i> , <i>Gnidia squarrosa</i> , <i>Helichrysum cymosum</i> , <i>H. dasyanthum</i> , <i>H. revolutum</i> , <i>H. teretifolium</i> , <i>Hermannia alnifolia</i> , <i>H. hyssopifolia</i> , <i>H. prismatocarpa</i> , <i>Leucadendron lanigerum</i> var. <i>lanigerum</i> , <i>Lobostemon argenteus</i> , <i>L. fruticosus</i> , <i>Nenax hirta</i> subsp. <i>hirta</i> , <i>Oftia africana</i> , <i>Phyllica thunbergiana</i> , <i>Rhus dissecta</i> , <i>R. rosmarinifolia</i> , <i>Salvia africana-caerulea</i> , <i>Stoebe cinerea</i> .
Succulent Shrub	<i>Lampranthus sociorum</i> .
Forb layer	
Herbs	<i>Helichrysum crispum</i> (d), <i>Annesorhiza macrocarpa</i> , <i>Cotula turbinata</i> , <i>Hebenstretia paarlensis</i> , <i>Lichtensteinia obscura</i> , <i>Stachys aethiopica</i>
Geophytic Herb	<i>Mohria caffrorum</i> (d), <i>Chlorophytum undulatum</i> , <i>Geissorhiza monanthos</i> , <i>Moraea papilionacea</i> , <i>Oxalis obtusa</i> , <i>O. pes-caprae</i> , <i>O. purpurea</i> , <i>Pelargonium longifolium</i> , <i>Romulea eximia</i> , <i>R. rosea</i> , <i>Sparaxis parviflora</i> , <i>Watsonia borbonica</i> subsp. <i>borbonica</i>
Succulent Herb	<i>Crassula capensis</i>
Herbaceous Climber	<i>Cynanchum africanum</i>



Grass layer	
Graminoids	<i>Ehrharta calycina</i> (d), <i>E. villosa</i> var. <i>villosa</i> (d), <i>Ischyrolepis gaudichaudiana</i> (d), <i>Cymbopogon marginatus</i> , <i>Ehrharta longiflora</i> , <i>E. ottonis</i> , <i>E. thunbergii</i> , <i>Ischyrolepis capensis</i> , <i>Thamnochortus bachmannii</i> , <i>Themeda triandra</i> , <i>Tribolium uniola</i> .
Endemic Taxa	
Succulent Shrub	<i>Antimima menniei</i> , <i>Erepsia hallii</i> , <i>Lampranthus citrinus</i> , <i>L. scaber</i> , <i>Phyllobolus suffruticosus</i> , <i>Ruschia klipbergensis</i>
Low Shrubs	<i>Agathosma hispida</i> , <i>A. latipetala</i> , <i>Aspalathus glabrata</i> , <i>A. rycroftii</i>
Herbs	<i>Arctopus dregei</i> , <i>Oncosiphon glabratum</i>
Geophytic Herbs	<i>Babiana pygmaea</i> , <i>B. regia</i> , <i>B. rubrocyanea</i> , <i>Geissorhiza darlingensis</i> , <i>G. eurystigma</i> , <i>G. malmesburiensis</i> , <i>G. mathewsii</i> , <i>G. radians</i> , <i>Haemanthus pumilio</i> , <i>Ixia aurea</i> , <i>I. curta</i> , <i>Lachenalia purpureo-caerulea</i> , <i>Moraea amissa</i> , <i>Oxalis stictocheila</i> , <i>Watsonia humilis</i> .

(d) = dominant species; T = Cape Thickets

FFd5 – Cape Flats Sand Fynbos



Figure D2: Cape Flats Sand Fynbos: One of the largest surviving remnants is located under powerlines in the Platteklouf Natural Heritage Site, here with *Serruria aemula*, *Diastella proteoides*, *Matalasia densa* and *Passerina vulgaris*. *Thamnochortus erectus* is showing signs of senescence due to the reluctance of the managers to burn under the powerlines. Image source: Mucina and Rutherford (2006) Figure 4.62, page 140.

Dominant and typical floristic species of Cape Flats Sand Fynbos (Mucina & Rutherford, 2012). The table contains the important taxa associated with the vegetation type.

Woody Layer	
Tall Shrubs	<i>Metalasia densa</i> , <i>Morella cordifolia</i> , <i>M. serrata</i> , <i>Passerina corymbosa</i> , <i>Protea burchellii</i> , <i>P. repens</i> , <i>Psoralea pinnata</i> ^W , <i>Pterocelastrus tricuspidatus</i> ^T , <i>Rhus lucida</i> ^T , <i>Wiborgia obcordata</i> .
Low Shrubs	<i>Diastella proteoides</i> (d), <i>Diosma hirsuta</i> (d), <i>Erica lasciva</i> (d), <i>E. muscosa</i> (d), <i>Phyllica cephalantha</i> (d), <i>Senecio halimifolius</i> (d), <i>Serruria glomerata</i> (d), <i>Stoebe plumosa</i> (d), <i>Anthospermum aethiopicum</i> , <i>Aspalathus callosa</i> , <i>A. hispida</i> , <i>A. quinquefolia</i> subsp. <i>quinquefolia</i> , <i>A. sericea</i> , <i>A. spinosa</i> subsp. <i>spinosa</i> , <i>A. ternata</i> , <i>Berzelia abrotanoides</i> , <i>Chrysanthemoides incana</i> , <i>Cliffortia eriocephalina</i> , <i>C. juniperina</i> , <i>C. polygonifolia</i> , <i>Erica articularis</i> , <i>E. axillaris</i> , <i>E. capitata</i> , <i>E. corifolia</i> , <i>E. ferrea</i> , <i>E. imbricata</i> , <i>E. mammosa</i> , <i>E. plumosa</i> , <i>E. pulchella</i> , <i>Eriocephalus africanus</i> var. <i>africanus</i> , <i>Galenia africana</i> , <i>Gnidia spicata</i> , <i>Helichrysum cymosum</i> , <i>Leucadendron floridum</i> , <i>L. salignum</i> , <i>Leucospermum hypophyllocarpodendron</i> subsp. <i>canaliculatum</i> , <i>Metalasia adunca</i> , <i>M. pulchella</i> , <i>Morella quercifolia</i> , <i>Passerina ericoides</i> , <i>Pharnaceum lanatum</i> , <i>Phyllica parviflora</i> , <i>Plecostachys polifolia</i> , <i>P. serpyllifolia</i> , <i>Polpoda capensis</i> , <i>Protea scolymocephala</i> , <i>Serruria fasciflora</i> , <i>S. trilopha</i> , <i>Staavia radiata</i> , <i>Stilbe albiflora</i> , <i>Stoebe cinerea</i> , <i>Syncarpha vestita</i> , <i>Trichocephalus stipularis</i>
Succulent Shrub	<i>Crassula flava</i> .
Herbaceous Climber	<i>Dipogon lignosus</i> .



Forb layer	
Herbs	<i>Berkheya rigida</i> , <i>Conyza pinnatifida</i> , <i>Edmondia sesamoides</i> , <i>Helichrysum tinctorum</i> , <i>Indigofera procumbens</i> , <i>Knowltonia vesicatoria</i> .
Geophytic Herbs	<i>Watsonia meriana</i> (d), <i>Aristea dichotoma</i> , <i>Geissorhiza tenella</i> , <i>Othonna heterophylla</i> , <i>Pelargonium longifolium</i> , <i>Wachendorfia paniculata</i> , <i>Zantedeschia aethiopica</i> ^W .
Succulent Herb	<i>Carpobrotus acinaciformis</i>
Grass layer	
Graminoids	<i>Cynodon dactylon</i> (d), <i>Ehrharta villosa</i> var. <i>villosa</i> (d), <i>Elegia tectorum</i> (d), <i>Restio quinquefarius</i> (d), <i>Sporobolus virginicus</i> (d), <i>Thamnochortus erectus</i> (d), <i>Willdenowia incurvata</i> (d), <i>Calopsis impolita</i> , <i>Elegia juncea</i> , <i>E. microcarpa</i> , <i>E. nuda</i> , <i>Hordeum capense</i> , <i>Hypodiscus aristatus</i> , <i>Ischyrolepis capensis</i> , <i>I. paludosa</i> , <i>Juncus capensis</i> , <i>Restio bifurcus</i> , <i>R. micans</i> , <i>R. quadratus</i> , <i>Willdenowia sulcata</i> , <i>W. teres</i> .
Endemic Taxa	
Low Shrubs	<i>Erica margaritacea</i> (d), <i>Aspalathus variegata</i> (probably extinct), <i>Athanasia capitata</i> , <i>Cliffortia ericifolia</i> , <i>Erica pyramidalis</i> ^W , <i>E. turgida</i> , <i>E. verticillata</i> , <i>Leucadendron levisanus</i> , <i>Liparia graminifolia</i> , <i>Serruria aemula</i> , <i>S. foeniculacea</i> , <i>S. furcellata</i> .
Succulent Shrub	<i>Lampranthus stenus</i> .
Graminoids	<i>Tetraria variabilis</i> , <i>Trianoptiles solitaria</i>
Geophytic Herb	<i>Ixia versicolor</i>

(d) = dominant species, T = Cape Thickets, W = Wetlands

FRs9 Swartland Granite Renosterveld

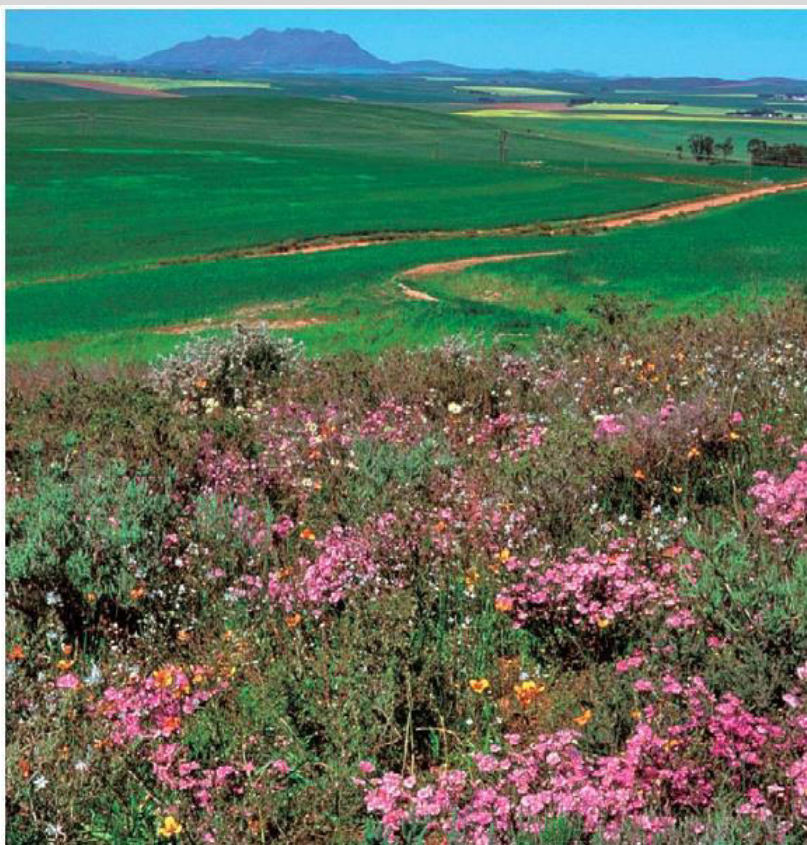


Figure D3: Swartland Granite Renosterveld: Renosterbos (*Elytropappus rhinocerotis*) shrublands on Malmesbury shale at the foot of Spitskop, near Piketberg, with *Moraea tulbaghensis*, (Orange, red data species), *Lampranthus dilutus* (mauve-flowered vygie), and *Ixia lutea* (cream-coloured in the background). Image source: Mucina and Rutherford (2006) Figure 4.109, page 182.



Dominant and typical floristic species of Swartland Granite Renosterveld (Mucina & Rutherford, 2012). The table contains the important taxa associated with the vegetation type.

Woody Layer	
Tall Shrubs	<i>Aspalathus acuminata</i> subsp. <i>acuminata</i> (d), <i>Olea europaea</i> subsp. <i>africana</i> (d), <i>Rhus angustifolia</i> (d), <i>R. incisa</i> (d), <i>Chrysanthemoides monilifera</i> , <i>Euryops speciosissimus</i> , <i>E. tenuissimus</i> , <i>Gymnosporia buxifolia</i> , <i>Lebeckia cytisoides</i>
Low Shrubs	<i>Anthospermum aethiopicum</i> (d), <i>A. spathulatum</i> subsp. <i>tulbaghense</i> (d), <i>Elytropappus rhinocerotis</i> (d), <i>Eriocephalus africanus</i> var. <i>africanus</i> (d), <i>Euryops thunbergii</i> (d), <i>Galenia secunda</i> (d), <i>Helichrysum cymosum</i> (d), <i>H. teretifolium</i> (d), <i>Osteospermum spinosum</i> (d), <i>Otholobium hirtum</i> (d), <i>Agathosma glandulosa</i> , <i>Aspalathus aculeata</i> , <i>A. pinguis</i> subsp. <i>pinguis</i> , <i>A. spinosa</i> subsp. <i>flavispina</i> , <i>A. tridentata</i> subsp. <i>staurantha</i> , <i>A. varians</i> , <i>Asparagus rubicundus</i> , <i>Athanasia trifurcata</i> , <i>Cliffortia marginata</i> , <i>Diosma hirsuta</i> , <i>Euclea acutifolia</i> , <i>Felicia filifolia</i> subsp. <i>filifolia</i> , <i>F. hyssopifolia</i> , <i>Galenia africana</i> , <i>Lebeckia cinerea</i> , <i>Leucadendron lanigerum</i> var. <i>lanigerum</i> , <i>Marasmodes polycephala</i> , <i>Metalasia dregeana</i> , <i>M. octoflora</i> , <i>Muraltia decipiens</i> , <i>M. ononidifolia</i> , <i>Oftia africana</i> , <i>Passerina truncata</i> subsp. <i>truncata</i> , <i>Phyllica gracilis</i> , <i>Plecostachys serpyllifolia</i> , <i>Pteronia divaricata</i> , <i>P. incana</i> , <i>Rhus dissecta</i> , <i>Senecio pubigerus</i> , <i>Stoebe plumosa</i> . Succulent Shrubs: <i>Euphorbia burmannii</i> (d), <i>E. mauritanica</i> , <i>Lampranthus elegans</i>
Woody Climber	<i>Microloma sagittatum</i>
Forb layer	
Herbs	<i>Berkheya armata</i> (d), <i>B. rigida</i> , <i>Cotula turbinata</i> , <i>Echiostachys spicatus</i> , <i>Lichtensteinia obscura</i> , <i>Manulea cephalotes</i> , <i>Senecio laxus</i> , <i>Stachys aethiopica</i>
Geophytic Herbs	<i>Cyanella hyacinthoides</i> (d), <i>Melasphaerula ramosa</i> (d), <i>Albuca maxima</i> , <i>Aristea africana</i> , <i>Babiana melanops</i> , <i>Cheilanthes capensis</i> , <i>Disa physodes</i> , <i>Geissorhiza imbricata</i> subsp. <i>bicolor</i> ^W , <i>G. inflexa</i> , <i>G. juncea</i> , <i>G. purpureolutea</i> , <i>G. tulbaghensis</i> , <i>Lachenalia longibracteata</i> , <i>L. pallida</i> , <i>L. polyphylla</i> , <i>Mohria caffrorum</i> , <i>Ornithogalum thyrsoides</i> , <i>Oxalis pes-caprae</i> , <i>Romulea flava</i> , <i>R. leipoldtii</i> , <i>R. rosea</i> , <i>R. tabularis</i> , <i>Watsonia marginata</i> .
Grass layer	
Graminoids	<i>Cynodon dactylon</i> (d), <i>Ehrharta calycina</i> (d), <i>Elegia capensis</i> (d), <i>E. recta</i> (d), <i>E. tectorum</i> (d), <i>Ficinia brevifolia</i> (d), <i>Ischyrolepis capensis</i> (d), <i>Merxmuellera stricta</i> (d), <i>Ehrharta delicatula</i> , <i>E. thunbergii</i> , <i>Hordeum capense</i> , <i>Merxmuellera arundinacea</i> , <i>Tribolium hispidum</i> .
Endemic Taxa	
Low Shrubs	<i>Leucadendron verticillatum</i> (d), <i>Aspalathus acanthophylla</i> , <i>A. horizontalis</i> , <i>A. pinguis</i> subsp. <i>longissima</i> , <i>A. pinguis</i> subsp. <i>occidentalis</i> , <i>A. puberula</i> , <i>A. rectistyla</i> , <i>Cliffortia acockii</i> , <i>Lotononis complanata</i> , <i>Serruria incrassata</i>
Succulent Shrub	<i>Erepsia ramosa</i> , <i>Ruschia patens</i> , <i>R. pauciflora</i>
Herb	<i>Indigofera triquetra</i>
Geophytic Herbs	<i>Aristea lugens</i> , <i>Babiana angustifolia</i> , <i>B. odorata</i> , <i>B. secunda</i> , <i>Hesperanthera pallescens</i> , <i>H. spicata</i> subsp. <i>fistulosa</i> , <i>Lachenalia liliifolia</i> , <i>L. mediana</i> var. <i>rogersii</i> , <i>L. orthopetala</i> , <i>Lapeirousia fastigiata</i> , <i>Moraea gigandra</i> , <i>M. tulbaghensis</i> , <i>Oxalis fragilis</i> , <i>O. involuta</i> , <i>O. leptocalyx</i> , <i>O. levis</i> , <i>O. macra</i> , <i>O. perineson</i> , <i>O. strigosa</i> , <i>Pelargonium vicifolium</i>

(d) = dominant species, W = Wetlands



FFa3 Swartland Alluvium Fynbos



Figure D4: Swartland Alluvium Fynbos: Proteoid fynbos with *Leucospermum calligerum* and *Serruria candicans* (foreground) and *Leucodendron corymbosum* (background) on alluvial fans in the Elandsberg Private Natrue Reserve north of Wellington (Western Cape). Image source: Mucina and Rutherford (2006) Figure 4.191, page 165.

Dominant and typical floristic species of Swartland Alluvium Fynbos (Mucina & Rutherford, 2012). The table contains the important taxa associated with the vegetation type.

Woody Layer	
Tall Shrubs	<i>Diospyros glabra</i> ^T (d), <i>Olea europaea</i> subsp. <i>africana</i> ^T (d), <i>Psoralea aphylla</i> (d), <i>Rhus angustifolia</i> ^T (d), <i>Dodonaea viscosa</i> var. <i>angustifolia</i> , <i>Metalasia densa</i> , <i>Morella cordifolia</i> , <i>Passerina corymbosa</i> , <i>Phyllica buxifolia</i> , <i>Protea repens</i> , <i>Rhus incisa</i> ^T , <i>Rubus rigidus</i>
Low Shrubs	<i>Cliffortia ferruginea</i> (d), <i>Elytropappus rhinocerotis</i> (d), <i>Eriocephalus africanus</i> var. <i>africanus</i> (d), <i>Leucadendron corymbosum</i> (d), <i>Leucospermum calligerum</i> (d), <i>Passerina truncata</i> subsp. <i>truncata</i> (d), <i>Senecio halimifolius</i> (d), <i>Serruria candicans</i> (d), <i>Athanasia trifurcata</i> , <i>Cliffortia juniperina</i> , <i>C. ruscifolia</i> , <i>Elytropappus gnaphaloides</i> , <i>Euryops pinnatipartitus</i> , <i>Galenia africana</i> , <i>Leucadendron lanigerum</i> var. <i>lanigerum</i> , <i>L. salignum</i> , <i>L. stellare</i> , <i>Oftia africana</i> , <i>Plecostachys serpyllifolia</i> , <i>Stoebe plumosa</i> , <i>Trichocephalus stipularis</i>
Woody Climber	<i>Microloma sagittatum</i>
Forb layer	
Herbs	<i>Conyza pinnatifida</i> , <i>Corymbium africanum</i> , <i>Dischisma arenarium</i> , <i>Lebeckia sepriaria</i>
Geophytic Herbs	<i>Pteridium aquilinum</i> (d), <i>Zantedeschia aethiopica</i> ^W (d), <i>Geissorhiza imbricata</i> subsp. <i>bicolor</i> ^W , <i>G. setacea</i> , <i>Mohria caffrorum</i> , <i>Oxalis goniorrhiza</i> , <i>Spiloxene flaccida</i>
Herbaceous Climber	<i>Dipogon lignosus</i>
Grass layer	
Graminoids	<i>Calopsis paniculata</i> (d), <i>Cynodon dactylon</i> (d), <i>Elegia filacea</i> (d), <i>Ficinia brevifolia</i> (d), <i>Ischyrolepis capensis</i> (d), <i>I. tenuissima</i> (d), <i>Juncus capensis</i> (d), <i>Merxmullera cincta</i> (d), <i>Calopsis rigorata</i> , <i>Cannomois parviflora</i> , <i>Elegia nuda</i> , <i>E. recta</i> , <i>Eragrostis curvula</i> , <i>Pentaschistis curvifolia</i> , <i>P. pallida</i> , <i>Pycreus polystachyos</i> ^W , <i>Restio filiformis</i> , <i>Thamnochortus fruticosus</i> , <i>T. punctatus</i> , <i>Willdenowia glomerata</i> , <i>W. incurvata</i> , <i>W. sulcata</i> , <i>W. teres</i> .
Endemic Taxa	



Low Shrubs	<i>Diastella buekii</i> , <i>Erica alexandri</i> , <i>E. bakeri</i> ^W , <i>Marasmodes duemmeri</i> , <i>M. undulata</i> , <i>Phylica stenopetala</i> , <i>Protea mucronifolia</i> .
Succulent Shrub	<i>Lampranthus schlechteri</i>
Geophytic Herbs	<i>Brunsvigia elandsmontana</i> , <i>Bulbine monophylla</i> , <i>Geissorhiza furva</i> , <i>Moraea villosa</i> subsp. <i>elandsmontana</i> .

(d) = dominant species, W = Wetlands, T = Cape Thickets



APPENDIX E: Details, Expertise And Curriculum Vitae of Specialists

1. (a) (i) Details of the specialist who prepared the report

Daryl van der Merwe	MSc Conservation Biology (University of Cape Town)
Christopher Hooton	BTech Nature Conservation (Tshwane University of Technology)
Kim Marais	BSc (Hons) Zoology (Herpetology) (University of the Witwatersrand)
Sanja Erwee	BSc Zoology (University of Pretoria)

1. (A). (ii) The expertise of that specialist to compile a specialist report including a curriculum vitae

Company of Specialist:	Scientific Terrestrial Services		
Name / Contact person:	Kim Marais		
Postal address:	PO. Box 751779, Gardenview		
Postal code:	2047		
Telephone:	011 616 7893	Fax:	086 724 3132
E-mail:	kim@sasenvgroup.co.za		
Qualifications	BSc (Hons) Zoology (University of the Witwatersrand) BSc (Zoology and Conservation) (University of the Witwatersrand)		
Registration / Associations	Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP) Member of South African Wetland Forum		

1. (b) a declaration that the specialist is independent in a form as may be specified by the competent authority

I, Daryl van der Merwe, declare that -

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

Signature of the Specialist



I, Christopher Hooton, declare that -

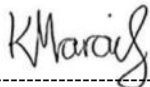
- I act as the **independent specialist (reviewer)** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise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



Specialist Signature

I, Kim Marais, declare that -

- I act as the **independent specialist (reviewer)** 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 relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct



Signature of the Specialist

I, Sanja Erwee, declare that -

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



Signature of the Specialist





**SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION**

CURRICULUM VITAE OF DARYL VAN DER MERWE

PERSONAL DETAILS

Position in Company	Junior Field Biologist
Joined SAS Environmental Group of Companies	2019

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Member of the South African Environmental Observation Network (SAEON)

EDUCATION

Qualifications

MSc (Conservation Biology Candidate) (University of Cape Town)	2019
BSc (Hons) Plant Science (Ecology) (University of Pretoria)	2014
BSc Environmental Science (University of Pretoria)	2013

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, North West, Limpopo and Northern Cape

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Faunal Assessments
- Invertebrate Assessments
- Invertebrate Monitoring
- Avifaunal Assessments
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Terrestrial Monitoring
- Protected Tree and Floral Marking and Reporting

Legislative Requirements, Processes and Assessments

- Water Use Applications (Water Use Licence Applications / General Authorisations)
- Environmental and Water Use Audits
- Freshwater Resource Management and Monitoring as part of EMPR and WUL conditions





**SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION**

CURRICULUM VITAE OF CHRISTOPHER HOOTON

PERSONAL DETAILS

Position in Company	Senior Scientist, Member Biodiversity Specialist
Joined SAS Environmental Group of Companies	2013

EDUCATION

Qualifications

BTech Nature Conservation (Tshwane University of Technology)	2013
National Diploma Nature Conservation (Tshwane University of Technology)	2008

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Eastern Cape, Western Cape, Northern Cape, Free State
Africa - Zimbabwe, Sierra Leone, Zambia

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Floral Assessments
- Faunal Assessments
- Biodiversity Actions Plan (BAP)
- Biodiversity Management Plan (BMP)
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Protected Tree and Floral Marking and Reporting
- Biodiversity Offset Plan

Freshwater Assessments

- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning





SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF **KIM MARAIS**

PERSONAL DETAILS

Position in Company	Senior Scientist Water Resource Manager
Joined SAS Environmental Group of Companies	2015

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP – Reg No. 117137/17)
Member of the Western Cape Wetland Forum (WCWF)

EDUCATION

Qualifications

BSc (Hons) Zoology (University of the Witwatersrand)	2012
BSc (Zoology and Conservation) (University of the Witwatersrand)	2011

Short Courses

Aquatic and Wetland Plant Identification (Cripsis Environment)	2019
Tools for Wetland Assessment (Rhodes University)	2018
Certificate in Environmental Law for Environmental Managers (CEM)	2014
Certificate for Introduction to Environmental Management (CEM)	2013

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Biodiversity Action Plans (BAP)
- Alien and Invasive Control Plans (AICP)
- Faunal Eco Scans
- Faunal Impact Assessments

Freshwater Assessments

- Desktop Freshwater Delineation
- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Watercourse Maintenance and Management Plans
- Freshwater Offset Plan

Aquatic Ecological Assessment and Water Quality Studies

- Riparian Vegetation Integrity (VEGRAI)
- Water quality Monitoring
- Riverine Rehabilitation Plans

Legislative Requirements, Processes and Assessments

- Water Use Applications (Water Use Licence Applications / General Authorisations)
- Water Use Audits
- Freshwater Resource Management and Monitoring as part of EMPR and WUL conditions
- Public Participation processes





SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF **SANJA ERWEE**

PERSONAL DETAILS

Position in Company	GIS Technician and Visual Specialist
Joined SAS Environmental Group of Companies	2014

EDUCATION

Qualifications

BSC Zoology (University of Pretoria) 2013

Short Courses

Global Mapper 2015

SANBI BGIS Course 2017

Global Mapper Lidar Course 2017

ESRI MOOC ARCGIS Cartography 2018

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Northern Cape, Western Cape Free State

KEY SPECIALIST DISCIPLINES

Freshwater Assessments

- Desktop Freshwater Delineation
- Plant species and Landscape Plan

Visual Impact Assessment

- Visual Baseline and Impact Assessments
- Visual Impact Peer Review Assessments
- View Shed Analyses
- Visual Modelling

GIS

- Mapping and GIS for various sectors and various disciplines (biodiversity, freshwater, aquatic, soil and land capability).

