Impact Assessment for Portion 30 / 275, Mossel Bay Municipality.

Specialist Plant Species and Terrestrial Biodiversity Report

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ABBREVIATIONS

BPA	Biodiversity Priority Area
BSP	Biodiversity Spatial Plan
CBA	Critical Biodiversity Area
CD:NGI	Chief Directorate: National Geo-spatial Information
DFFE	Department of Forestry, Fisheries and the Environment
EIA	Environmental Impact Assessment
EMP	Ecological Management Plan
ESA	Ecological Support Area
NEM:BA	National Environmental Management: Biodiversity Act
ONA	Other Natural Areas
PAOI	Project Area of Influence
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
SDP	Site Development Plan
SEI	Site Ecological Importance

DECLARATION OF SPECIALIST INDEPENDENCE

The consulting services comprise an assessment of the potential sensitivity of the ecosystems and flora that fall within the development footprint for the site. The following declaration is given by the appointed specialist:

- I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP).
- At the time of conducting the field assessment and compiling this report I did not have any interest, hidden or otherwise, in the proposed development that this report has reference to, except for financial compensation for work done in a professional capacity.
- Work performed for this site was done in an objective manner. Even if this results in views and findings that are not favourable to the client/applicant, I will not be affected in any manner by the outcome of any environmental process of which this report may form a part, other than being members of the general public.
- I declare that there are no circumstances that may compromise my objectivity in performing this specialist investigation. I do not necessarily object to or endorse any proposed developments, but aim to present facts, findings and recommendations based on relevant professional experience and scientific data.
- I do not have any influence over decisions made by the governing authorities.
- I undertake to disclose 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 a competent authority to such a relevant authority and the applicant.
- I have the necessary qualifications and guidance from professional experts in conducting specialist reports relevant to this application, including knowledge of the relevant Act, regulations and any guidelines that have relevance to the proposed activity.
- This document and all information contained herein is and will remain the intellectual property of Confluent Environmental. This document, in its entirety or any portion thereof, may not be altered in any manner or form, for any purpose without the specific and written consent of the specialist investigators.
- All the particulars furnished by me in this document are true and correct.

Signed: 02 October 2024

BIANKE FOUCHÉ ABRIDGED CV

Qualifications

- B.Sc. Environmental Sciences (Nelson Mandela University),
- B.Sc. Honours in Botany (Nelson Mandela University),
- M.Sc. Conservation Biology (University of Cape Town)

SACNASP Registration No: 141757 (Professional Botanical; Candidate Ecological)

Skills and Core Competencies

- My MSc research will add to our understanding of plant community niche construction and Alternative Stable State (ASS) theory. The knowledge gained will be used to advise landscape stewardship practices, especially regarding reforestation initiatives in the Overstrand.
- I have worked closely with the conservation team of the Grootbos Foundation, where I assisted with vegetation surveys, mounting voucher specimens in the Grootbos herbarium, and taken part in controlled fynbos fires in the Overberg.
- Postgraduate studies of mine included assessing the allelopathic effects of *Eucalyptus* leaves on garden peas and leeks and assessing the accuracy of the climate leaf analysis multivariate programme (CLAMP) in predicting the climate of fynbos vegetation.
- In Cape Town I regularly took part in alien clearing activities and helped to identify relevant listed invasive plants.
- I am currently a member of SACNASP, the International Association for Impact Assessment (IAIA) in South Africa, Botanical Society of South Africa, and the custodians for rare and endangered wildflowers (CREW-Outramps) in George.

References

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1. INTRODUCTION

1.1 Background

Confluent Environmental was contracted by the Applicant on the recommendation of Cape EAPrac to undertake a impact assessment for botanical and terrestrial sensitivity of Portion 30 / 275 in near Vleesbaai in the Mossel Bay Municipality. According to the Department of Forestry, Fisheries, and the Environment (DFFE) Screening Tool, the report is required because the terrestrial plant species theme has been highlighted as having a **Medium** sensitivity, and the terrestrial biodiversity has a **Very High** sensitivity. These screening tool sensitivities apply to the entire Portion 30 / 275. The plant species theme is triggered due to several species of conservation concern (SCC) that are potentially present in the area (mentioned later in this report). The terrestrial biodiversity theme sensitivity is due to the Portion being mapped as a terrestrial critical biodiversity area (CBA1), because the area is mapped as part of endangered (EN) Hartenbos Dune Thicket, and because it falls within a mapped Freshwater Ecosystem Priority Area (FEPA) sub-catchment. The purpose of this impact assessment report is to verify the presence of the ecosystem / vegetation types present on Portion 30 / 275, confirm whether any plant species of conservation concern (SCC) are present at the site, and provide mitigation measures as part of the impact assessment in this report.

1.2 General Site Location

Portion 30 / 275 south west of Vleesbaai is located on sandy dunes (Fig. 1). The surrounding landscape is mostly still in a natural state, some existing buildings visible to the east. The site can be accessed from the road indicated in Fig. 1. Some largely bare sand dunes are visible almost directly south of the property.

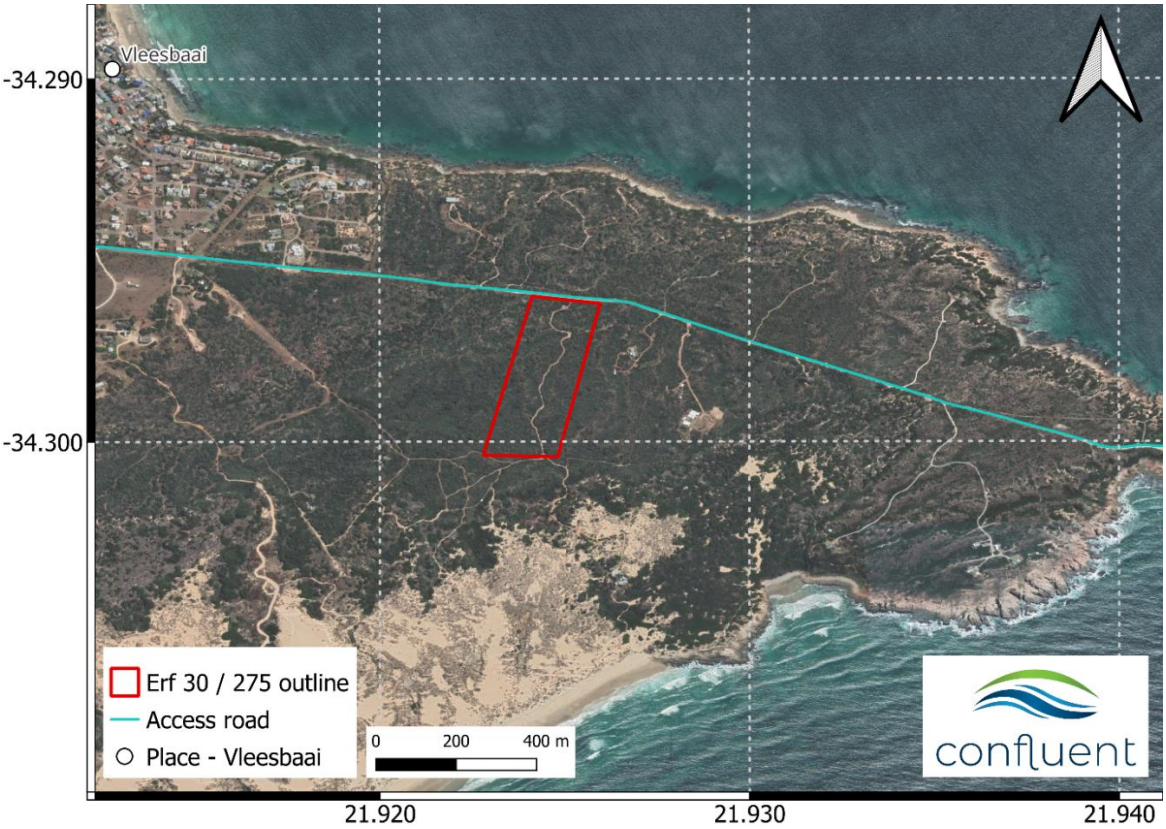


Figure 1: The general location of Portion 30 / 275 near Vleesbaai.

1.3 The Latest Preferred Development Layout

The preferred site development plan (SDP; Fig. 2) includes the development of one residential dwelling which has a total footprint of 1962 sqm, which includes predicted temporary disturbance areas covering a total of 464 sqm (see the coverage table in Fig. 2). The permanent disturbance footprint is therefore 1498 sqm. The existing disturbed area east of the existing access road will be left to rehabilitate and will not be affected by the development. The SDP also aims to avoid all the protected Milkwood trees (no. 579) in the site. The owners may consider adding an extra area for solar panels (included in their preferred SDP), however if at all possible this must be avoided and the solar panels should be placed on the roofs of the dwelling.

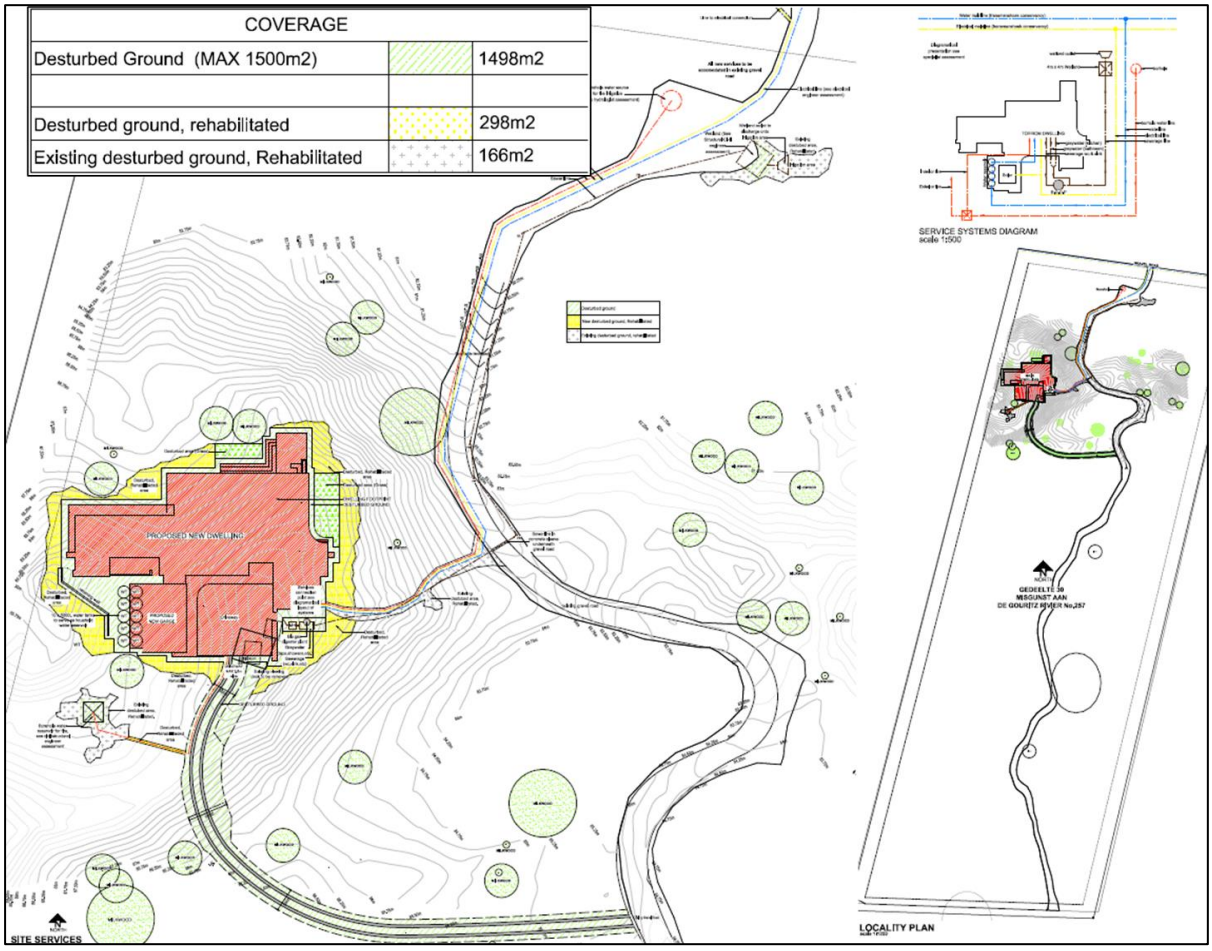
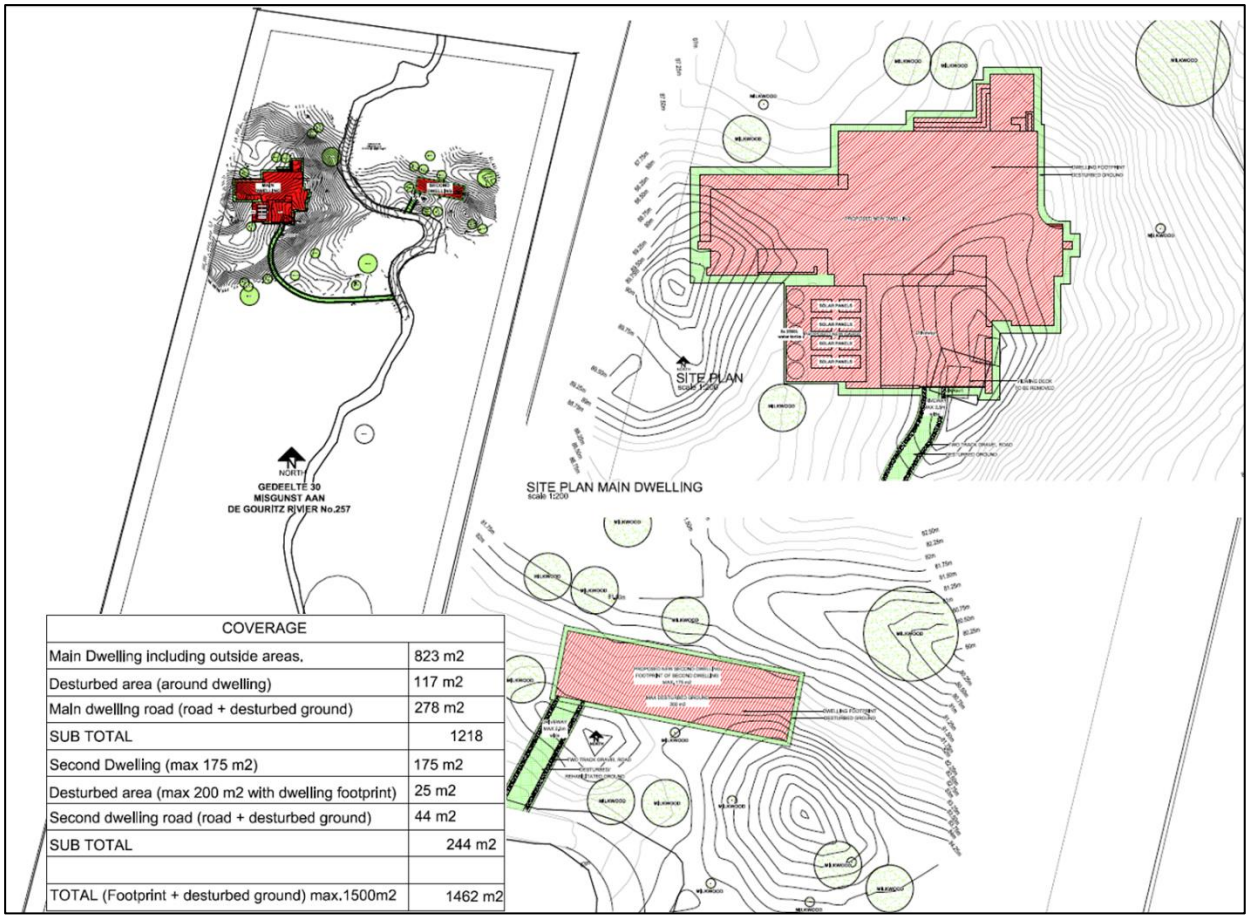


Figure 2: The latest site development plan (SDP; September 2024) for Portion 30 / 275.

1.4 Non-Preferred Development layout

The non-preferred development option includes two residential dwellings in the northern half of the portion. The location of the two dwellings make it easier to add essential services from the existing gravel road, such as electricity, water, and sewage (similar to the preferred option above). All of these services will fall within the proposed development footprint as it is described in Fig. 3. The non-preferred alternative has a total footprint of ca. 1462 sqm, which is 500 sqm smaller than the total footprint for the preferred alternative.



COVERAGE	
Main Dwelling including outside areas.	823 m2
Desturbed area (around dwelling)	117 m2
Main dwelling road (road + desturbed ground)	278 m2
SUB TOTAL	1218
Second Dwelling (max 175 m2)	175 m2
Desturbed area (max 200 m2 with dwelling footprint)	25 m2
Second dwelling road (road + desturbed ground)	44 m2
SUB TOTAL	244 m2
TOTAL (Footprint + desturbed ground) max.1500m2	1462 m2

Figure 3: The Non-Preferred site development plan (SDP) for Portion 30 / 275.

2. TERMS OF REFERENCE

This screening tool sensitivity verification report provides information on Terrestrial and Botanical diversity and sensitivity of the proposed development. The results presented are based on a desktop and field assessment, which includes a consideration of historical photographic records of the site. The assessment presented in this report follows the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity, and Terrestrial Plant Species themes.

This site sensitivity assessment follows the requirements of:

- The Environmental Impact Assessment Regulations, as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998), which includes:
    - The protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial plant species (28 July 2023).
    - The protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial biodiversity (20 March 2020).
- Additional guidelines for the terrestrial biodiversity theme:
    - Ecosystem Guidelines for Environmental Assessment in the Western Cape (de Villiers et al., 2016).

  - The Western Cape Biodiversity Spatial Plan Handbook and summary booklet (CapeNature, 2017; Pool-Sandvliet et al., 2017).
  - The Subtropical Thicket Ecosystem Programme Handbook: Integrating the natural environment into land-use decisions at the municipal level: towards sustainable development (Pierce & Mader, 2006).

- Additional guidelines for the terrestrial plant species theme:
  - Species Environmental Assessment Guideline: Guidelines for the implementation of the Terrestrial Flora (3c) & Terrestrial Fauna (3d) Species Protocols for environmental impact assessments in South Africa (Verburgt et al., 2020).

The assessment was undertaken by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with relevant expertise in the field of Botanical and/or Ecological science.

2.1 Online Screening Tool

The Department of Forestry, Fisheries, and the Environment (DFFE) screening tool report for the development footprint has identified the **terrestrial plant species theme as having a Medium sensitivity**, and the **terrestrial biodiversity theme as having a Very High sensitivity**. The reasons for the terrestrial plant sensitivity theme are the possible occurrence of species of conservation concern (SCC) on the site. A Medium screening tool sensitivity for plants indicates that:

> *"Model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level. Two types of spatial models have been included. The first is a simple rule-based habitat suitability model where habitat attributes such as vegetation type and altitude are selected for all areas where a species has been recorded to occur. The second is a species distribution model which uses species occurrence records combined with multiple environmental variables to quantify and predict areas of suitable habitat. The models provide a probability-based distribution indicating a continuous range of habitat suitability across areas that have not been previously surveyed. A probability threshold of 75% for suitable habitat has been used to convert the modelled probability surface and reduce it into a single spatial area which defines areas that fall within the medium sensitivity level."* ~ (Verburgt et al., 2020)

A Very High sensitivity rating for terrestrial biodiversity according to the screening tool is triggered for all Biodiversity Priority Areas (BPAs) and other sensitive features (Stewart et al., 2021). BPAs include the various management layers of the Western Cape Biodiversity Spatial Plan (WC BSP), as well as the other sensitive features in Table 1 below.

Table 1: Sources of BPA data for the Terrestrial Biodiversity Theme sensitivity (Stewart et al., 2021). Red rows indicate BPAs that have been triggered for Portion 30 / 275, and these form the basis for the Very High sensitivity assigned by the screening tool.

Sensitivity layer	Data included and source
Critical Biodiversity Areas (CBAs)	Most recent terrestrial CBA spatial footprint for metros, provinces, or bioregional plans, combined to create a national data set.
Freshwater Ecosystem Catchments (terrestrial)	Freshwater ecosystem catchments, determined through the National Freshwater Ecosystem Priority Area (NFEPA) process.
Red Listed Ecosystems	Any ecosystem that is listed as Vulnerable, Endangered, or Critically Endangered according to the "Revised National List of Ecosystems that are Threatened and in Need of Protection (NEM:BA Act no.10 of 2004, as amended in November 2022)

3. METHODOLOGY

3.1 Desktop Assessment

The desktop assessment was performed using Cape Farm Mapper and QGIS version 3.28.3 “Firenze”. Plant species data was sourced from the following sources:

- The DFFE screening tool listed SCC.
- Information on plant occurrence prior to the site visit was sourced from SANBIs Botanical Research and Herbarium Management System (BRAHMS) for the Plants of Southern Africa (POSA) database.
- iNaturalist observations of the property and surrounding areas.

Ecosystem/ vegetation type data was sourced from:

- The 2018 updated South African National Vegetation Map from SANBIs Biodiversity GIS (BGIS) database, and the National Biodiversity Assessment report of 2018 (Skowno et al., 2018).
- Shapefiles for the Western Cape Biodiversity Spatial Plan (WC-BSP) i.e., information on PAs, CBAs, ESAs, and ONAs were downloaded from BGIS database (CapeNature, 2017; Pool-Sandvliet et al., 2017).
- Cape Farm Mapper for additional spatial information required for the site.
- Chief Directorate: National Geo-spatial Information (CD: NGI) Geospatial Portal and Google Earth for the acquisition of historical aerial imagery of the site.
- The conservation status of ecosystems was found in the Revised National List of Ecosystems that are Threatened and in need of protection, published under the National Environmental Management: Biodiversity Act (Act No. 10, 2004, as revised in Nov. 2022), and also using The Vegetation of South Africa, Lesotho, and Swaziland (Mucina & Rutherford, 2006).

3.2 Field Assessment

Field work was undertaken on the 28th of August 2023. The method for identifying species was similar to a BioBlitz, also described as a “timed meander”, where the specialist especially keeps an eye out for rarer and threatened species. Some Red Listed Plant species are more easily spotted and found during a site survey than other species. This survey method is an attempt to account for the short and single survey period, where detection probability of some rare and threatened species (e.g., geophytes, small succulents, small perennials etc.) are low (Garrard et al., 2008; Wintle et al., 2012). Observations of individual species and environmental characteristics were documented using an android app “Spot Lens”. A provisional species list and plant species accumulation curve is provided in Appendix 12.1.

3.3 Assumptions & Limitations

This assessment is subject to a few assumptions, uncertainties, and limitations, as listed below:

- Only one survey took place during winter on the 28th of August 2023. Seasonal and time constraints always play a role in limiting the findings of a terrestrial specialist report.
- Some rare and threatened plant species are difficult to locate and easily overlooked in the field (e.g., geophytes, small succulents, small shrubs, and cryptic spp.). The species list for the area is limited to the findings of the one field assessment, as well

as past records on iNaturalist and the Plants of Southern Africa (POSA) database for the proposed development site and its surrounding areas. It is very likely that the species list and SCC reported are not exhaustive (Perret et al., 2023).

- Some species may not have been visible at the time of the site assessment (e.g., some geophytes, annuals, and parasitic plants).
- Many plant species flower seasonally and are therefore difficult to identify outside of their flowering season. Environmental factors such as the prevailing fire regime and level of alien invasion influence the successional stage of the vegetation present at the site, and therefore the species visible at the time of assessment (Cowling et al., 2010; Privett et al., 2001).
- The dense fynbos and thicket sections on the made it hard to gain access to some sections of the site. It is possible that the impenetrable nature of the vegetation in some places caused an SCC/ several SCC to be missed on the site.

4. RESULTS: DESKTOP ASSESSMENT

4.1 Terrestrial Biodiversity

4.1.1 Climate

The climate of Portion 30 / 275 is described as warm and temperate. The rainfall pattern is aseasonal, although two peaks are reflected during Autumn and Spring (see Fig. 4). The temperature throughout the year remains moderate, with sub-zero temperatures rarely occurring.

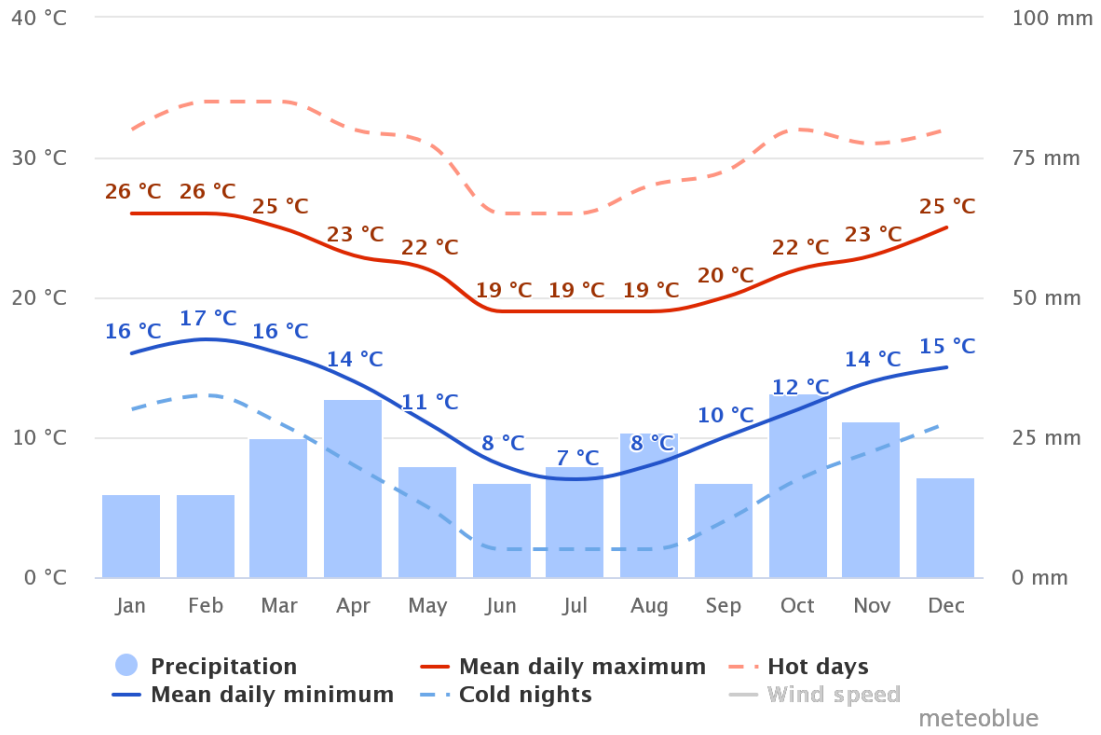


Figure 4: A summary graphic of Simulated historical climate & weather data for Vleesbaai - meteoblue.

4.1.2 Geology and soil

The soil on the site is sandy (i.e., derived from coastal dunes), with a high erodibility factor (0.6 on Cape Farm Mapper). These sandy substrates are very well drained and are typically quite deep, but with limited pedological development. The geology of Hartenbos Dune Thicket is usually associated with Wankoe and Strandveld formations.

4.1.3 Vegetation type(s)

Hartenbos Dune Thicket

The mapped vegetation for Portion 30 / 275 is Hartenbos Dune Thicket according to the 2018 National Vegetation Map of South Africa (Fig. 5; Dayaram et al., 2019; Mucina & Rutherford, 2006). The Vlok vegetation map for the site indicates "Gouritz Drift Sands" over the southern ¾ of the site and "Gouritz Dune Thicket" over the northern ¼ of the portion (see Fig. 5). Usually, the Vlok vegetation map is better at showing the finer scale vegetation communities where the vegetation types from the national map are drawn more coarsely. Hartenbos Dune thicket (AT 40) occurs only in the Western Cape province in coastal areas between Glentana and the Great Brak River (Vlok & Euston-Brown, 2002). This vegetation type is associated with moderately undulating coastal dunes and is composed of a mosaic of low thicket clumps (1-3m height) in a matrix of low (1-2m) asteraceous fynbos. The vegetation observed during the site assessment fits this description perfectly. The thicket elements in this vegetation type are best developed in dune slacks that are protected from fires. Geological heterogeneity, i.e., mudstones and shales, result in the succulent elements being present in the landscapes of Hartenbos Dune Thicket (e.g., *Aloe ferox*, *A. arborescens*, and *Eriocephalus africanus*). Some of the important taxa that are associated with this vegetation type includes (green entries were observed during the site assessment, blue entries indicate that the genus was observed on the site):

Small trees: *Pterocelastrus tricuspidatus*, and *Sideroxylon inerme*.

Succulents: *Aloe ferox*, *Aloe arborescens*, *Carpobrotus acinaciformis* , *Carpobrotus edulis*, *Conicosia pugioniformis*, *Cotyledon orbiculata*, *Crassula nudicaulis*, *Cleretum bellidiforme*, *Euphorbia bayeri*, *Euphorbia burmannii*, *Euphorbia caput-medusae*, *Jordaaniella dubia*, *Roepera morgsana*, *Carpobrotus muirii*, and *Haworthia mirabilis* var. *paradoxa*.

Geophytes: *Brunsvigia orientalis*, *Chasmanthe aethiopica*, *Freesia leichtlinii*, *Haemanthus coccineus*, and *Ixia orientalis*

Shrubs: *Azima tetracantha*, *Carissa bispinosa*, *Cassine peragua*, *Cussonia thyrsiflora*, *Eriocephalus africanus*, Euclea racemosa, *Felicia echinata*, *Grewia occidentalis*, *Helichrysum patulum*, *Lauridia tetragona*, *Maytenus procumbens*, *Metalasia muricata*, *Morella cordifolia*, *Muraltia spinosa*, Mystroxylon aethiopicum, *Salvia africana-lutea*, *Agathosma apiculata*, *Agathosma muirii*, *Athanasia cochlearifolia*, *Athanasia quinquedentata* subsp. *rigens*, *Diosma aristata*, *Euchaetis albertiniana*, *Hermannia muirii*, *Muraltia barkerae*, *Muraltia depressa*, *Olea exasperata*, *Osteospermum moniliferum*, *Passerina rigida*, *Putterlickia pyracantha*, *Robsonodendron maritimum*, *Scutia myrtina*, *Searsia crenata*, *Searsia glauca*, *Searsia lucida*, *Searsia pterota*, and *Leucospermum praecox*.

Graminoids: *Restio eleocharis*, *Sporobolus fimbriatus*, *Stenotaphrum secundatum*, Thamnochortus *insignis*, and *Themeda triandra*

Climbers: *Cynanchum ellipticum*, *Cynanchum viminale*, *Rhoicissus digitata*, and *Solanum africanum*.

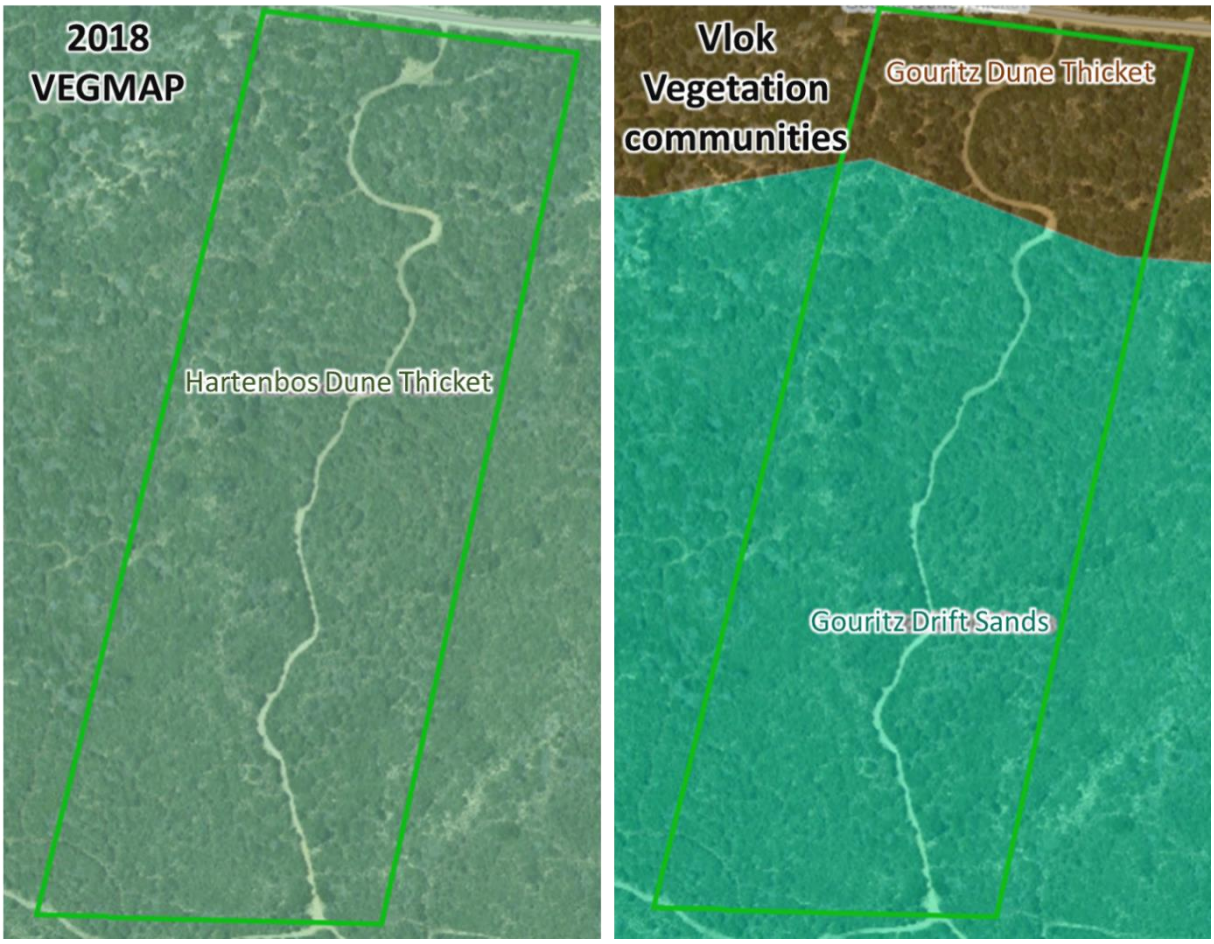


Figure 5: A) The mapped vegetation types according to the 2018 National Vegetation Map of South Africa (Dayaram et al., 2019; Mucina & Rutherford, 2006). B) The Vlok vegetation map categories for Portion 30 / 275 and the surrounding area.

The conservation status of Hartenbos Dune Thicket (AT 40) is endangered (EN). The conservation target for this vegetation type is 19% of its original extent (Grobler et al., 2018; Vlok & Euston-Brown, 2002). Currently it is only conserved in three nature reserves. The map in Fig. 6 below illustrates the full historical extent of this vegetation type and the land use land cover layer of 2020 is illustrated over the mapped extent of the vegetation type. The majority of Portion 30 / 275 is mapped as low shrubland (associated with fynbos) in the land cover dataset.

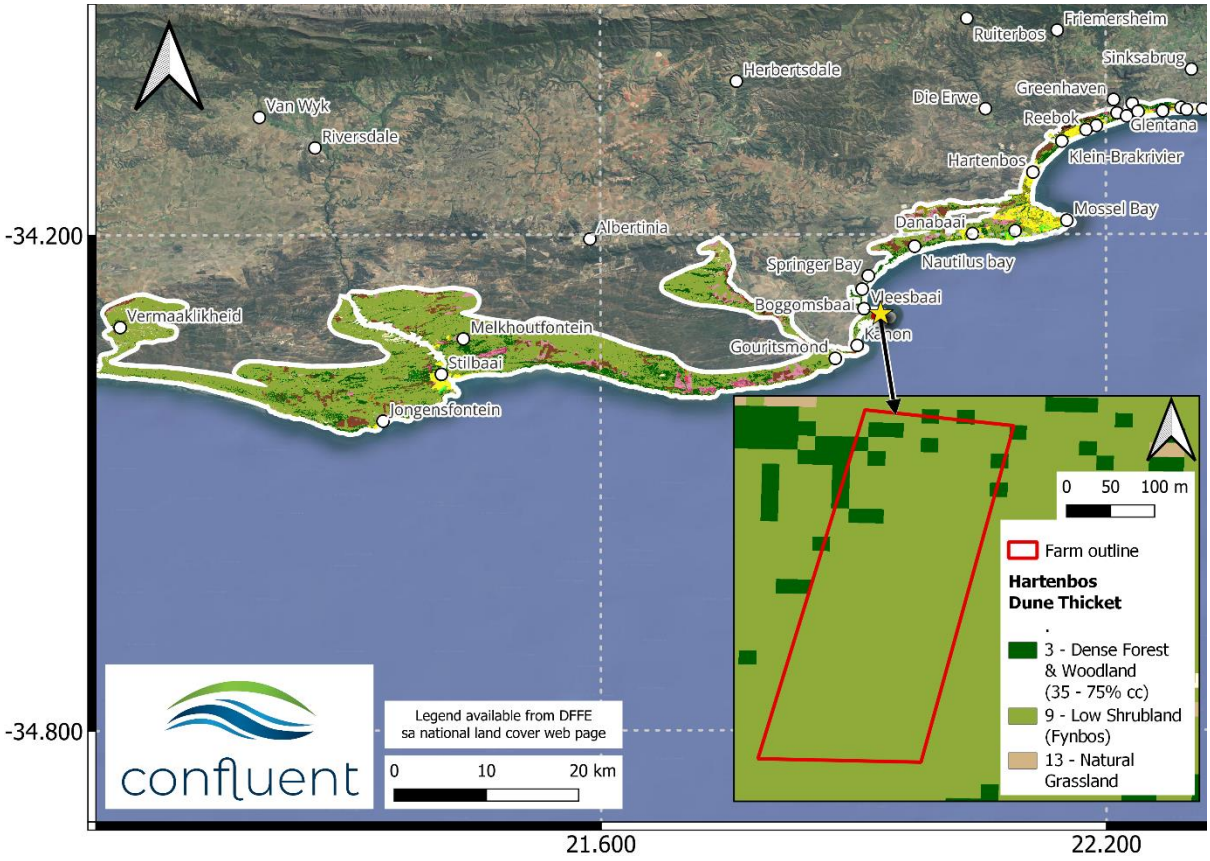


Figure 6: The 2020 land-use-land-cover (LULC) categories mapped for the full extent of Hartenbos Dune Thicket, with the proposed development site as an inset map. The legend provided is only for the inset map. The emaining legend is available here: South African National Land-Cover (SANLC)

4.1.4 Western Cape Biodiversity Spatial Plan

The Biodiversity Spatial Plan for the Western Cape (WC BSP) contains several conservation planning layers that are used to set priority areas for conserving biodiversity. The definition and objectives of the WC BSP layer mapped on Portion 30 / 275 is given in BOX 1. Appendix 12.2 illustrates the recommended land-uses associated with the various BSP layers. The entire Portion 30 / 275 is mapped as a terrestrial and CBA 1 (i.e., natural Critical Biodiversity Area; Fig. 7) with small sections of CBA2 are also mapped. The reasons for its assignment of the BSP layers in this area are listed below (grey reasons either do not apply to the site, or are outside of the scope of this study to comment on):

- **Endangered (EN) Hartenbos Dune Thicket**. Portion 30 / 275 is Hartenbos Dune Thicket according to the vegetation map of South Africa (Dayaram et al., 2019; Mucina & Rutherford, 2006; NEM:BA Act, 2022).
- **Coastal habitat types, including Cape Seashore Vegetation (LT)**. The development is mapped as part of coastal vegetation, and this is somewhat true. The vegetation is coastal, but it does not represent seashore vegetation.
- **Coastal Resource Protection - Eden.** This area was included as part of the Coastal Management Lines for the Eden district. Mr Vernon Gibbs-Halls, Eden's Environmental Control Coordinator has stated that the "*Delineation of coastal set-back lines must be undertaken in accordance with the National Environmental Management: Integrated Coastal Management Act (Act No. 24 of 2008) (ICM Act), the National Environmental Management Act (Act No. 107 of 1998) (NEMA), Environmental Impact Assessment*

(EIA) Regulations, 2010, as well as the Western Cape Provincial Spatial Development Framework (PSDF). Coastal set-backs are proposed as a means to facilitate improved planning and management of sensitive and often vulnerable coastal areas."

- **Canca Limestone Fynbos (LT)**. This vegetation type is mapped nearby but does not represent the vegetation on Portion 30 of 275.
- The area is mapped as being part of the **Bontebok extended distribution range**. This trigger falls outside of the scope of this study, as the author is not a mammal specialist.

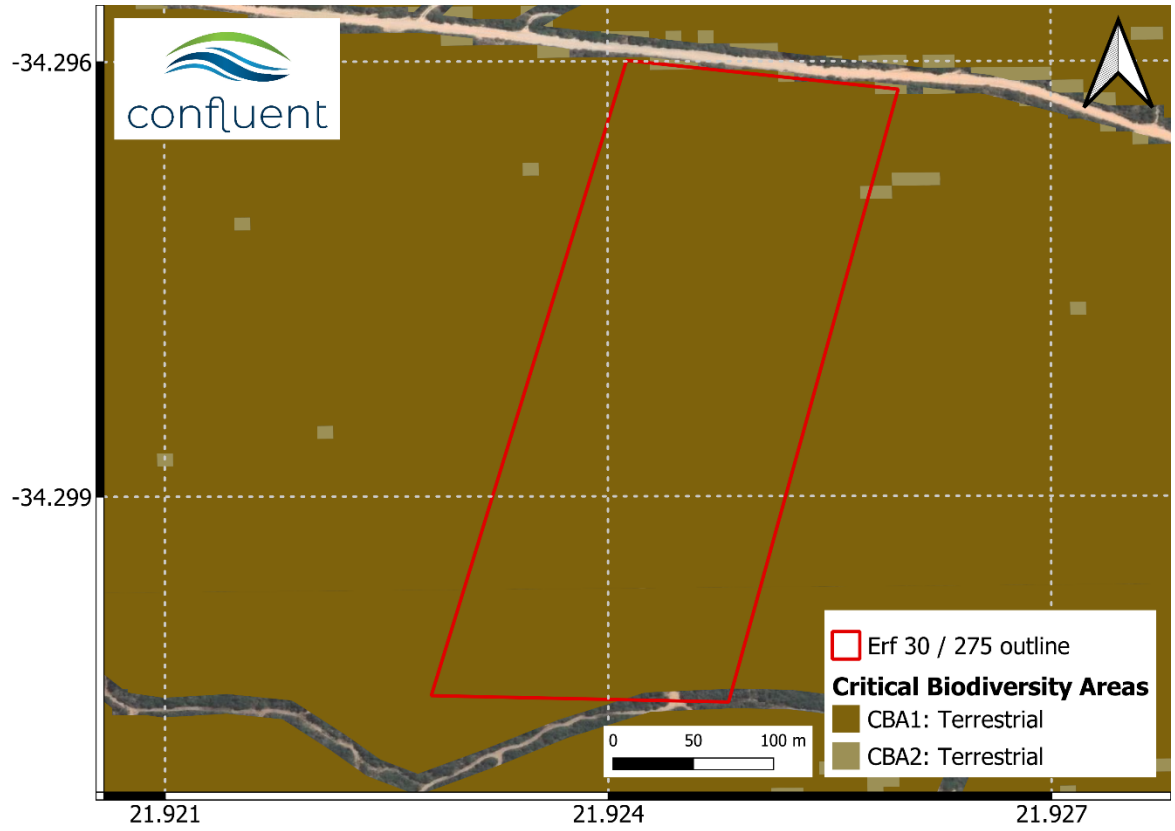


Figure 7: The mapped Western Cape Biodiversity Spatial Plan (WC BSP) categories that have been mapped for Portion 30 of 275 and surrounding landscape.

BOX 1: The Biodiversity Spatial Plan

Critical Biodiversity Area 1

Definition: Areas in a natural condition. Required to meet biodiversity targets for species, ecosystems or ecological processes and infrastructure.

Objective: Maintain in a natural or near-natural state, with no further loss of habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.

Critical Biodiversity Area 2

Definition: Areas in a degraded or secondary condition. Required to meet biodiversity targets for species, ecosystems or ecological processes and infrastructure.

Objective: Maintain in a functional, natural, or near-natural state, with no further loss of habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.

4.1.5 FEPA sub-catchment

National Freshwater Ecosystem Priority Areas (NFEPAs) represent freshwater ecosystems that are required to meet the national biodiversity goals of freshwater ecosystems for South Africa. The proposed development on Portion 30 / 275 does not fall within a freshwater ecosystem, nor will it impact one.

4.1.6 Historical Aerial Imagery

High resolution historical imagery (Fig. 8) can be sourced upon request from the CD: NGI Geospatial portal, or from their offices in Mowbray, Cape Town. Google Earth is also a repository of more recent historical images (after 2000). The imagery reveals that the portion has remained in a near-natural condition since at least the early 1960s. In the 1960s a large sand dune is visible north-west of the farm portion, and this dune then becomes stabilised as vegetation took over by the 1990s. In the early 2000s the area previously occupied by the dunes started to be developed. By 2017 roads and houses had been erected on this area. However, the property has not lacked vegetation at any point between the present day and the earliest available imagery from 1964. The existing buildings east of the farm portion are visible in 2017, and have been built rather recently.

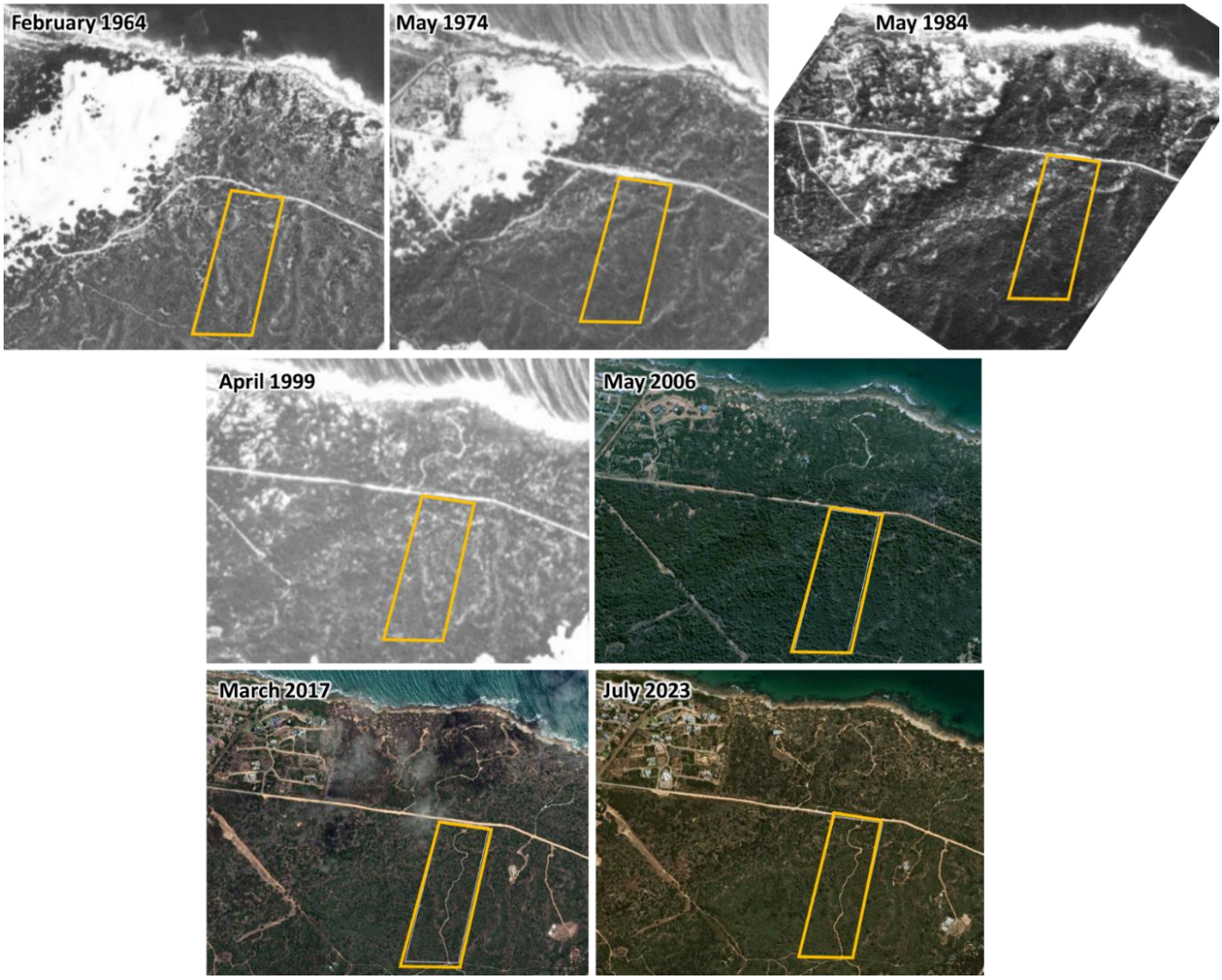


Figure 8: A series of historical imagery sourced from the CD: NGI geospatial portal (top row) and Google Earth (bottom row). The white polygons highlight the position of Portion 30 / 275.

4.2 Plant Species

The plant species theme sensitivity of Medium is dependent on the presence, or likely presence, of several plant species of conservation concern (SCC). The Red List categories of the species listed in this section is discussed later in this report.

4.2.1 Species of conservation concern (SCC) listed in the screening tool

Several SCC have the potential to occur on the site. The SCC listed in the screening tool report are:

- *Agathosma eriantha*
- *A. muirii*
- *A. riversdalensis*
- *Argyrolobium harmsianum*
- *Aspalathus arenaria*
- *A. obtusifolia*
- *A. odontoloba*
- *Athanasia cochlearifolia*
- *Drosanthemum lavisii*
- *Duvalia immaculata*
- *Erica viscosissima*
- *Euchaetis albertiana*
- *Hermannia lavandulifolia*
- *Lampranthus ceriseus*
- *L. diutinus*
- *L. fergusoniae*
- *L. foliosus*
- *L. pauciflorus*
- *Lebeckia gracilis*
- *Leucadendron galpinii*
- *Leucospermum praecox*
- *Metalasia luteola*
- *Polygala pubiflora*
- *Ruschia leptocalyx*
- *Selago glandulosa*
- *S. villicaulis*
- Sensitive species 153
- Sensitive species 268
- Sensitive species 500
- Sensitive species 654
- Sensitive species 800
- *Thamnochortus muirii*
- *Wahlenbergia polyantha*

On POSA no nearby SCC are recorded. SCC that have been observed nearby on iNaturalist are:

- *Cephalophyllum diversiphyllum*
- *Jamesbrittennia calciphilla*
- *Lotononis acocksii*
- *Selago ramosissima*

5. RESULTS: FIELD ASSESSMENT

5.1 Refined vegetation map

The revised vegetation map, as made after the site assessment had been completed, is illustrated in Fig. 9. The vegetation across the Misgunst farm portion was very similar and should be mapped as a single strandveld thicket – fynbos mosaic. The existing platform (Fig. 9 A) provided a good vantage point from which to take photos of the site (Fig. 9 B & C). There is some evidence of rooikrans (*Acacia cyclops*) clearing on the site (Fig. 9 D), and the existing sandy road is well defined and maintained (Fig 9 E). The proposed driveway as well as the main dwelling is most prone to impacting numerous protected milkwood trees (*Sideroxylon inerme inerme*; protected tree number 579) on the site (Fig. 9 F, G, & H). The owners will need to obtain the relevant forestry licence for trimming or removal of any material part of these protected trees.

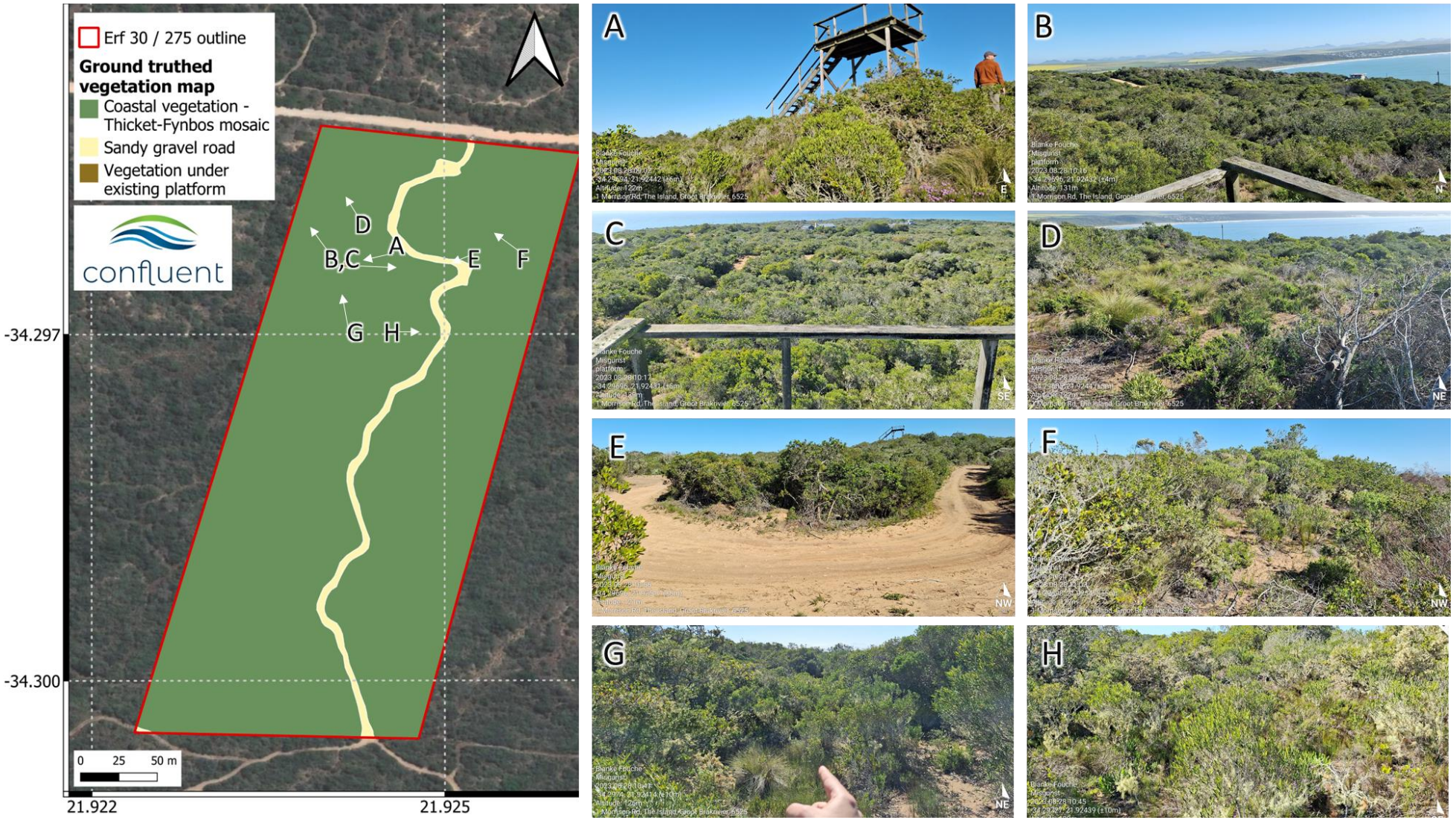


Figure 9: A revised vegetation map for the entire Portion 30 / 275, including a selection of photos that were taken on the site.

5.2 Invasive plants and plant species of conservation concern

One threatened plant species on the South African Red List was observed during the site assessment, however, it was not found within the proposed development footprint. This SCC is *Agathosma muirii*, (the heart buchu which has a vulnerable status). Wherever this Red Listed SCC was observed a 20m no-go buffer was applied (Fig. 10). LC milkwood trees (*Sideroxylon inerme inerme*) were observed throughout the entire property. Fig 10 is an attempt to illustrate the trees that were observed in the northern half of the property. Photos of these trees and the SCC on the site are in Fig. 11. If it is anticipated that the development may require trimming or removal of protected milkwood trees, then the appropriate forestry licence must be applied for. Several large rooikrans (*Acacia cyclops*; Fig. 12) bushes were observed on Misgunst, some of which were very large. CapeNature is actively clearing rooikrans in this area, but the invasion remains serious and in need of attention on this property in order to preserve its biodiversity. Another exotic species, the white sweetclover (*Melilotus albus*; Fig 12) was also observed in some places on the site. A description of the relevant NEMBA invasive species categories is provided in BOX 2.

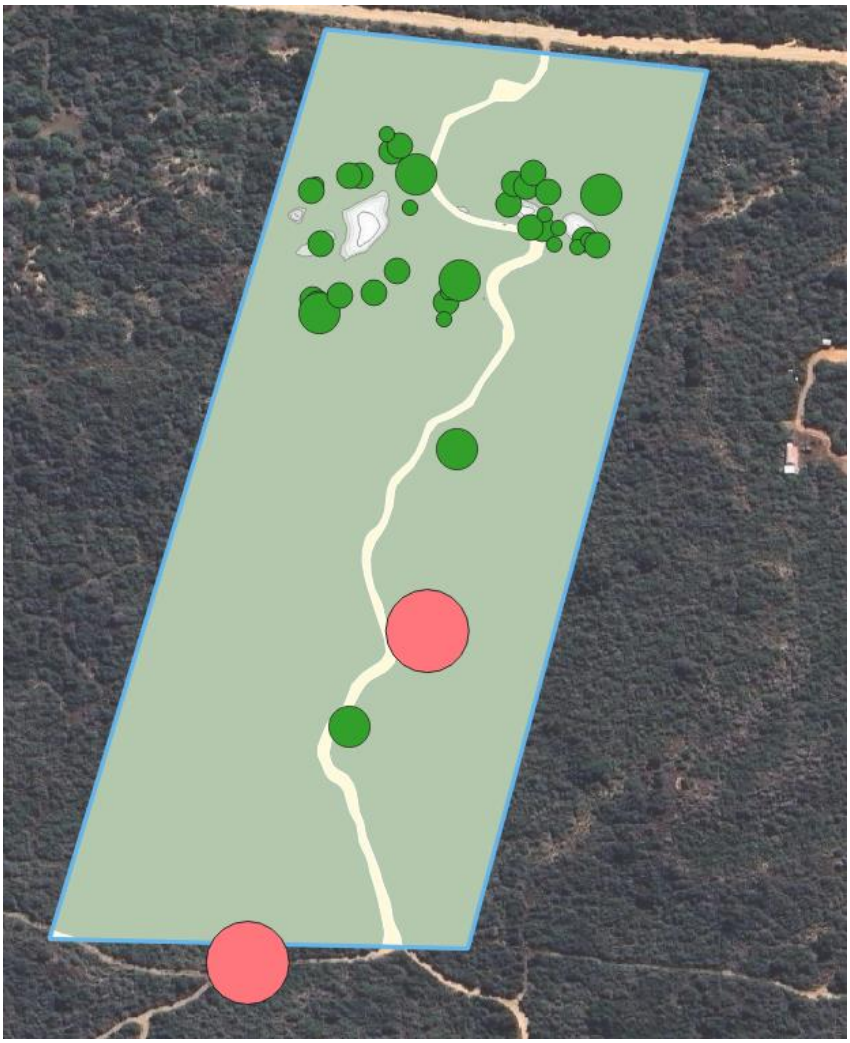


Figure 10: The vegetation on the site is composed of Hartenbos Dune Thicket and the Sandy Gravel Road (north to south). Milkwood trees surveyed are green circles, and 20m buffers around observed *Agathosma muirii* is indicated in pink.

Figure 11: Photos of Milkwood trees (*Sideroxylon inerme inerme*) and heart buchu (*Agathosma muirii*) that was observed during the site assessment.

Figure 12: Photo of the invasive *Acacia cyclops* (NEMBA category 1b) on the left and the exotic *Melilotus albus* on the right.

BOX 2: Most common NEMBA categories for listed invasive alien plants

Category 1b

- Species which must be controlled.
- Property owners and organs of state must control the listed invasive species within their properties.
- If an Invasive Species Management Programme has been developed, a person must control the listed invasive species in accordance with such programme.
- Authorised officials must be permitted to enter properties to monitor, assist with or implement the control of listed species.
- Any Category 2 listed species (where permits are applicable) which fall outside of containment and control, revert to Category 1b and must be controlled.
- Any Category 3 listed species which occur within a Protected Area or Riparian (wetland) revert to Category 1b and must be controlled.
- The Minister may require any person to develop a Category 1b Control Plan for one or more Category 1b species occurring on a property.
- A person in control of a Category 2 listed species must take all necessary measures to ensure that specimens of the species do not spread outside of the land or area, such as an aviary) specified in the permit.

5.3 Additional SCC that may be found

All SCC that may be present on the site have been identified using the screening tool report for the site, iNaturalist nearby observations, and the POSA database (Table 2). The probability of occurrence is reported as medium where the site meets the habitat requirements of a species, and recent observations have been made nearby. It is always possible that a species assessed as having a low probability of occurrence (meaning the habitat seems unsuitable for the species to occur there) can still occur on the site, and therefore the list of species in Table 2 below must only be used as a guideline only.

Table 2: Plant SCC probability of occurrence on Portion 30 / 275.

Species	Common name	Family	Growth form	Source	SANBI Red List status	Probability of occurrence
A. muirii	Heart buchu	Rutaceae	Shrub	Screening Tool	Vulnerable A4abc	Confirmed Found on the farm, but not within the proposed disturbance areas
Hermannia lavandulifolia	Lavender dollrose	Malvaceae	Herbaceous perennial	Screening Tool	Vulnerable A2c	Very High This is a common and widespread species.
Lebeckia gracilis	Slender ganna	Fabaceae	Shrub	Screening Tool	Endangered A2bc; B1ab(ii,iii,iv,v)	Very High This species has been recorded nearby and is widespread.
Sensitive species 654		Orchidaceae	Geophyte	Screening Tool	Vulnerable C2a(i)	Very High This species has been recorded nearby and is widespread.
Cephalophyllum diversiphyllum	Variable starfig	Aizoaceae	Succulent	iNaturalist	Near Threatened B1ab(ii,iii,iv,v)	Very High This species has been observed nearby.
Erica viscosissima	Heath species	Ericaceae	Shrub	Screening Tool	Vulnerable B1ab(ii,iii,v)+2ab(ii,iii,v)	Very High This species has been observed nearby.
Jamesbrittennia calciphila	Lime jaybee	Scrophulariaceae	Herbaceous perennial	iNaturalist	Near Threatened B1ab(iii)	Very High This species has been observed nearby.
Selago ramosissima	Bitterbush species	Scrophulariaceae	Herbaceous perennial	iNaturalist	Endangered B1ab(iii)	Very High This species has been observed nearby.
Agathosma eriantha	Ridged buchu	Rutaceae	Shrub	Screening Tool	Vulnerable B1ab(ii,iii,iv,v)	High Following the precautionary approach, this species has a high likelihood of being on the site
Argyrolobium harmsianum	Limestone silverpod	Fabaceae	Herbaceous perennial	Screening Tool	Endangered B1ab(ii,iii)	High Following the precautionary approach, this species has a high likelihood of being on the site
Aspalathus arenaria	Sand capegorse	Fabaceae	Herbaceous perennial	Screening Tool	Vulnerable B1ab(ii,iii,iv,v)	High Following the precautionary approach, this species has a high likelihood of being on the site
A. obtusifolia	Capeforse species	Fabaceae	Herbaceous perennial	Screening Tool	Vulnerable B1ab(ii,iii,v)+2ab(ii,iii,v)	High Following the precautionary approach, this species has a high likelihood of being on the site
A. odontoloba	Capegorse species	Fabaceae	Herbaceous perennial	Screening Tool	Endangered B1ab(iii)+2ab(iii)	High Following the precautionary approach, this species has a high likelihood of being on the site
Drosanthemum lavisii	Scarlet dewfig	Aizoaceae	Succulent	Screening Tool	Endangered B1ab(ii,iii,iv,v); C2a(i)	High Following the precautionary approach, this species has a high likelihood of being on the site

Species	Common name	Family	Growth form	Source	SANBI Red List status	Probability of occurrence
Duvalia immaculata	Succulent	Apocynaceae	Succulent	Screening Tool	Endangered B1ab(ii,iii,iv,v)	High Following the precautionary approach, this species has a high likelihood of being on the site
Euchaetis albertiana	Albertina mothflower	Rutaceae	Shrub	Screening Tool	Endangered A2c	High Following the precautionary approach, this species has a high likelihood of being on the site
Lampranthus ceriseus	Cerise brightfig	Aizoaceae	Succulent	Screening Tool	Vulnerable B1ab(ii,iii,iv,v)	High Following the precautionary approach, this species has a high likelihood of being on the site
L. diutinus	Brightfig species	Aizoaceae	Succulent	Screening Tool	Endangered B1ab(ii,iii,iv,v)	High Following the precautionary approach, this species has a high likelihood of being on the site
L. fergusoniae	Limestone brightfig	Aizoaceae	Succulent	Screening Tool	Rare	High Following the precautionary approach, this species has a high likelihood of being on the site
L. pauciflorus	Beach brightfig	Aizoaceae	Succulent	Screening Tool	Endangered B1ab(ii,iii,iv,v)	High Following the precautionary approach, this species has a high likelihood of being on the site
Leucadendron galpinii	Hairless conebush	Proteaceae	Shrub	Screening Tool	Vulnerable A4c	High Following the precautionary approach, this species has a high likelihood of being on the site
Leucospermum praecox	Mossel Bay pincushion	Proteaceae	Shrub	Screening Tool	Vulnerable A2c+3c+4c	High Following the precautionary approach, this species has a high likelihood of being on the site
Metalasia luteola	Yellow blombush	Asteraceae	Shrub	Screening Tool	Vulnerable B1ab(iii,v)+2ab(iii,v)	High Following the precautionary approach, this species has a high likelihood of being on the site
Polygala pubiflora	Hairyflower falsepea	Polygalaceae	Herbaceous perennial	Screening Tool	Vulnerable B1ab(ii,iii,iv)+2ab(ii,iii,iv)	High Following the precautionary approach, this species has a high likelihood of being on the site
Ruschia leptocalyx	Tentfigs	Aizoaceae	Succulent	Screening Tool	Endangered B1ab(ii,iii,iv,v)	High Following the precautionary approach, this species has a high likelihood of being on the site
Selago glandulosa	Bitterbushes	Scrophulariaceae	Herbaceous perennial	Screening Tool	Vulnerable B1ab(ii,iii,iv,v)	High Following the precautionary approach, this species has a high likelihood of being on the site
S. villicaulis	Dune bitterbush	Scrophulariaceae	Herbaceous perennial	Screening Tool	Vulnerable B1ab(ii,iii,iv,v)	High Following the precautionary approach, this species has a high likelihood of being on the site

Species	Common name	Family	Growth form	Source	SANBI Red List status	Probability of occurrence
Sensitive species 153		Ruscaceae	Geophyte	Screening Tool	Endangered B1ab(ii,iii,v)+2ab(ii,iii,v)	High Following the precautionary approach, this species has a high likelihood of being on the site
Sensitive species 268		Asphodelaceae	Succulent	Screening Tool	Endangered B1ab(iii,iv,v)	High Following the precautionary approach, this species has a high likelihood of being on the site
Sensitive species 500		Orchidaceae	Geophyte	Screening Tool	Endangered C2a(i)	High Following the precautionary approach, this species has a high likelihood of being on the site
Sensitive species 800		Iridaceae	Geophyte	Screening Tool	Vulnerable B1ab(iii)	High Following the precautionary approach, this species has a high likelihood of being on the site
Thamnochortus muirii	Thatching reeds	Restionaceae	Graminoid	Screening Tool	Vulnerable B1ab(i,ii,iii,iv,v)	High Following the precautionary approach, this species has a high likelihood of being on the site
Wahlenbergia polyantha	Capebells	Campanulaceae	Herbaceous perennial	Screening Tool	Vulnerable B1ab(ii,iii,iv,v)	High Following the precautionary approach, this species has a high likelihood of being on the site
A. riversdalensis	Buchu species	Rutaceae	Shrub	Screening Tool	Vulnerable B1ab(ii,iii,iv,v)	Medium Found along arid transitions between limestone and sand plain fynbos.
L. foliosus	Brightfig species	Aizoaceae	Succulent	Screening Tool	Endangered B1ab(ii,iii,iv,v)	Medium It is conceivable that this species might be present on the site.
Athanasia cochlearifolia	Kanniedood species	Asteraceae	Shrub	Screening Tool	Endangered B1ab(ii,iii,v)	Low Associated with limestone outcrops, mostly in renosterveld.
Lotononis acocksii	Lotononis species	Fabaceae	Herbaceous perennial	iNaturalist	Endangered B1ab(iii,v)	Low This species occurs further inland in mountainous areas.

6. SITE SENSITIVITY VERIFICATION

6.1 Terrestrial Biodiversity

The sensitivity of the terrestrial biodiversity theme for the site is confirmed as **Very High** as some of the sensitivity triggers highlighted in the screening tool report were present on the site (i.e., the site forms part of a terrestrial CBA 1 and .

Reasons that still apply for a High terrestrial biodiversity sensitivity

- The entire Farm portion is mapped as a terrestrial CBA 1 (with small patches mapped as CBA 2). Despite this, the property is privately owned and can only be considered as a conservation area if the land is acquired, and the current owners compensated for this. However, the property is ca. 8.6 ha. This means that just over 90% of the property will remain in a natural state (where the existing road also counts towards transformed areas on the site, not just the 2.3% affected by this proposed dwelling). Continued Rooikrans (*Acacia cyclops*) clearing is required. The development will have a minimal to negligible effect on the objectives and goals of a terrestrial CBA as the majority 8.66 ha will remain natural.

- The site is mapped as part of endangered (EN) Hartenbos Dune Thicket, and the site assessment confirms the presence of this coastal vegetation type across the entire property.

Reasons that do not apply to Portion 30 / 275.

- The proposed development of the dwelling and their associated driveways will not affect FEPAs.

6.2 Botanical diversity

The site sensitivity in terms of the terrestrial plant species theme is confirmed as **Low within the proposed development footprint**, and **High within a 20m buffer where Red Listed SCC, like *Agathosma muirii* have been observed**. The proposed development area will likely impact some Milkwood trees and seedlings (*Sideroxylon inerme inerme*). The SCC observed on the Farm portion is *Agathosma muirii*, a sweet smelling buchu species, however no stands of this species or any other Red Listed SCC were observed within the proposed development footprint – this may change with longer-term sampling and monitoring. Should protected Milkwood trees will be affected during construction or for dwelling maintenance during the operational phase of the project, the relevant forestry licence must be applied for. The removal of invasive alien plant species is also a requirement by law and must be continued on the property, as the eradication of rooikrans (*Acacia cyclops*) is a long term-commitment.

7. SITE ECOLOGICAL IMPORTANCE

The site ecological importance (SEI) assessment is a function of biodiversity importance (BI) and receptor resilience (RR), which is defined as:

> *"The intrinsic capacity of the receptor (i.e., habitat type in question) to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention."*

The function is as follows: SEI = BI + RR. BI is a function of conservation importance (CI) and habitat functional integrity (FI), so that BI = CI + FI. The definition of CI given by the Species Environmental Assessment Guideline of 2022 is:

"The importance of a site for supporting biodiversity features of conservation concern present, e.g., populations of IUCN threatened and Near Threatened species (CR, EN, VU and NT), Rare species, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes."

Most features included in CI are provided by the screening tool but needs to be evaluated at a finer scale from the field work assessment. FI is defined as:

"A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts."

The criteria for defining RR, CI and FI are provided in the Species Environmental Assessment Guidelines of 2022. BI can be derived from a simple matrix of CI and FI, as illustrated in Table 3 below.

Table 3: The matrix that defines the biodiversity importance (BI) of a given habitat type, as identified from a desktop and field assessment.

Biodiversity Importance		**Conservation Importance**				
		Very High	High	Medium	Low	Very Low
Functional Integrity	Very High	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

SEI can then be derived from a second matrix, as depicted in Table 4. SEI is specific to the proposed development and can therefore only be compared between alternative layouts for the same proposed development, but not between developments.

Table 4: The matrix that defines the site ecological importance (SEI) of a given habitat type, as identified from a desktop and field assessment.

Site Ecological Importance		**Biodiversity Importance**				
		Very High	High	Medium	Low	Very Low
Receptor Resilience	Very High	Very High	Very High	High	Medium	Low
	High	Very High	Very High	High	Medium	Very Low
	Medium	Very High	High	Medium	Low	Very Low
	Low	High	Medium	Low	Very Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

The site ecological importance map (Fig. 13) is intended to provide a more refined overview of the sensitivity of the various habitats that have been identified on the site. The benchmark for "fully natural" vegetation is defined according to the Vegetation Assets, States, and Transitions (VAST) framework, which considers natural vegetation to be the state pre-European conditions (i.e., period prior to the 1700s or 1600s). The habitats and ecosystems of the property are therefore defined according to the VAST framework, which acts as an aid for the SEI calculation, especially in determining the appropriate RR to assign. The VAST framework categories are summarised in Appendix 12.3 below, and is an aid for the SEI calculation as it helps to (Thackway & Lesslie, 2006):

- Describe and accounts for changes in the condition and status of vegetation.

- Make explicit links between land management (current) and vegetation modification.
- Provide a mechanism for describing the consequences of certain land management on vegetation.
- Contribute to the analysis of terrestrial ecosystem services that are provided by vegetation, including comparison between various land-use

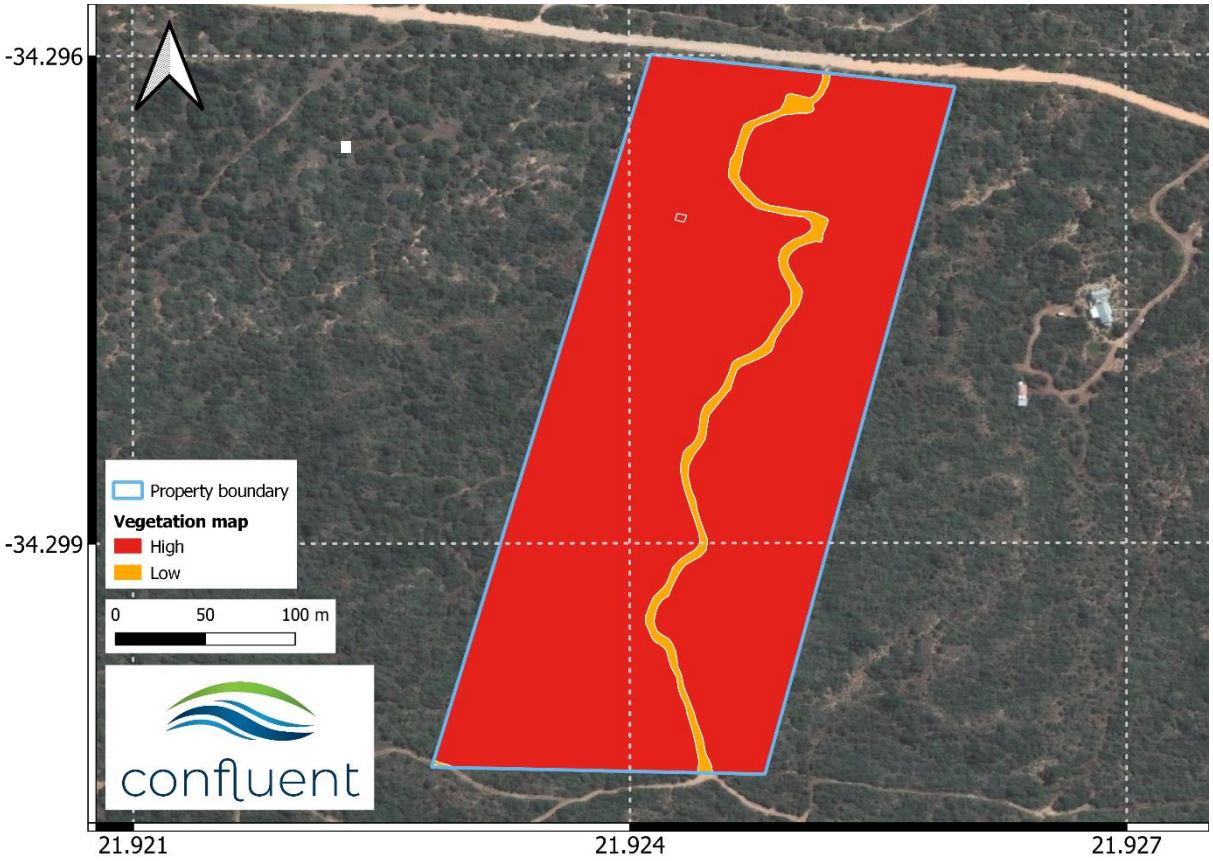


Figure 13: The SEI map for the proposed development of a dwelling on Portion 30 of 275.

The majority of Portion 30 of 215 has a High SEI (Fig. 13 above), and the reasoning behind this is provided in Table 5 and 6. Table 5 contains the recommendations made by the species guideline for each of the SEI categories calculated in Table 6.

Table 5: The mitigation guidelines for interpreting the various SEI categories for the proposed development activities.

Site Ecological Importance	Recommendation for activities based on the mitigation hierarchy
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.

Table 6: The evaluation of the SEI for the vegetation / habitats present within and surrounding the proposed development.

Vegetation	Conservation Importance (CI)	Functional Integrity (FI)	Receptor Resilience (RR)	Site Ecological Importance (SEI)
Coastal vegetation – Thicket-Fynbos mosaic	**High** Confirmed habitat for a VU species listed under criterion A (*Agathosma muirii*), and several other SCC that have a high likelihood of occurrence. Small area of an EN habitat type.	**High** Good habitat connectivity, without fences between neighbouring properties, and minor current ecological impacts (mostly from rooikrans invasion, however invasions in this area is actively managed by CapeNature).	**Medium** VAST Class I: Residual, with the main threat being rooikrans invasion. The habitat recovers slowly from disturbance, and invasives have a moderate likelihood to remain on the site even with effort to control invasive plants.	**High** BI: High RR: Medium
Sandy gravel road	**Low** The sandy road is maintained as a surface clear of vegetation, therefore no natural habitat remains.	**Medium** This is a road, but dispersal and migration is possible across it.	**Medium** VAST Class VI: Removed.	**Low** BI: Low RR: Medium
Vegetation under existing platform	**High** Several other SCC that have a high likelihood of occurrence. Small area of an EN habitat type.	**High** The vegetation growing under the platform is the same as the rest of the surrounding mosaic vegetation and has the same good connectivity.	**Medium** VAST Class I: Residual, with the main threat being rooikrans invasion.	**High** BI: High RR: Medium

8. PROJECT AREA OF INFLUENCE

The project area of influence (PAOI) is already illustrated in Fig. 10 earlier in this report. The PAOI is defined according to ecosystem services and processes that are likely to be affected by the proposed development. The PAOI calculation is first calculated by the Environmental Assessment Practitioner (EAP), and then independently also worked out by the specialists that have been appointed. Specialist defined PAOIs are then consolidated by the EAP after these first two steps in the process of identifying its area. In this case, the PAOI for the preferred and non-preferred layouts are accurately represented in the SDPs presented in the beginning of this report.

9. IMPACT ASSESSMENT

The impact assessment is required due to the high sensitivity and SEI that was calculated for both the Terrestrial Biodiversity, and Plant Species Themes assessed in this report. For any impact assessment, the mitigation hierarchy is important (Brownlie et al., 2023; Ekstrom et al., 2015). If mitigation measures are likely to be ineffective at minimising large impacts, then avoidance mitigation must be implemented (Fig. 14). If an impact cannot be prevented, then minimisation is preferred. The methods used for this impact assessment is provided in Appendix 12.4.

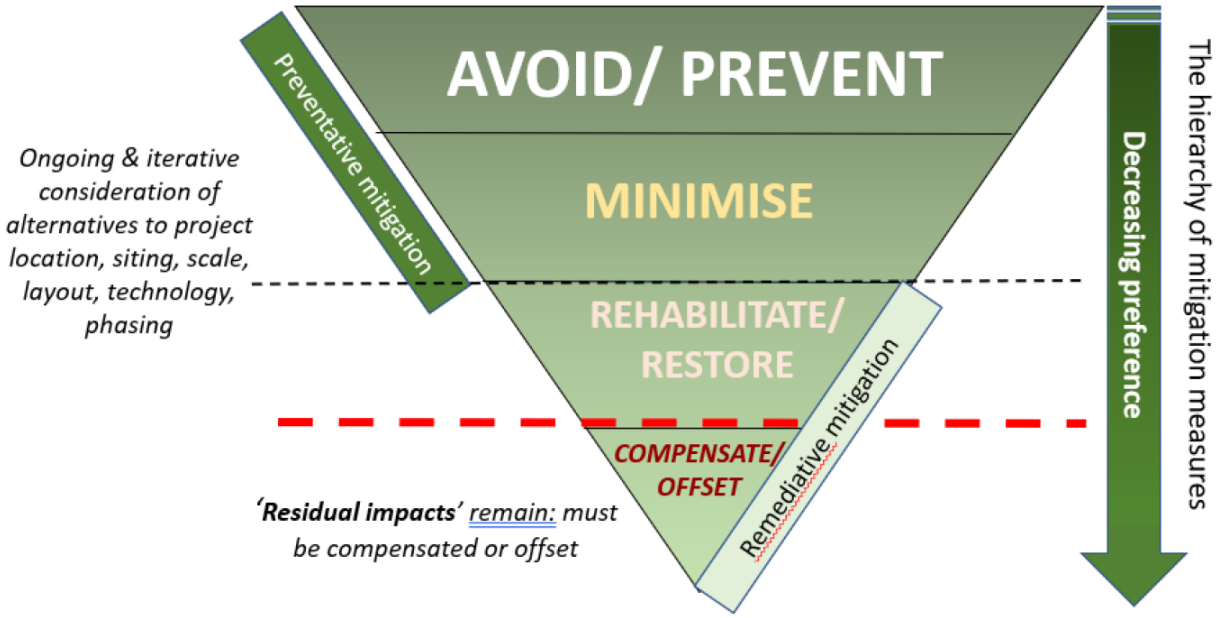


Figure 14: The mitigation hierarchy as presented in (Brownlie et al., 2023). Mitigation steps are illustrated in a hierarchy. The lower steps in the diagram should only be considered once the steps above have been duly considered.

9.1 Current Impacts

A summary of some of the negative impacts on the site are:

- The site is invaded by large Rooikrans (*Acacia cyclops*) shrubs, which require attention to preserve biodiversity and habitat resilience. Despite active clearing efforts by CapeNature, the invasion remains a concern.

- Alien and invasive plant clearing efforts have led to the accumulation of slash material in some places, and may affect the habitat quality in which protected trees and SCC can occur.
- The existing dirt road on the property requires maintenance and can be a source of invasive species that create negative edge effects in this Red Listed vegetation type.
- The existing platform on the property, however this structure has a minimal negative impact on the site.

9.1 Layout and Design Phase

This is an important part of any project and relates to the very first step in the mitigation hierarchy – consideration for impact avoidance. In this case, the Owners of Portion 30 of 275 have tried to avoid impacting the existing Milkwood trees on their site. It is however still likely that some trees will be impacted, and this must be accounted for by obtaining a relevant forestry licence.

- The preferred development option is related to the first SDP, which involved a single dwelling, access road, and services.
    - Solar panels should be installed on the roof of the dwelling if possible
    - Extra solar panels on the ground will increase the disturbance and cause an increase in the impact on the site. The scenario with solar panels on the ground is considered part of the impact assessment before mitigation.
- The non-preferred option is building two dwellings
- The third option is the no-go scenario.

9.3 Construction Phase

Construction will include several activities that relate to the specific themes assessed in this report. The construction phase is the most intense phase of the proposed development and will result in a permanent loss of habitat and vegetation on the site, including SCC. The impacts presented in this section are shown from the most significant to least significant in terms of the Terrestrial Biodiversity and Plant Species Themes assessed. An Environmental Control Officer (ECO) needs to be appointed to oversee and ensure compliance with management plans and mitigation measures throughout the construction phase.

9.3.1 Construction Impact 1 – Permanent Loss of Terrestrial Biodiversity

Description: The permanent loss of Hartenbos Dune Thicket (EN) as a result of earthworks and other construction related activities for the proposed development.

Mitigation:

1. Prior to construction: The disturbance footprint of proposed developments should be clearly defined and demarcated to prevent unnecessary damage to the surrounding environment.
    a. The proposed development must have a maximum disturbance envelope of 2m around the proposed development (this is the PAOI presented in this report).
    b. Construction netting and fencing must be used to clearly indicate construction areas. Shade cloth used as fencing should be hammered into the ground using wooden pegs.
    c. Clear signs for “no-go” areas for vehicles and personnel should be placed strategically on the site. No-go areas are anywhere outside of the direct area of influence of the construction phase.
    d. A turning and parking area for construction and delivery vehicles may only take place in areas that are already cleared or part of the permanent disturbance footprint of the development plan
2. Prior to construction: With the aid of a suitably qualified ECO with botanical knowledge, install protective barriers around protected tree stands (Milkwood, *Sideroxylon inerme inerme*) and other significant stands of SCC to prevent damage from construction activities
3. Prior to construction: Schedule vegetation clearance during the winter in order to minimize impact on plant life cycles & pollination.
4. During construction: Protection and re-use of topsoil.
    a. The topsoil will be vital for the success of rehabilitation of fynbos-thicket vegetation following construction processes and must therefore be treated with care.
    b. Topsoil from fynbos-thicket vegetation on the site (excluding topsoil under dense stands of invasive plants) in new excavation areas must be stripped to a depth of ca. 30cm and kept in designated piles.
    c. Topsoil piles must be suitably covered and bunded (e.g., with sandbags). This will prevent the material from washing away and contaminating the substrate of the site which likely still contains useful seeds and soil organisms.
    d. If the SDP of a proposed development does not have enough space for the storage and protection of topsoil within the disturbance envelope, then the Contractor must identify an non-preferred temporary stockpile area that is already transformed and where it can easily be retrieved for post-construction rehabilitation.

a. The topsoil piles must be clearly labelled so that it does not mix with subsoils excavated or any other construction material for the site

5. During construction: New roads need to be either dirt roads or must be made using the same / similar permeable surfaces illustrated in Fig. 15.

Figure 15: An image of the road & minimal edge effect on a different property near the coast.

Discussion of the Alternatives: The impact assessment of Table 7 indicates that it is inevitable that some habitat will be lost on the site. Both the preferred and alternative options will have Minor residual impacts (i.e., the impact after mitigation has been applied).

Table 7: Construction Impact 1 – Permanent Loss of Terrestrial Biodiversity.

Construction Impact 1	Preferred: One Dwelling		Non-preferred: Two dwellings		No-go
Mitigation	Without	With	Without	With	Without
Duration	Permanent	Permanent	Permanent	Permanent	Immediate
Extent	Very limited	Very limited	Limited	Very limited	Very limited
Intensity	Moderate	Negligible	High	Very low	Negligible
Probability	Certain	Certain	Certain	Certain	Certain
SCORE	Moderate negative: -84	Minor negative: -63	Moderate negative: -98	Minor negative: -70	Negligible negative: -21
Comfidence	High	High	High	High	High
Reversibility	Low	Low	Low	Low	Low
Resource irreplaceability	Moderate	Moderate	Moderate	Moderate	Moderate

9.3.2 Construction Impact 2 – Permanent Loss of Populations of Important Plant Species

Description: The permanent loss of SCC and other important and protected plant species of the property as a result of earthworks and other construction related activities for the proposed development.

Mitigation:

1. Prior to construction: A plant search and rescue must be conducted for geophytes in the defined PAOI (with a botanist / ecologist on the site to provide guidance on best practice).
    a. Geophyte plants with a high likelihood of survival in the 2m disturbance strip must be rescued, and specific important sections in the permanent disturbance footprint must be identified and added to the rescue operation prior to the commencement construction.
    b. Stands of plants could be removed carefully with an excavator or shovels to preserve as much as possible of the soil around the roots of the plants.
    c. These could then be temporarily planted elsewhere for the duration of the construction phase. The rescued plants must be kept in a nursery that should preferably be set up on the site in an existing disturbed area.
    d. Alternatively, arrangements with a suitable nursery / available receptor site should be made to keep and care for removed plants during the construction phase of the project.
    e. The rescued plants must be planted back with the aid of botanists and / or horticultural specialists within the 2m disturbance footprint around the permanent disturbance footprints. This will promote the regeneration of natural thicket and fynbos abound the developments and reduce the possibility of negative edge effects on the site.
    f. Any additional SCC and plants with a high survival likelihood that are observed during construction within a development footprint must be rescued (soil in-tact) and added to the rescued plants in the indigenous nursery.
2. During construction: Materials used during construction must be sourced and transported responsibly to minimise the risk new invasive plants.
3. During construction: Staff, if suspected may be checked when they leave to ensure no plants have been poached from the natural surrounding environment. Staff should also be told that plants may not be collected outside of the search and rescue operation.
    a. Geophytes are at a large risk of poaching, and this is an important reason why SANBI has a list of sensitive species for plants (i.e., their identities are unknown) in South Africa.
    b. However, some LC and Near Threatened species, especially geophytes, can also be targeted by plant poachers despite not being listed as sensitive species.

4. Post construction: Undertake revegetation of the disturbance envelope outside of the permanent disturbance footprint.
    a. Start with the plants that have been rescued on the site
        i. Site preparation – remove all non-native weeds from the site of revegetation to reduce competition with native plant species.
        ii. Planting - Plant during the cooler, wetter months to reduce transplant shock and ensure moisture availability. This would ideally be during winter (June, July). Space plants according to their natural distribution & spacing, which will be visible in the surrounding remaining natural vegetation on the site. So not add any additional organic matter to the soil, as some fynbos species are sensitive to nutrient stress in a way most typical garden species are not.
        iii. Post planting care - Regularly water & monitor the newly planted thicket and fynbos, particularly during the establishment phase. Apply a thin layer of mulch to conserve moisture and suppress weeds. Continue removing any invasive species that may reappear.
    b. If more plants are required for successful coverage of disturbed areas, augmentation with sourced plants can be done.
        i. Species selection – Choose a mix of pioneer species and slower-growing species to ensure quick coverage and long-term sustainability. Some species that could be considered include: *Helichrysum petiolare, Metalasia muricata, Osteospermum moniliferum, Searsia crenata, Senecio elegans, Tetragonia decumbens, Thamnochortus insignis, Agathosma apiculata, A. capensis, Chironia baccifera, Watsonia pillansii, Chasmanthe aethiopica, Restio leptoclados, Passerina corymbosa*, etc. Make use of the species list provided in this report.
        ii. Adaptive management – Be prepared to adapt strategies based on monitoring results and environmental conditions.

Discussion of the Alternatives: The residual impacts are negligibly negative for all the development options, and the no-go scenario is also a Minor negative impact, assuming gardening, lawns, and fertilisers will be avoided (Table 8). Should the non-preferred option go ahead, the relevant permit from forestry must be obtained for the disturbance of protected Milkwood trees.

Table 8: Construction Impact 2 – Permanent Loss of Populations of Important Plant Species.

Construction Impact 2	Preferred: One Dwelling		Non-preferred: Two dwellings		No-go
Mitigation	Without	With	Without	With	Without
Duration	Long term	Short term	Long term	Short term	Immediate
Extent	Very limited	Very limited	Very limited	Very limited	Very limited
Intensity	Low	Negligible	Moderate	Very low	Negligible
Probability	Certain	Certain	Certain	Certain	Certain
SCORE	Minor negative: -63	Negligible negative: -35	Minor negative: -70	Minor negative -42	Negligible negative -21
Comfidence	High	High	High	High	High
Reversibility	Low	Low	Low	Low	Low
Resource irreplaceability	Moderate	Moderate	Moderate	Moderate	Moderate

9.4 The Conclusion of the Construction Phase

The conclusion of any project is an essential, but often overlooked aspect of projects. This relates primarily to the cleaning up of the site once construction has concluded. This is not a separate impact, but it is important enough to warrant a section in this report. The conclusion of the construction phase is technically still included in the construction phase, but unlike other construction impacts, impacts that could occur here are less predictable.

1. All of the mitigation measures proposed above are only meaningful if construction is properly concluded.
2. Construction sites must be cleared of all waste material, rubble, and debris associated with the construction phase at regular intervals during, and at the conclusion of the construction phase.
3. Revegetation of bare soil following construction is an essential part of concluding the construction phase of the project. Some recommendations for revegetation are included in the second construction phase impact above.
4. Drainage structures must be checked to ensure that there are no blockages or pollution that is blocking the free flow of water over the site; these checks will prevent erosion during and after the construction phase that could have potentially far-reaching implications beyond the direct area of influence for the proposed development.

9.5 Operational Phase

The operational phase of the project refers to the state of the site after the construction phase has been concluded, when the proposed developments are ready for, or are in use.

9.5.1 Operational Phase Impact 1 – Landscaping effects on Habitats and Plant Species

Description: Thicket-fynbos and SCC populations in these habitats negatively affected by inappropriate permanent landscaping & landscape management resulting in water attenuation problems, genetic pollution, and potential long-term biodiversity loss from the cultivation of species that are not indigenous to the vegetation type and surrounding landscape. An increase

in hard surfaces is also problematic, as it causes changes in microclimate and the interaction of water with the substrate adjacent to the built environment.

Mitigation:

1. Protection of biodiversity beyond the permanent disturbance footprint, especially where the habitat is becoming increasingly invaded by Rooikrans.
    a. The rehabilitation of the 2m disturbance footprint with topsoil and plants rescued on the site must occur as soon as possible after the conclusion of construction.
    b. Control of alien & invasive plant species according to a management plan must occur over the long-term on the site. This is a requirement by law.
        i. Contact an invasive unit (such as Stellenbosch University's "Centre for Invasion Biology") if alien clearing efforts are not progressing as desired.
        ii. The infographic below (Fig. 16) is a conceptual framework that was made by the Centre for Invasion Biology (Van Wilgen et al., 2014) which may assist in the level of management required in different areas.

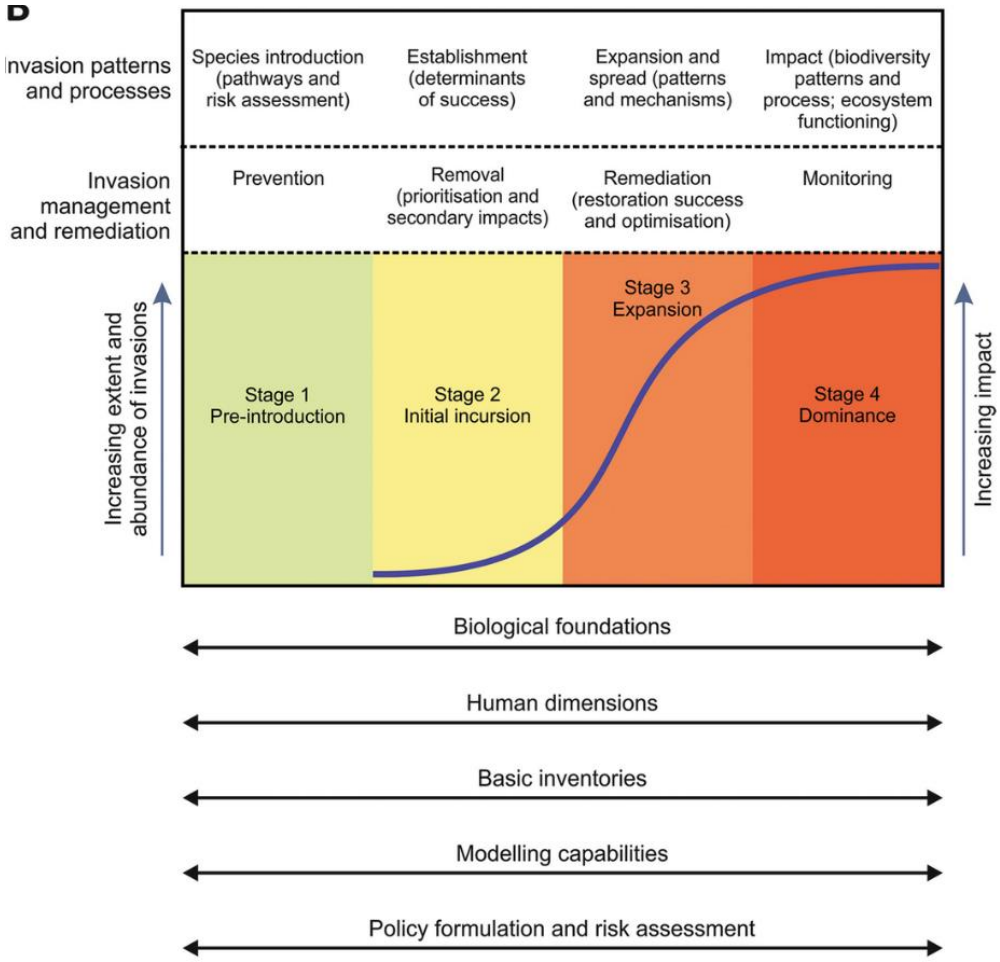


Figure 16: An infographic from the Centre for Invasion Biology showing how invasive alien plants should be managed depending on the degree of invasion severity (Van Wilgen et al., 2014).

2. If gardens need to be considered, they can be designed to be water wise (avoid erosion) and friendly to wildlife and the greater natural habitat. Fynbos Life in Cape Town is an inspirational indigenous landscaping project with very useful tips allowing a garden to add biodiversity value, instead of detract value.
    a. Gardens & the built environment should be planned with rainfall, slope/aspect, wind direction, & microclimates in mind. Gardens could be planned to capture rainfall & slow water loss. Create a grey-water wetland if there is a need for water filtration & absorption of extra nutrients.
    b. No garden waste may be dumped in any remaining natural area and must be disposed of in a responsible manner.
    c. Make sure not to plant NEMBA listed invasive plants (e.g., kikuyu grass) in your garden.
    d. Select locally indigenous plants for gardens, making use of as many of the rescued plant species as possible. Avoid plants that are hybrids and cultivars.
    e. Plant during the rainy season (early winter May/June) and add a 10cm thick layer of wood chip to keep in moisture.
    f. Reduce or replace lawns with water-wise groundcovers or enlarging shrub beds.
    g. Add local edible and aromatic plants to avoid water & nutrient intensive vegetable gardens
    h. Ensure soft landscaping is used as opposed to hard landscaping (BOX 3)

BOX 3: Landscaping

Soft landscaping

Soft landscaping refers to natural spaces around constructed buildings that contain plants. The plants used are often trees, shrubs, and herbs that perform valuable ecosystem functions and services. Soft landscapes support biodiversity if local indigenous species are planted, or better yet, if the natural vegetation is left to recover and grow with minimal to no planting of man-made gardens. Grasses and shrubs are as effective at converting Carbon dioxide as are trees. Keeping thicket & fynbos vegetation allows groundwater attenuation and minimisation of erosion risk.

Hard landscaping

Hard landscaping are spaces around buildings that have been transformed into impermeable surfaces, such as pavements, and concrete driveways. Hard landscapes have negative impacts on the natural environment. Hard landscaping results in the absorption and reflection of heat, which makes them hotter than the surrounding natural areas. Furthermore, they speed up the flow of rainwater. No plants can really grow on these surfaces making groundwater attenuation problematic.

3. Fire-proof hedges (Esler et al., 2014) can be made with indigenous species to reduce fire risk around the built enviornment. Some of the species that could be planted for this purpose include *Osteospermum moniliferum* (Bietou), *Diospyros dichrophylla*, *Searsia glauca*, *Pterocelastrus tricuspidatus* (Candlewood), *Ekebergia capensis* (Cape Ash), *Grewia occidentalis* (Crossberry), *Carissa bispinosa*, and *Euclea racemosa* (Gwarrie).

4. Clearly delineate maintenance zones and employ low-impact maintenance techniques
    a. Schedule major maintenance activities to avoid critical periods such as flowering, seed dispersal, and pollination periods (for most species this is during spring between September to November).
    b. Minimize soil disturbance and compaction, such as using hand tools instead of heavy machinery. Use specialized equipment designed to reduce environmental footprint, like lightweight mowers or trimmers.
    c. When chemical treatments are necessary, use targeted applications that minimize exposure to non-target species.

Discussion of the Alternatives: The addition of gardens and lawns on the site will result in negative impact and the introduction of more invasive and alien plant species to the site. A lack of alien clearing will also have detrimental effects on habitat quality over time. Therefore, the pre-mitigation impact significance is moderately negative, while post mitigation can be minor or negligible negative if all alterations (apart from the proposed built environment) are avoided (Table 9). The non-preferred option has a minor negative residual impact due to the assumed periodic disturbance of protected trees on the site.

Table 9: Operational Phase Impact 1 – Landscaping effects on Habitats and Plant Species

Construction Impact 2	Preferred: One Dwelling		Non-preferred: Two dwellings		No-go
Mitigation	Without	With	Without	With	Without
Duration	Ongoing	Brief	Permanent	Short term	Brief
Extent	Limited	Very limited	Limited	Very limited	Very limited
Intensity	Moderate	Very low	High	Low	Negligible
Probability	Certain	Almost certain	Certain	Almost certain	Almost certain
SCORE	Moderate negative: -84	Negligible negative: -30	Moderate negative: -98	Minor negative: -42	Negligible negative: -24
Comfidence	High	High	High	High	High
Reversibility	Low	Low	Low	Low	Low
Resource irreplaceability	Moderate	Moderate	Moderate	Moderate	Moderate

10. CONCLUSION

This impact assessment has identified several key considerations essential for the sustainable development of Portion 30 of 275. Both the Terrestrial Biodiversity and Plant Species Themes demonstrate high sensitivity and ecological importance, which means that adherence to the mitigation hierarchy is essential to preserve the biodiversity and habitat resilience here. While the proposed development will lead to the inevitable loss of habitat, including portions of the Hartenbos Dune Thicket (EN), the mitigation measures outlined in this report aim to minimize these impacts to a degree where the impacts are either minor, or negligible negative. The overall residual impact of the dwelling proposed is therefore Minor negative.

The most significant challenge currently on the site, and likely in the future too, is related to invasive species (Rooikrans mostly). This is because invasive species are associated with long-tern landscape degradation. The presence of alien slash material and an existing dirt road exacerbate edge effects on the site. The preferred development option offers a practical approach by avoiding direct harm to sensitive and protected species, including Milkwood trees and species of conservation concern (SCC), though some disturbance may be unavoidable depending on the development scenario selected. Mitigation efforts emphasize the importance of early intervention, including the clear demarcation of construction zones, protective measures for key species, and the reuse of topsoil. During the construction phase, a coordinated plant search and rescue operation will preserve geophytes other species with a high likelihood of transplant survival. The operational phase further underscores the critical importance of responsible landscaping, particularly the prevention of genetic pollution and water attenuation problems through inappropriate landscaping and gardening.

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12. APPENDIX

12.1 Provisional plant species list

All species that were observed during the site visit are in Table 10. A species accumulation curve for all the species recorded on the site during the assessment are presented in Fig. 17. The site assessment species list is not exhaustive.

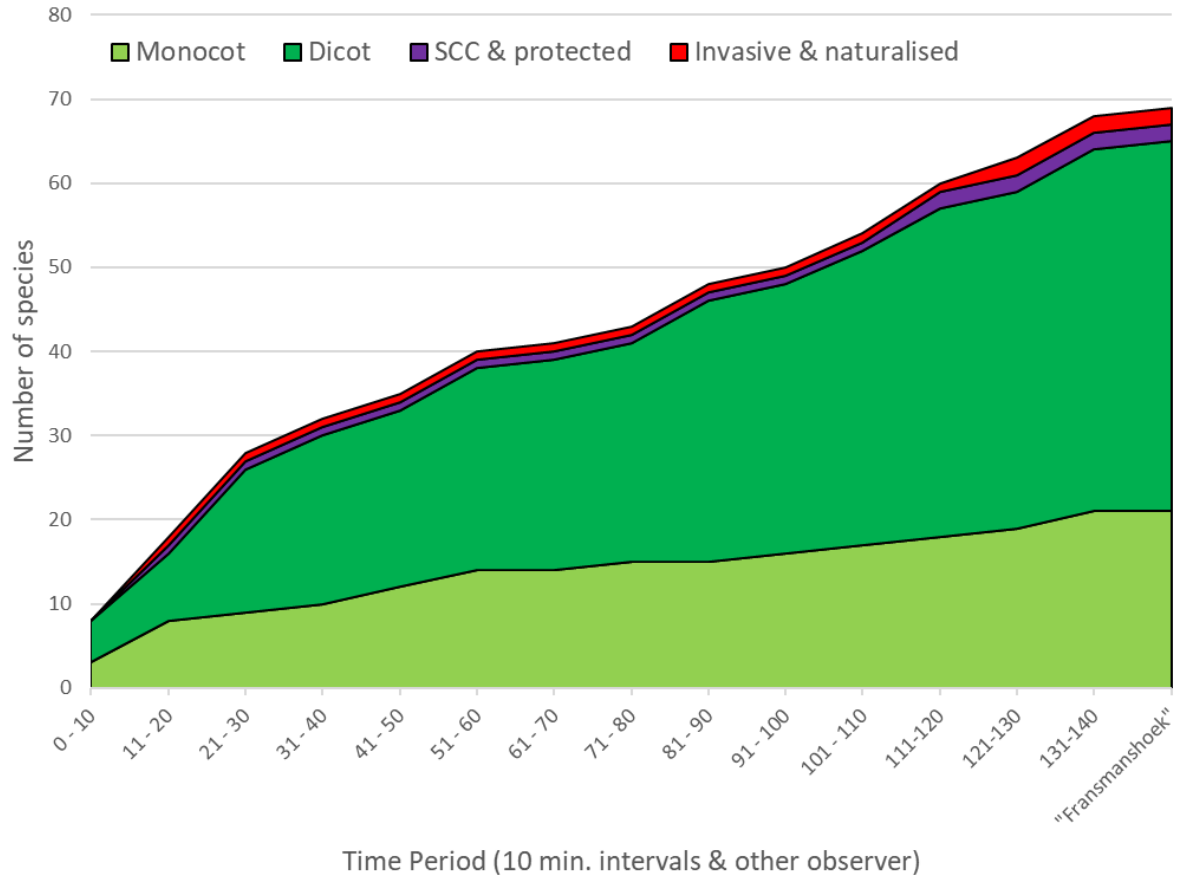

Figure 17: A plant species accumulation curve for the site assessment.

Table 10: A provisional species list made during the site assessment on Portion 30 / 275. The orange species is a naturalised exotic, in red is the invasive rooikrans, in green is the protected milkwood trees, and lastly the purple entry represents the Red Listed SCC.

Family	Species	Common Name
Class Liliopsida (Monocots)		
Amaryllidaceae	*Brunsvigia orientalis*	candelabra lily
Amaryllidaceae	*Haemanthus coccineus*	Spotted Bloodlily
Asparagaceae	*Asparagus aethiopicus*	African Asparagus
Asparagaceae	*Asparagus sp.*	Asparagus
Asparagaceae	*Lachenalia punctata*	Dotted Viooltjie
Asparagaceae	*Lachenalia sp.*	Cape Cowslips
Asparagaceae	*Massonia setulosa*	Hedgehog Lily
Asphodelaceae	*Aloe ferox*	Cape Aloe
Asphodelaceae	*Trachyandra ciliata*	Common Capespinach
Asphodelaceae	*Trachyandra sp.*	Capespinachs

Family	Species	Common Name
Colchicaceae	*Colchicum eucomoides*	Green Men-in-a-Boat
Cyperaceae	*Ficinia ramosissima*	Branch Clubrush
Cyperaceae	*Ficinia sp.*	Star Grasses
Cyperaceae	*Hellmuthia membranacea*	Helmet Sedge
Iridaceae	*Gladiolus cunonius*	Red Pypie
Iridaceae	*Moraea polyanthos*	Manyflower Tulp
Poaceae	*Ehrharta calycina*	Perennial Veldtgrass
Poaceae	*Ehrharta sp.*	Veldtgrasses
Poaceae	*Eragrostis sp.*	Lovegrasses
Restionaceae	*Restio eleocharis*	Beach Pegreed
Restionaceae	*Thamnochortus insignis*	True Thatchreed
Class Magnoliopsida (Dicots)		
Aizoaceae	*Carpobrotus edulis*	Sea fig
Aizoaceae	*Drosanthemum floribundum*	Pale dewplant
Aizoaceae	*Jordaaniella maritima*	Southern Beachfig
Anacardiaceae	*Searsia crenata*	Crowberry
Anacardiaceae	*Searsia glauca*	Blue Kunibush
Anacardiaceae	*Searsia laevigata*	Dune Currantrhus
Anacardiaceae	*Searsia longispina*	Thorn Currantrhus
Anacardiaceae	*Searsia sp.*	Karees
Apocynaceae	*Carissa bispinosa*	num-num
Apocynaceae	*Cynanchum africanum*	Cape Buckhorn
Araliaceae	*Cussonia thyrsiflora*	Cape Coast Cabbagetree
Asteraceae	*Chrysocoma ciliata*	Bitterbush
Asteraceae	*Felicia amoena*	Soft Felicia
Asteraceae	*Helichrysum patulum*	Honey Everlasting
Asteraceae	*Helichrysum sp.*	Everlasting-flowers
Asteraceae	*Helichrysum teretifolium*	Needle Everlasting
Asteraceae	*Metalasia muricata*	White bristle bush
Asteraceae	*Osteospermum moniliferum*	Bietou
Asteraceae	*Othonna undulosa*	Clambering Babooncabbage
Asteraceae	*Senecio elegans*	Red-purple Ragwort
Brassicaceae	*Heliophila linearis*	Needle Sunspurge
Campanulaceae	*Wahlenbergia tenella*	Fine Capebell
Caryophyllaceae	*Cerastium glomeratum*	Sticky mouse-ear chickweed
Celastraceae	*Gymnosporia nemorosa*	White Forest Spikethorn
Celastraceae	*Lauridia tetragona*	Climbing Saffron
Celastraceae	*Pterocelastrus tricuspidatus*	Candlewood
Crassulaceae	*Crassula ericoides*	Heath Stonecrop
Crassulaceae	*Crassula expansa*	Fine Stonecrop
Crassulaceae	*Crassula subulata*	Bihair Stonecrop
Ebenaceae	*Euclea racemosa*	Dune Gwarrie
Euphorbiaceae	*Euphorbia mauritanica*	Yellow Milkbush
Fabaceae	*Acacia cyclops*	western coastal wattle

Family	Species	Common Name
Fabaceae	*Indigofera candicans*	Canary Indigo
Fabaceae	*Melilotus albus*	White Sweetclover
Fabaceae	*Psoralea bracteolata*	Strand Dottypea
Oleaceae	*Olea exasperata*	Dune olive
Polygalaceae	*Muraltia satureioides*	Sand Purplegorse
Polygalaceae	*Polygala myrtifolia*	Sweet Pea Shrub
Primulaceae	*Myrsine africana*	African Boxwood
Ranunculaceae	*Knowltonia vesicatoria*	Common Burnleaf
Rutaceae	*Agathosma muirii*	Heart Buchu
Sapotaceae	*Sideroxylon inerme inerme*	Southern White Milkwood
Scrophulariaceae	*Jamesbrittenia microphylla*	Minileaf Jaybee
Scrophulariaceae	*Nemesia affinis*	Common Lionface
Scrophulariaceae	*Zaluzianskya gracilis*	Slender Drumsticks
Vitaceae	*Rhoicissus digitata*	Baboon Grape
Zygophyllaceae	*Roepera flexuosa*	Thin Twinleaf
Zygophyllaceae	*Roepera morgsana*	Salad Twinleaf

12.2 Land use recommendations according to the WC BSP

Recommended acceptable land-uses for each BSP layer is outlined and summarised in Table 11 below.

Table 11: The land-use planning proposed by the Western Cape Biodiversity Spatial Plan

LAND USE CATEGORIES		Conservation		Agriculture		Tourism and Recreational Facilities		Rural Accomodation		Urban			Business & Industrial				Infrastructure Installations			
LAND USE SUB-CATEGORIES (Refer to table 4.7 for descriptions)		Proclaimed Protected Areas	Other Nature Areas	Intensive Agriculture	Extensive Agriculture	Low Impact Facilities	High Impact Facilities	Agri-worker Accommodation	Small holdings	Urban Development & Expansion	Community Facilities & Institutions	New Settlements	Rural Business	Non-place-bound Industry (low-moderate impact)	Non-place-bound Industry (high impact)	Extractive Industry (incl. Prospecting)	Linear - roads & rail	Linear - pipelines & canals	Linear - powerlines	Other Utilities
MAP CATEGORY	DESIRED MANAGEMENT OBJECTIVE	Y = Yes: Permissible land uses that are not likely to compromise the biodiversity objective						R = Restricted: Land uses that may compromise the biodiversity objective are only permissible under certain conditions (refer to Table 4.7 for conditions)							N = No: Land uses that will compromise the biodiversity objective and are not permissible							
Protected Area	Must be kept in a natural state, with a management plan focused on maintaining or improving the state of biodiversity.	Land use within proclaimed protected areas are subject to management plan drawn up for that specific protected area.																		
Critical Biodiversity Area 1	Keep natural, with no further loss of habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.	Y	Y	N	R	N	N	N	N	N	N	N	N	N	N	N	N	N	R	N
Critical Biodiversity Area 2	Keep natural, with no further loss of habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.	Y	Y	N	R	R	N	N	N	N	N	N	N	N	N	N	R	R	R	N
Ecological Support Area 1: Terrestrial	Maintain in a functional, near-natural state. Some habitat loss is acceptable, provided the underlying biodiversity objectives and ecological functioning are not compromised.	Y	Y	N	R	R	N	N	N	N	N	N	R	R	N	N	R	R	R	R
Ecological Support Area 1: Aquatic	Maintain in a functional, near-natural state. Some habitat loss is acceptable, provided the underlying biodiversity objectives and ecological functioning are not compromised.	Y	Y	N	R	R	N	N	N	N	N	N	N	N	N	N	R	R	R	N
Ecological Support Area 2	Restore and/or manage to minimise impact on ecological infrastructure functioning, especially soil and water-related services.	Y	Y	N	R	R	N	N	R	N	N	N	N	N	N	N	R	R	R	R
ONA: Natural to Near-Natural	Minimise habitat and species loss and ensure ecosystem functionality through strategic landscape planning. Offers flexibility in permissible land uses, but some authorisation may still be required for high impact land uses.	Y	Y	R	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
ONA: Degraded	Minimise habitat and species loss and ensure ecosystem functionality through strategic landscape planning. Offers flexibility in permissible land uses, but some authorisation may still be required for high impact land uses.	R	R	R	Y	Y	R	R	Y	R	R	R	R	R	R	R	Y	Y	Y	Y
No Natural Remaining	These areas are suitable for development but may still provide limited biodiversity and ecological infrastructure functions and should be managed in a way that minimises impacts on biodiversity and ecological infrastructure.	R	R	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

12.3 Vegetation Assets, States, and Transitions (VAST)

Vegetation Assets, States, and Transitions (VAST) framework with columns representing states. Shifts between states are defined as transitions, as laid out in (Lesslie et al., 2010; Thackway & Lesslie, 2006).

Increasing modification

		Native vegetation cover Dominant plant species indigenous to the locality and spontaneous in occurrence, i.e. a vegetation community described using definitive vegetation types relative to estimated pre 1750 types				**Non-native vegetation cover** Dominant structuring plant species indigenous to the locality but cultivated; alien to the locality and cultivated; or alien to the locality and spontaneous		
Vegetation cover classes		**Class 0:** **RESIDUAL BARE** Areas where native vegetation does not naturally persist	**Class I:** **RESIDUAL** Native vegetation community structure, composition, and regenerative capacity intact—no significant perturbation from land use or land management practice. Class I forms the benchmark for classes II to VI	**Class II:** **MODIFIED** Native vegetation community structure, composition and regenerative capacity intact—perturbed by land use or land management practice	**Class III:** **TRANSFORMED** Native vegetation community structure, composition and regenerative capacity significantly altered by land use or land management practice	**Class IV:** **REPLACED -ADVENTIVE** Native vegetation replacement—species alien to the locality and spontaneous in occurrence	**Class V:** **REPLACED -MANAGED** Native vegetation replacement with cultivated vegetation	**Class VI:** **REMOVED** Vegetation removed
Diagnostic criteria	Current regenerative capacity	Natural regenerative capacity unmodified—ephemerals and lower plants	Natural regenerative capacity unmodified	Natural regeneration tolerates or endures under past and or current land management practices	Natural regenerative capacity limited or at risk under past and or current land use or land management practices. Rehabilitation and restoration possible through modified land management practice	Regeneration of native vegetation community has been suppressed by ongoing disturbances of the natural regenerative capacity; limited potential for restoration	Regeneration of native vegetation community lost or suppressed by intensive land management; limited potential for restoration	Nil or minimal
	Vegetation structure	Nil or minimal	Structural integrity of native vegetation community is very high	Structure is predominantly altered but intact, e.g. a layer or strata and or growth forms and or age classes removed	Dominant structuring species of native vegetation community significantly altered, e.g. a layer or strata frequently removed	Dominant structuring species of native vegetation community removed or predominantly cleared or extremely degraded	Dominant structuring species of native vegetation community removed	Vegetation absent or ornamental
	Vegetation composition	Nil or minimal	Compositional integrity of native vegetation community is very high	Composition of native vegetation community is altered but intact	Dominant structuring species present—species dominance significantly altered	Dominant structuring species of native vegetation community removed	Dominant structuring species of native vegetation community removed	Vegetation absent or ornamental

12.4 Impact Assessment Methods

Individual impacts for the construction and operational phase were identified and rated according to criteria which include their intensity, duration, and extent. The criteria and their associated ratings are shown in Table 12. The ratings were then used to calculate the consequence of the impact which can be either negative or positive as follows:

Consequence = *type x (intensity + duration + extent)*

Where type is either negative (i.e., -1) or positive (i.e., 1). The significance of the impact was then calculated by applying the probability of occurrence to the consequence as follows:

Significance = *consequence x probability*

Table 12: Categorical descriptions for impacts and their associated ratings.

Rating	Intensity	Duration	Extent	Probability
1	Negligible	Immediate	Very limited	Highly unlikely
2	Very low	Brief	Limited	Rare
3	Low	Short term	Local	Unlikely
4	Moderate	Medium term	Municipal area	Probably
5	High	Long term	Regional	Likely
6	Very high	Ongoing	National	Almost certain
7	Extremely high	Permanent	International	Certain

Categories assigned to the calculated significance ratings are presented in Table 13.

Table 13: Value ranges for significance ratings, where (-) indicates a negative impact and (+) indicates a positive impact

Significance Rating	Range	
Major (-)	-147	-109
Moderate (-)	-108	-73
Minor (-)	-72	-36
Negligible (-)	-35	-1
Neutral	0	0
Negligible (+)	1	35
Minor (+)	36	72
Moderate (+)	73	108
Major (+)	109	147

Each impact was considered from the perspective of whether losses or gains would be irreversible or result in the irreplaceable loss of biodiversity of ecosystem services. The level of confidence was also determined and rated as low, medium, or high (Table 14).

Table 14: Definition of reversibility, irreplaceability, and confidence ratings.

Rating	Reversibility	Irreplaceability	Confidence
Low	Permanent modification, no recovery possible.	No irreparable damage and the resource isn't scarce.	Judgement based on intuition.
Medium	Recovery possible with significant intervention.	Irreparable damage but is represented elsewhere.	Based on common sense and general knowledge
High	Recovery likely.	Irreparable damage and is not represented elsewhere.	Substantial data supports the assessment