Impact assessment for Portion 101 of 489, called Zwarte Jongensfontein, Hessequa local 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
SSVR	Site Sensitivity Verification Report

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: 23 August 2024

BIANKE FOUCHÉ ABRIDGED CV

Qualifications

- B.Sc. Environmental Sciences,
- B.Sc. Honours (Botany),
- M.Sc. Conservation Biology 2022-2023 (currently completing at the University of Cape Town. Graduation is 15 December 2023).

SACNASP Registration No: 141757 (Candidate Botanical Scientist)

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 the Botanical Society of South Africa and the custodians for rare and endangered wildflowers (CREW) 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 Site Sensitivity Verification Report (SSVR) and the applicable assessment for botanical and terrestrial sensitivity of Portion 101/489 (called Jongensfontein) near Jongensfontein and Still Bay in the Hessequa local Municipality. This farm portion covers a total area of 61.08 ha. According to the Department of Forestry, Fisheries, and the Environment (DFFE) Screening Tool, the SSVR 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 farm portion. The plant species theme is triggered due to several species of conservation concern (SCC) that are potentially present in the area (these are listed later in this report). The terrestrial biodiversity theme sensitivity is due to the Farm being mapped as covering several biodiversity priority areas (BPAs).

1.2 General Site Location

Portion 101/489, west of Vleesbaai is located on a sandy substrate. The farm portion borders ocean along its southern boundary, and along the western boundary there is the existing residential settlement of Jongensfontein (Fig. 1). The road that runs along the western boundary of the Farm portion is called Boegspriet Road. This road links to Main Road which splits Portion 101/489 into western and eastern sections. The eastern section represents the majority of the site. Both the existing road on the site and the water reservoir that it leads to on the Farm are part of existing servitudes on the site. No other servitude areas are mapped on the site.

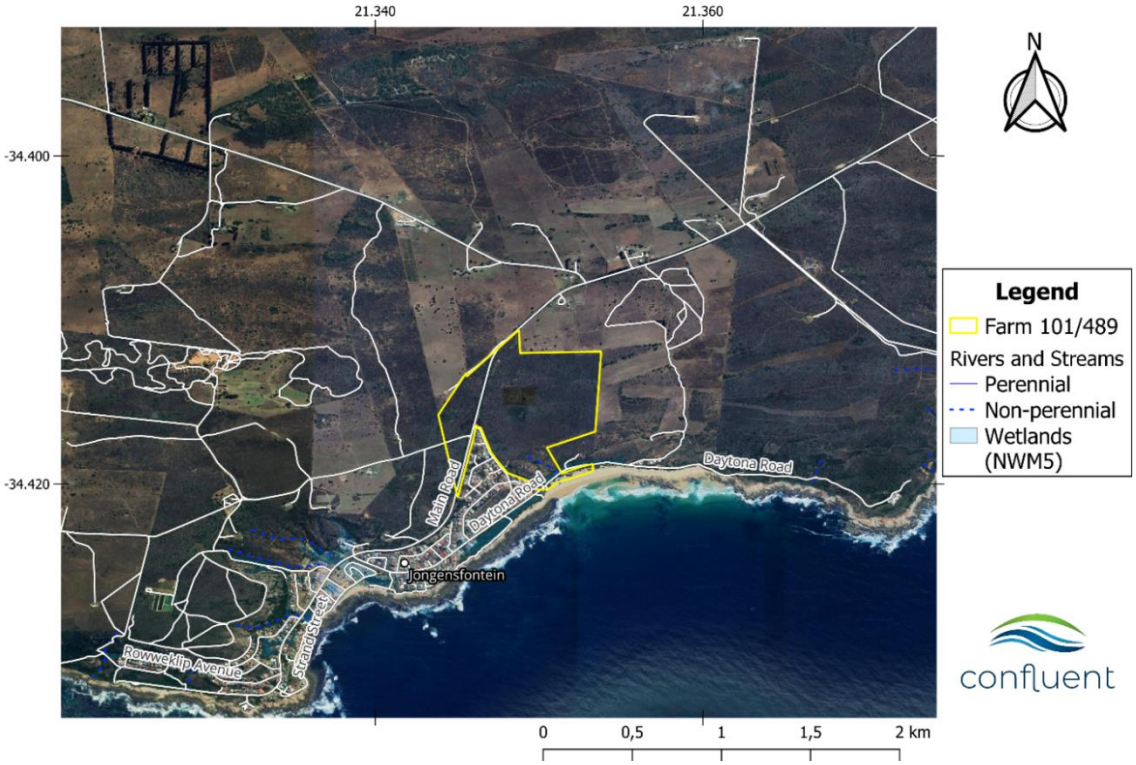

Figure 1: The general location of Portion 101 / 489 near Still Bay.

1.3 Site Development Plan

The site development plan (SDP) for the site was made after the initial site sensitivity report had been completed. The current SDP was updated during August of 2024, and was informed by the SSVRs that had been previously submitted. The areas that will be affected under this development plan are illustrated in Fig. 2. The total area that roads will cover is 1547 sqm, the total built area is 360 sqm, and parking spaces 108 sqm. The total area where vegetation clearance will be required is therefore ca. 2015 sqm.

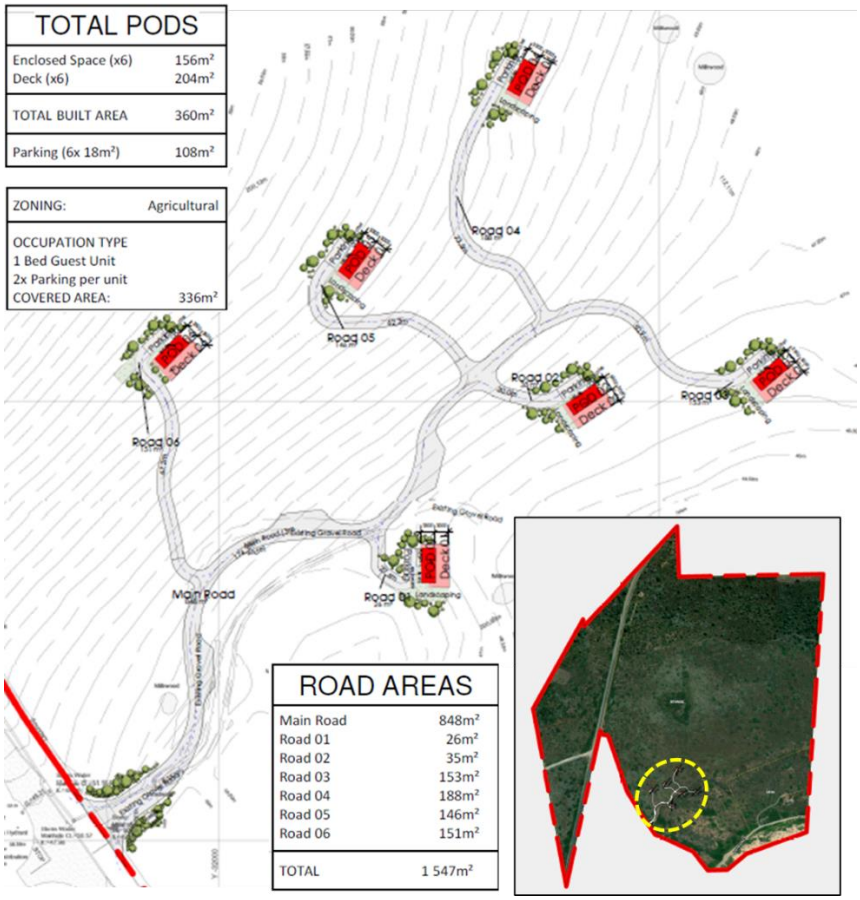

Figure 2: The site development plan (SDP) on a section of the property (outlined area in yellow dotted outline).

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).

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.
Ecological Support Areas (ESAs)	Most recent ESA spatial footprint for metros, provinces, or bioregional plans, combined to create a national data set.
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 20th of October 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 spring on the 20th of October 2023. 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. The species list and SCC reported are not exhaustive (Perret et al., 2023).
- It was raining during the site assessment which significantly alters the likelihood of some species being observed on the site.
- Seasonal and time constraints always play a role in limiting the findings of a terrestrial specialist report. Many plant species flower seasonally and are therefore difficult to identify outside of their flowering season.
- 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.). Furthermore, some species may not have been visible at all during the time of the site assessment (e.g., some geophytes, annuals, and parasitic plants).
- 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 property made it difficult to gain access to some sections of the site. It is possible that focus on “bundu bashing” and getting access to some parts of the site may have caused a lapse in concentration so that an SCC/ several SCC could have been missed on the site.

4. RESULTS: DESKTOP ASSESSMENT

4.1 Terrestrial Biodiversity

4.1.1 Climate

The climate of Portion 101 / 489 is described as warm and temperate. The rainfall pattern is aseasonal, although two peaks are reflected during Autumn and Spring (see Fig. 3). The temperature throughout the year remains moderate, with sub-zero temperatures rarely occurring.

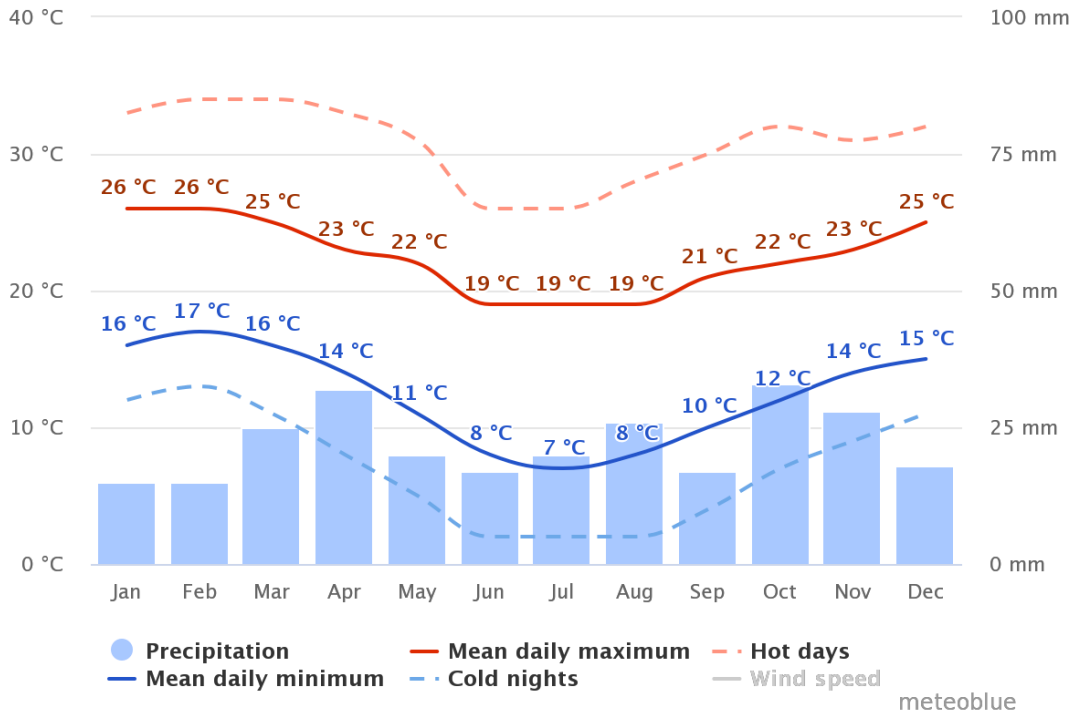

Figure 3: A summary graphic of simulated historical climate & weather data for Stilbaai-Wes - meteoblue.

4.1.2 Geology and Soil

The soil on the site is sandy (i.e., derived from coastal dunes), with a high erodibility factor (0.56 – 0.63 on Cape Farm Mapper). These sandy substrates are very well drained and are typically quite deep, but with limited pedological development and a very low to negligible clay content. The geology on the site is sedimentary and is likely calcareous sandstone.

4.1.3 Vegetation Type(s)

Jongensfontein farm is largely mapped as forming part of the **endangered (EN) Hartenbos Dune Thicket** (Fig. 4; Dayaram et al., 2019; Mucina & Rutherford, 2006). The Vlok vegetation map is also available for this area and is also presented in Fig. 4. The Vlok vegetation map, in this instance, has divided Portion 101/489 into two vegetation communities. The majority of the site is mapped as Ystervarkpunt Forest-Thicket-Fynbos (suggesting that the vegetation here is a mosaic of these vegetation types). The southern section of the site closest to the coast is mapped as Gouritz Dune Thicket.

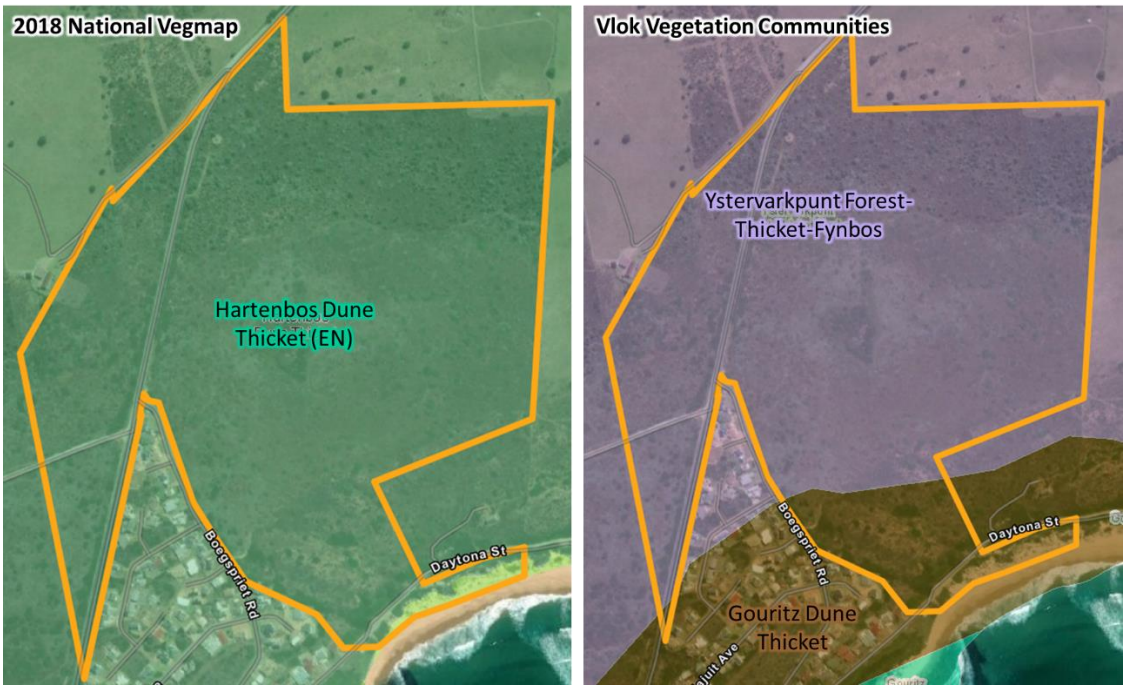

Figure 4: The mapped vegetation type according to the 2018 National Vegetation Map of South Africa (Dayaram et al., 2019; Mucina & Rutherford, 2006) and the Vlok vegetation map categories for Portion 101 / 489 and the surrounding area.

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. This description is also consistent with the Vlok vegetation map which mapped the area as a "forest-thicket-fynbos". Often this vegetation type is characterised by a thicket-fynbos mosaic where the thicket component occurs in fire-refugia over the landscape. 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*.

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*.

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*

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

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

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.

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 101/489 is given in BOX 1. Appendix 12.2 illustrates the recommended land-uses associated with the various BSP layers. The majority of the farm portion is mapped as a terrestrial critical biodiversity area (CBA1), with a small section along the south of the site mapped as an aquatic CBA 1 area (Fig. 5). The reasons for the 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) Albertinia Sand Fynbos**. The BSP layers say this is a VU vegetation type, but it has since been upgraded to EN. This vegetation type is not mapped on the site, but EN Hartenbos Dune Thicket is mapped according to the vegetation map of South Africa (Dayaram et al., 2019; Mucina & Rutherford, 2006; NEM:BA Act, 2022). This isn't listed as a BSP reason, but it should be one of the factors to consider given the conservation planning of the site.
- **Blombos Strandveld (LT), and Foredune**. The southern section of the site is part of the coastline, which is protected in South Africa. The National Coastal Management Programme states that the coastal zone must be managed sustainably to ensure that natural resources are protected for the future. Blombos Strandveld is found between Witsand and Gouritsmond and is characterised by forest thickets. This unit, although not threatened, contains protected tree species, and adds to the diversity and uniqueness of the site.
- **Watercourse protection – Southern Coastal Belt, and Coastal Resource Protection (Eden)**. This BSP trigger falls outside of the scope of this study. Refer to the aquatic specialist study for comment.
- **South Strandveld Western Strandveld Channelled & Unchanneled Valley Bottom Wetlands**. This BSP trigger falls outside of the scope of this study. Refer to the aquatic specialist study for comment.
- **Bontebok natural & extended distribution range.** This BSP trigger falls outside of the scope of this study. Refer to the animal species theme specialist study for comment.

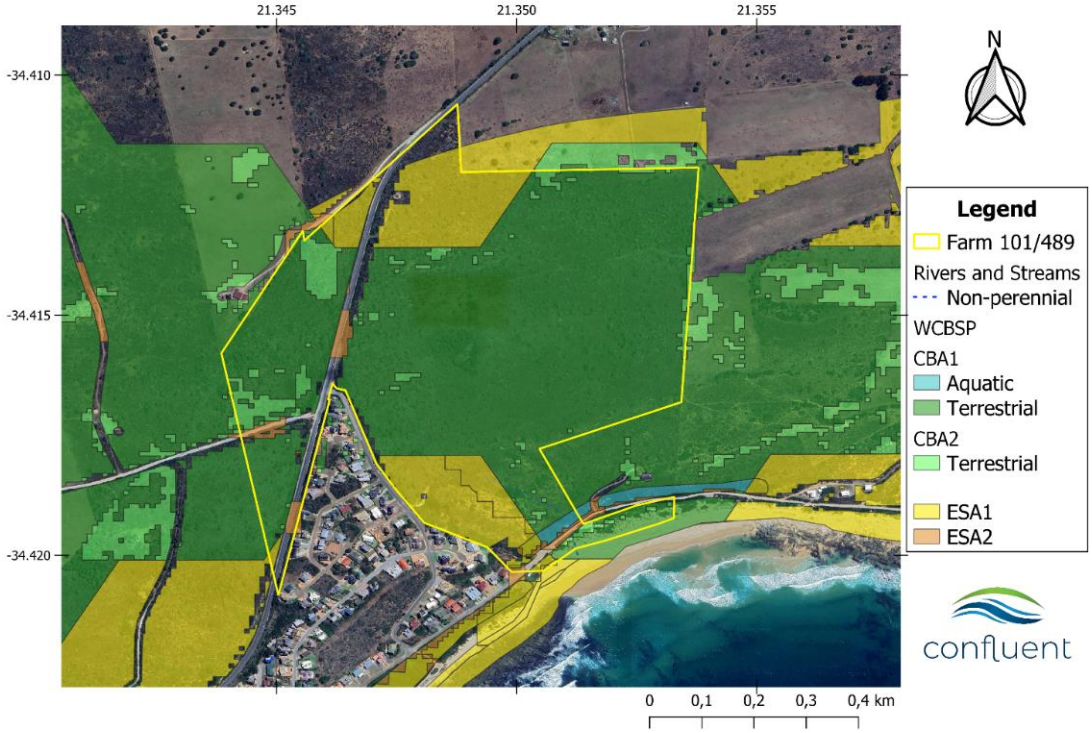

*Figure 5: The mapped Western Cape Biodiversity Spatial Plan (WC BSP) categories that have been mapped for Jongensfontein Farm and adjacent surrounding landscape. *

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.

Ecological Support Area 1

Definition: Not essential for meeting biodiversity targets. An important role in supporting the functioning of PAs or CBAs. Often vital for ecosystem services.

Objective: Maintain in a functional, near-natural state. Some habitat loss is acceptable, provided underlying biodiversity objectives/ecological functioning are not compromised.

Ecological Support Area 2

Definition: Not essential for meeting biodiversity targets. Important in supporting functioning of PAs or CBAs. Often vital for ecosystem services.

Objective: Restore/minimise impact on ecological infrastructure functioning, especially soil and water-related services.

4.1.5 Historical Aerial Imagery

High resolution historical imagery (Fig. 6) 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. The historical imagery discussed here is illustrated in Fig. 6. The earliest image illustrated is from 1954, which shows that the site was largely natural with some agricultural pasture fields present in patches over the site. By 1963, vegetation clearing for agricultural purposes on the site and in the surrounding landscape had increased significantly. However, large sections of the site still had natural vegetation/habitats. The agricultural fields on the site were mostly abandoned by 1983, with only a small section remaining in the westernmost section of the Farm portion. By 1983 roads for the existing residential development west of Jongensfontein had been laid down. Some vegetation clearing is again visible on the Farm portion between 1983 and 1991, however natural vegetation and habitats are still present on the site.

By 2005 only the western section of the site was still maintained actively as fields, while the rest of the site east of Main Road seems unmanaged. 2005 is also the first time that the servitude road and reservoir is visible on the site. The residential development west of Jongensfontein densified rapidly from 2000 to the present day. By 2011, natural undisturbed vegetation had returned to the site, with no pasture fields being managed on the site anymore. This is still the case currently (i.e., in 2023). The vegetation on the site today has therefore been left in a near-natural state for over a decade, despite disturbances before that since at least the early 1900s.

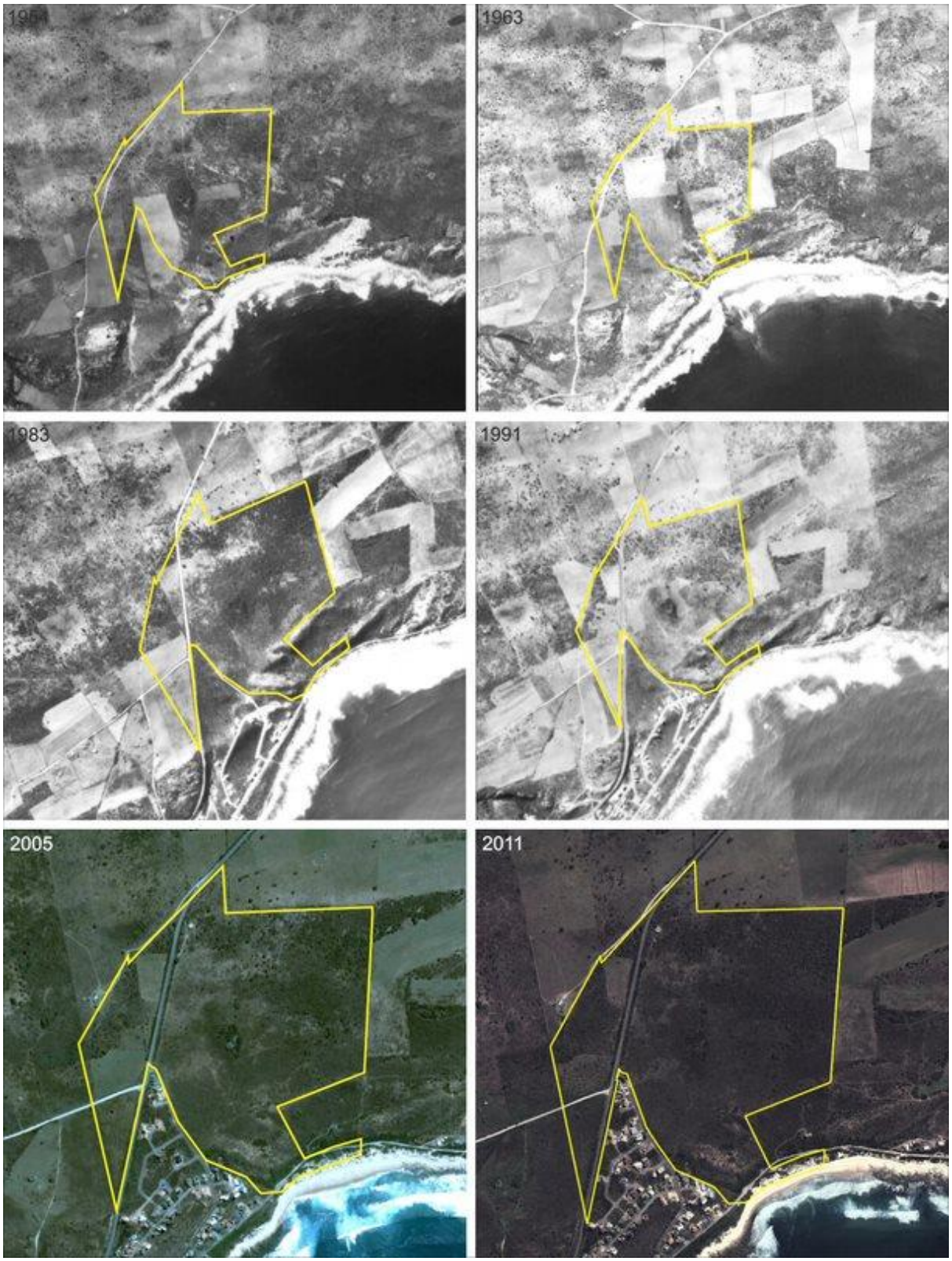

Figure 6: A series of historical imagery sourced from the CD: NGI geospatial portal (top two rows) and Google Earth (bottom row). The yellow polygons highlight the position of Portion 101/489.

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 are discussed later.

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 shown in Fig. 7 below.

Medium	Lampranthus ceriseus	Medium	Thamnochortus muirii
Medium	Lampranthus fergusoniae	Medium	Thamnochortus pluristachyus
Medium	Lampranthus foliosus	Medium	Duvalia immaculata
Medium	Lampranthus pauciflorus	Medium	Heliophila linearis var. reticulata
Medium	Ruschia leptocalyx	Medium	Metalasia luteola
Medium	Argyrolobium harmsianum	Medium	Sensitive species 784
Medium	Psoralea sp. nov. (Muir 1850 PRE)	Medium	Sensitive species 764
Medium	Aspalathus acutiflora	Medium	Felicia ebracteata
Medium	Aspalathus arenaria	Medium	Oedera steyniae
Medium	Aspalathus calcarea	Medium	Athanasia quinquedentata subsp. rigens
Medium	Aspalathus dasyantha	Medium	Chrysocoma strigosa
Medium	Aspalathus odontoloba	Medium	Stoebe muirii
Medium	Aspalathus prostrata	Medium	Diosma tenella
Medium	Aspalathus sanguinea subsp. foliosa	Medium	Agathosma eriantha
Medium	Otholobium sp. nov. (Esterhuysen 33240a BOL)	Medium	Agathosma minuta
Medium	Lebeckia gracilis	Medium	Agathosma muirii
Medium	Leucadendron galpinii	Medium	Agathosma riversdalensis
Medium	Leucospermum praecox	Medium	Agathosma robusta
Medium	Wahlenbergia polyantha	Medium	Euchaetis albertiniana
Medium	Selago diffusa	Medium	Cliffortia longifolia
Medium	Selago glandulosa	Medium	Muraltia barkerae
Medium	Selago villicaulis	Medium	Polygala pubiflora
Medium	Pentameris calcicola var. hirsuta	Medium	Sensitive species 5
Medium	Sensitive species 340	Medium	Phylica incurvata
Medium	Lobelia valida	Medium	Drosanthemum lavisii
Medium	Erica baueri subsp. baueri	Medium	Sensitive species 800
Medium	Erica viscosissima	Medium	Sensitive species 335
Medium	Erica calcicola	Medium	Sensitive species 500
Medium	Hermannia lavandulifolia	Medium	Sensitive species 654
Medium	Hermannia muirii	Medium	Agathosma microcarpa

Figure 7: The potential species of conservation concern (SCC) with a regional Red List status of Vulnerable or higher according to the Screening Tool Report generated for the site. Sensitive species on the site may not be named in this report.

Additional SCC that have been observed nearby on iNaturalist and / or POSA are:

- *Acmadenia densifolia*
- *Agathosma collina*
- *Aspalathus sanguinea sanguinea*
- *Asparagus lignosus*
- *Carpobrotus muirii*
- *Cullumia carlinoides*
- *Erica prolata*
- *Freesia caryophyllacea*
- *Freesia leichtlinii alba*
- *Geissorhiza tenella*
- *Helichrysum cochleariforme*
- *Ixia micrandra*
- *Jamesbrittenia calciphila*
- *Kalanchoe beharensis*
- *Lachnaea axillaris*
- *Lampranthus diutinus*
- *Lampranthus explanatus*
- *Leucadendron muirii*
- *Limonium linifolium*
- *Manulea caledonica*
- *Mesembryanthemum vanrensburgii*
- *Pelargonium triste*
- *Phylica stenopetala stenopetala*
- *Protea obtusifolia*
- *Senecio lycopodioides*
- *Thamnochortus fraternus*
- *Thamnochortus karooica*
- *Tribolium ciliare*
- *Tritonia squalida*

5. RESULTS: FIELD ASSESSMENT

5.1 Refined Vegetation Map

The vegetation on the majority of the farm is consistent with Hartenbos Dune Thicket. The vegetation here follows the description of Hartenbos Dune Thicket, in that milkwood thicket clumps are dispersed within a fynbos matrix on an alluvial substrate (Fig. 8). The southernmost section of the site just above the coastline is dominated by milkwood trees (*Sideroxylon inerme inerme*), which is consistent with the Vlok vegetation map indicating Gouritz Dune Thicket in the southern section of the site. Just above and between the dense thicket stands, a unique section of Hartenbos Dune Thicket occurs, as this seems to be the section of the site with the highest concentration of *Leucospermum praecox* (VU), as well as *Agathosma muirii* (VU). In fact, both of these SCC are dominant species in this southern section of the site. Some *Agathosma muirii* is present further north on the site, but it is less common. Some sections of the site was invaded by Rooikrans, especially near the artificial furrow, however the majority of the surveyed area on the site was in a near natural condition. The western section of the site was not included in the survey due to time constraints, however the vegetation type is the same as that present over the majority of the farm portion. Another botanical survey will be required if the scope / footprint of the proposed development increases (i.e., if it extents further into the blue and light blue Hartenbos Dune Thicket sections).

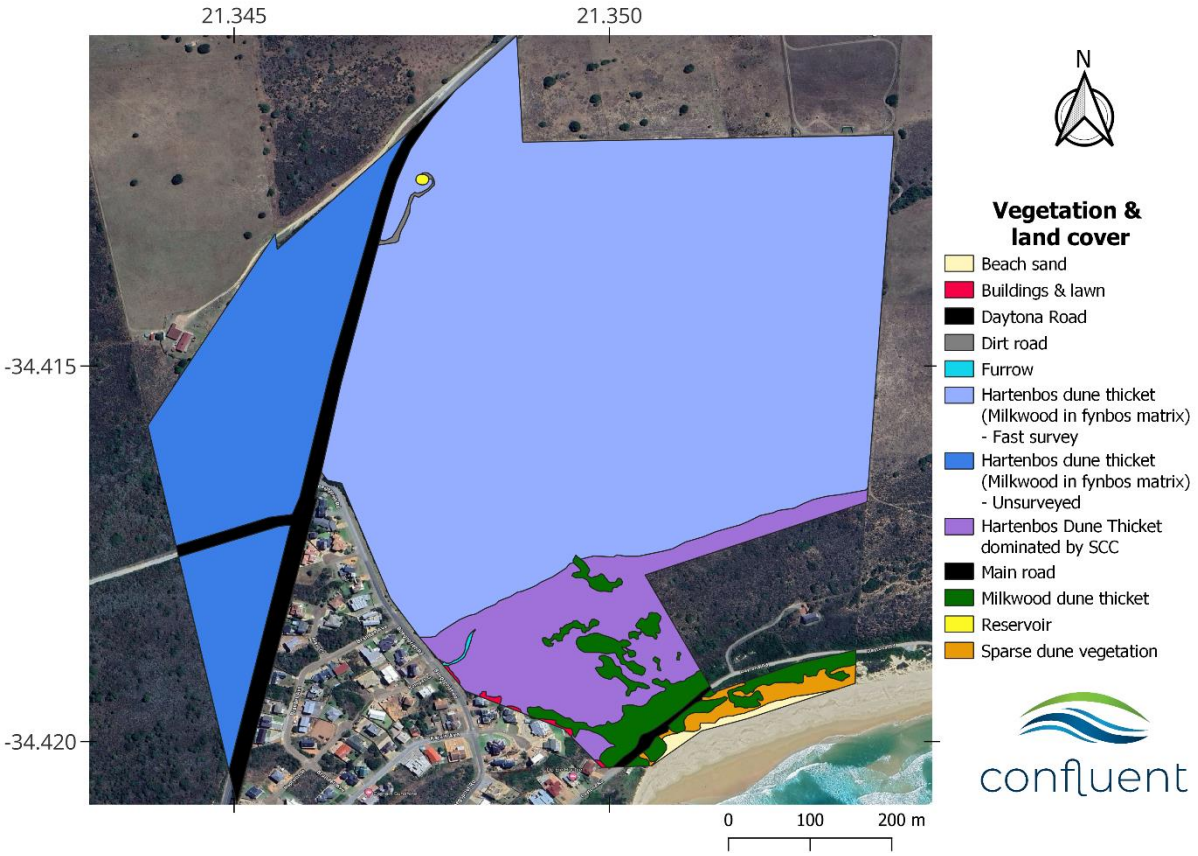

Figure 8: A revised vegetation map for the entire Portion 101/489.

5.2 Plant Species of Conservation Concern Found on the Site

The species of conservation concern that were found on the site were *Agathosma muirii*, *Cullumia carlinoides, Freesia leichtlinii alba, Helichrysum cochleariforme, Leucospermum praecox,* and *Manulea caledonica* (Fig. 9). The Red List status and accompanying reason for each of the species observed is provided in Appendix 12.1.

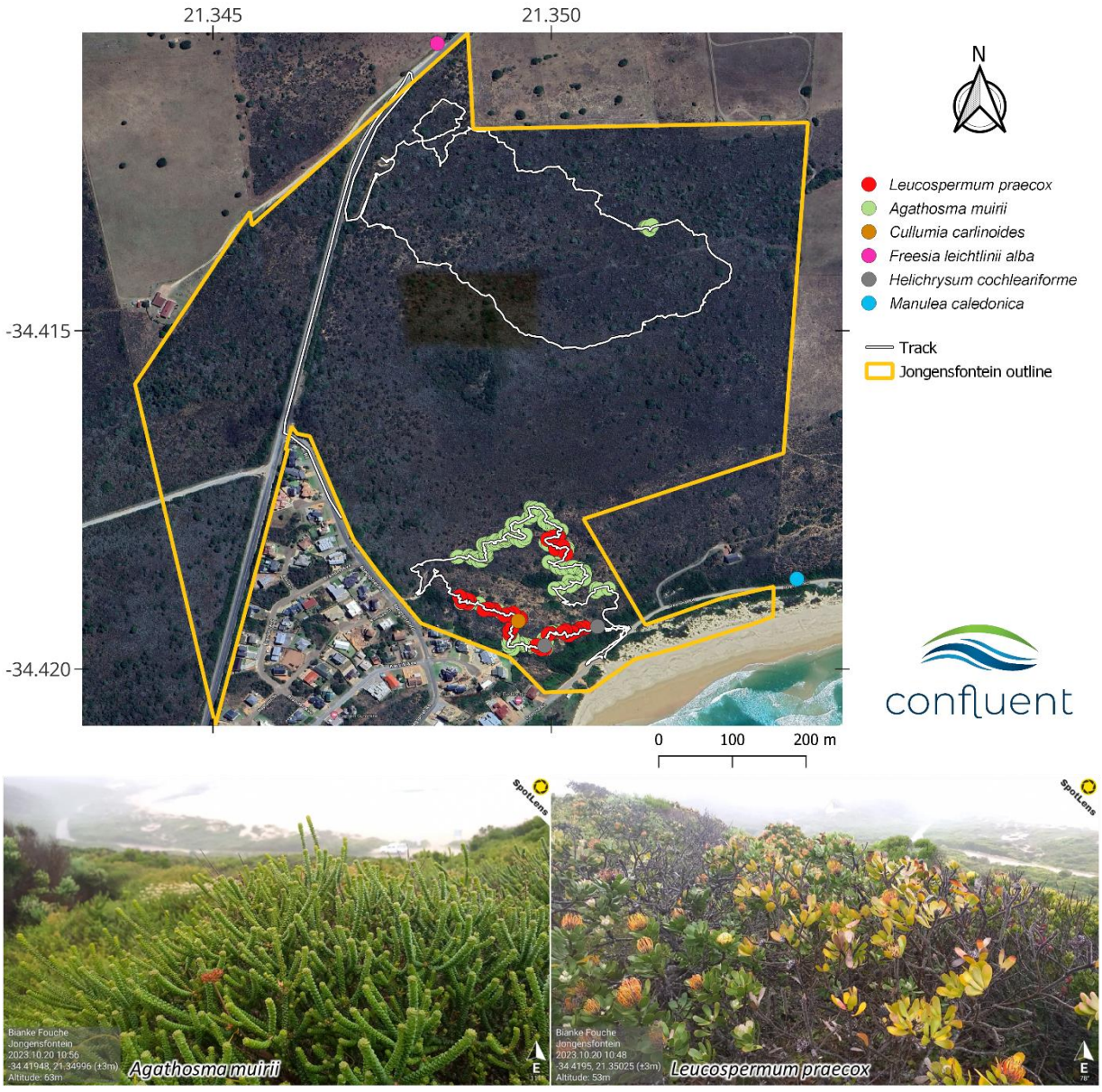

Figure 9: A map showing the distribution of the observed SCC on Jongensfontein, as well as the track walked during the site assessment. Manulea caledonica was observed to the east of the farm portion and is assumed to be present on the site. Photos of the two dominant SCC in the southern portion of the site is illustrated below the map, namely Agathosma muitii and Leucospermum praecox.

5.3 Invasive and Naturalised Exotic Plant Species on the Site

The only invasive plant species that was observed on the site was Rooikrans (*Acacia cyclops*). Several naturalised exotic species were also observed on this site; however, none were on NEMBA or CARA invasive species lists apart from the Rooikrans on the farm portion. The lack of invasive plant species on the site is remarkable given the past disturbance on the

site. A photo of the Rooikrans on the site is provided in Fig. 10. The Rooikrans on the site must be cleared in accordance with an alien management plan, as alien clearing on the site is required by law. The NEMBA and CARA category of Rooikrans is provided in the species list in Appendix 12.1. NEMBA category 1b is described in a little more detail in BOX 2 below.

Figure 10: An image illustrating one of the large Rooikrans (Acacia cyclops) bush clumps on the Jongensfontein farm portion.

BOX 2: 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.

5.4 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. Because of the sheer number of additional potential SCC, the probability of occurrence for every single species will

not be discussed in this report, rather a blanket probability of occurrence of “Medium to High” will be assigned to all potentially occurring SCC – i.e., the site is very likely to contain more SCC than was found during the assessment related to this report. These SCC include species listed as near threatened, vulnerable, endangered, critically endangered, rare, and critically rare. The species that were listed by the screening tool report have been mentioned earlier in this report, and additional SCC can be found by initiating a simple search on iNaturalist or POSA (the Plants of Southern Africa database).

6. SITE SENSITIVITY VERIFICATION

6.1 Terrestrial Biodiversity

The sensitivity of the terrestrial biodiversity theme for the site is confirmed as **Very High**. The sensitivity triggers that were highlighted by the screening tool and biodiversity spatial plan of the Western Cape are all present and valid on the site, as discussed in this report. The majority of the site is a terrestrial CBA 1 area, and the site has been in a near natural state with minimal soil disturbance (only for the reservoir built) for at least the last decade. The CBA1 area assigned here is consistent with the definition provided for a CBA1 area. Jongensfontein is a large farm portion, which is connected to adjacent protected areas by larger surrounding natural areas. Given this connection, its location next to the coastline, and the status of Hartenbos Dune Thicket habitat, the terrestrial biodiversity on the site is sensitive, and an impact assessment is required.

6.2 Botanical Diversity

The site sensitivity in terms of the terrestrial plant species theme is confirmed as **High** across the entire Portion 101/489. At least six SCC were recorded on the site, of which two were the dominant plant species in the southern half of the site (*Leucospermum praecox* and *Agathosma muirii*. Furthermore, although the whole farm portion is sensitive in terms of the terrestrial plant species theme, the southern section of the site (ca. 200 m from the southern-most boundary along the coastline) contained the highest concentration and largest population of SCC on the site, and it is highly recommended that any development here be avoided entirely to preserve these populations and the coastal habitat connectivity. The proposed six glamping pods are located outside the 200m buffer from the southern-most boundary. An impact assessment is required.

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 2 below.

Table 2: 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 3. 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 3: 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 overall SEI score 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, 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

The SEI map that was produced for Portion 101/489 reflects the sensitivity of the site (Fig. 11). The recommended SEI mitigation per category is in Table 4 and the reasoning behind the map is provided in Table 5.

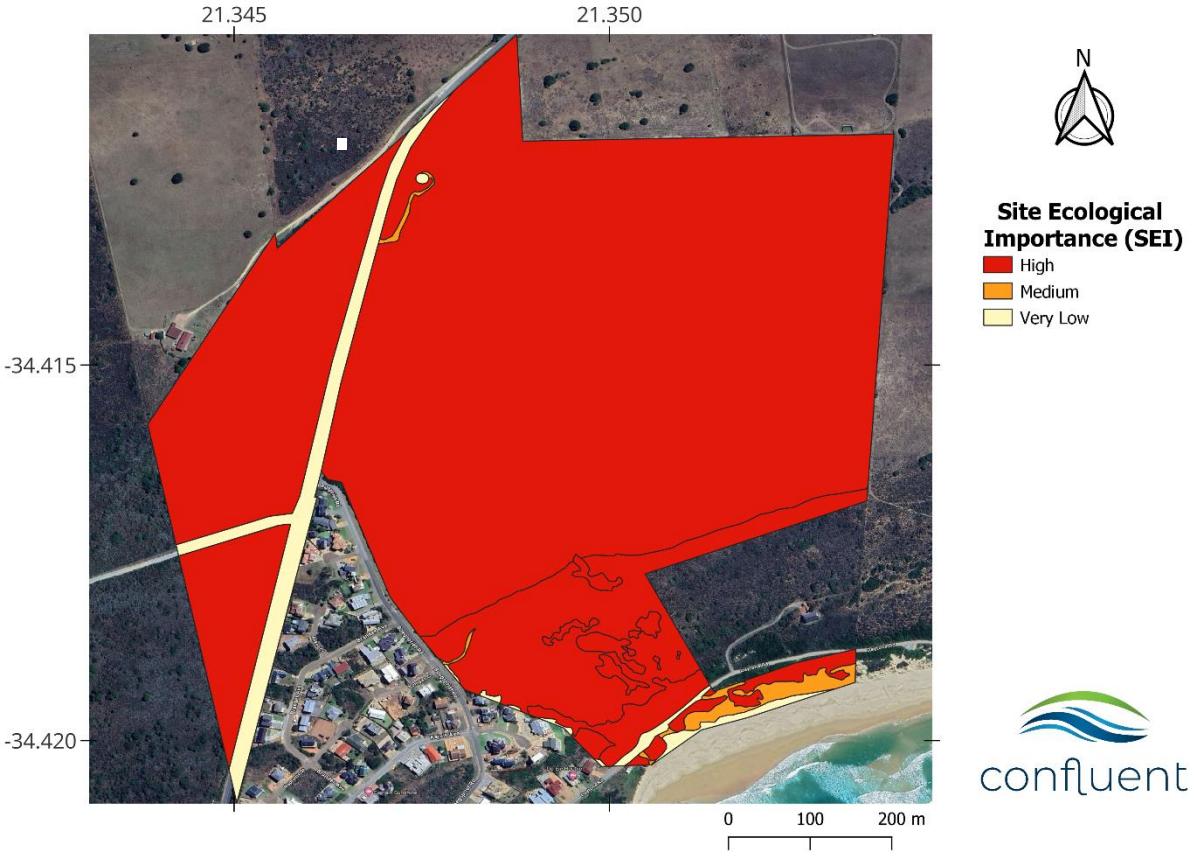

Figure 11: The SEI map for the proposed residential development on Jongensfontein Farm near Stil Bay.

Table 4: 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
Very High	Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e. last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
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.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

Table 5: 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)
Beach sand	**Low** No confirmed or highly likely populations of range-restricted terrestrial plant species.	**Medium** Part of a coastline which is has had minimal disturbance and modification in the past. However, almost no terrestrial plants grow here.	**Very High** VAST category The receptor is naturally bare and will remain this way after a disturbance.	**Very Low** BI: Low RR: Very High
Sparse dune vegetation	**Medium** Confirmed occurrence of populations of NT species and threatened species listed under criterion A only.	**High** Coastal connectivity with potentially functional ecological corridors and a Daytona dirt road above the intact habitat patches.	**Medium** VAST category Prone to invasion. This receptor contains species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.	**Medium** BI: Medium RR: Medium
Buildings & lawn, Reservoir, Daytona Road, and the Main road	**Very Low** No natural habitat remaining.	**Very Low** No habitat connectivity except for flying species or selected ornamental flora (i.e., not natural).	**High** VAST category The receptor is transformed and will remain so with or without active maintenance. Species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.	**Very Low** BI: Very Low RR: High
Dirt roads & Furrow	**Low** < 50% of receptor contains natural habitat with limited potential to support SCC.	**Low** Degraded natural habitat with several naturalised exotic	**Medium** VAST category The habitat here is already altered and modified, and the original fynbos has been	**Medium** BI: Low RR: Medium

		plants and invasive rooikrans.	replaced in placed with species creeping in from the urban edge (e.g., numerous poppy plants next to the furrow). The current receptor is likely to remain similar following a disturbance and may become more invaded.	
Hartenbos dune thicket (Milkwood in fynbos matrix) – Fast survey & unsurveyed areas	**High** Small area of an EN vegetation type. Confirmed occurrence of threatened species listed under criterion A only.	**High** > 10 ha for EN Hartenbos Dune Thicket. Good habitat connectivity with functional ecological corridors and a regularly used road network between intact habitat patches. Natural fynbos with minimal invasive plant species biomass.	**Medium** VAST category Hartenbos dune thicket is very prone to invasion (especially rooikrans). Even a more natural disturbance like fire can catalyse a shift to an increase in invasive plant biomass and habitat loss. Development here will result in a receptor with some original species composition, but an altered and secondary overall veld and reduced terrestrial plant biodiversity.	**High** BI: High RR: Medium
Hartenbos Dune Thicket dominated by SCC, and Milkwood dune thicket	**High** Small area of an EN vegetation type. Confirmed occurrence of populations of NT species and habitat dominated by threatened species listed under criterion A only. Protected milkwood trees.	**Medium** Medium (> 5 ha but < 20 ha) semi-intact area (houses to the west, connected to natural areas to similar habitat to the east) for any conservation status of ecosystem type. Some areas with rooikrans invasion, but these invaded areas can easily be passively rehabilitated by ongoing removal of rooikrans.	**Low** VAST category The natural flora, including threatened and near threatened species will not persist on the site, even if disturbance is moderate. Worsening rooikrans invasion is a threat if development here occurs. Perhaps the protected Milkwood trees will be preserved, but the habitat is unlikely to recover following disturbance.	**High** BI: Medium RR: Low

8. PROJECT AREA OF INFLUENCE

The project area of influence (PAOI) is defined according to ecosystem services and processes that are affected by the proposed development, as they relate to the themes assessed in this report. The SDP for Portion 101 of 489 already clearly states the planned area calculations for the proposed development, however the PAOI is larger than the SDP as it considers areas that will likely be affected outside of the direct and permanent footprint of 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. The PAOI, In this case, was defined using two principles.

1. The first principle was allowing for an additional 2m disturbance envelope around all proposed roads and dwellings (Fig. 12).

2. The second principle is that the specialist altered the shape where deemed necessary, e.g., sharp edges in the periphery of the plan area was rounded, in order to account for edge effects more accurately.

Figure 12: The proposed development PAOI, as defined in this report, illustrated in relation to the SEI map made for the property.

The current PAOI, as in Fig 12, indicates that an area of 4820 sqm of High SEI area will be affected by this development, 190 sqm in Medium SEI areas, and 60 sqm in Very Low SEI areas. The total area affected according to this PAOI amounts to ca. 5070 sqm. The total area where vegetation will be cleared is much less than the PAOI area, namely 2015 sqm. It is also important to note that if gardens and lawns are excluded from this development, then the PAOI presented in this report will reduce in area. The total area of Portion 101 of 489 is 610 789 sqm (or ca. 61 ha). Presently, no conservation areas are being considered, and the remainder of the property will remain zoned for Agriculture.

9. IMPACT ASSESSMENT

The impact assessment of Portion 101 of 489 is required due to the High sensitivity and High SEI that has been conformed here. 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. 13). If an impact cannot be prevented, then minimisation is preferred. The methods used for this impact assessment is provided in Appendix 12.4.

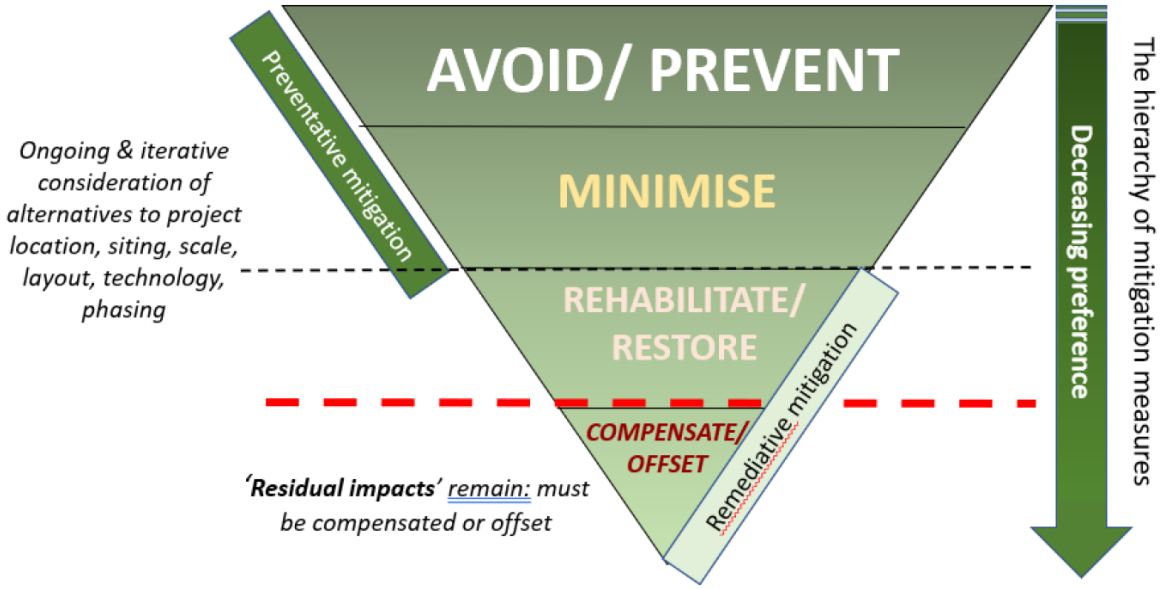

Figure 13: The mitigation hierarchy as presented in (Brownlie et al., 2023). Mitigation steps are illustrated in a hierarchy. The lower steps in the diagram should only be considered once the steps above have been duly considered.

9.1 Current Impacts

While the impact assessment is mostly focussed on impacts that will occur due to the proposed development, it is also useful to note some of the existing impacts that are present on the property:

- Some sections of the property are invaded with large established Rooikrans (*Acacia cyclops*) shrubs.
- The area adjacent to the property in the south-west is already occupied by a transformed residential development.
- All along the northern boundary of the property farms with modified to transformed fields are present adjacent to the property (Fig. 14). These edges are also fenced. This limits the connectivity of this large natural fragment to the rest of the surrounding natural landscape.

Figure 14: An example of a fenceline contrast at Portion 101 of 489.

- Next to the residential development there is a small section where a furrow has been dug (this is also the area where this development is being proposed). The furrow is surrounded by exotic garden escapee species (e.g., poppies) and is more modified than the surrounding landscape (Fig. 15). The furrow area is mapped as a Medium SEI area.

Figure 15: Photos of the furrow on Portion 101 0f 489 as it extends onto the property from the residential development.

- A parking space, existing reservoir (north-west; Fig. 16), and several tarred roads fragment the habitats on the property.

Figure 16: Two photos of the existing reservoir (from the site and from the top).

9.2 Layout And Design Considerations

The proposed development is occurring on a small section of the total Portion 101 of 489. The first 200 m inland from the coastline must be avoided for development (the current proposed glamping development is compliant with this requirement), and access roads should preferably also not be made in this area near the coast. The current 6 glamping pods proposed development will impact *Agathosma muirii*, as it is the dominant species, but it is also common elsewhere on the farm portion and is not threatened by the current development.

9.3 Construction Phase

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. 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 and Habitats.

Description: The Permanent loss of the fynbos thicket mosaic (Hartenbos Dune Thicket which is EN). The fynbos could also be reminiscent of Swellendam Silcrete Fynbos which is also EN. This loss is due to 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 already illustrated in 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 the ECO or botanist (a botanist is preferred if the ECO is unsure of the species on the site), 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 vegetation following construction processes and must therefore be treated with care.
    b. Topsoil from fynbos 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 the proposed development does not have enough space for the storage and protection of topsoil within the disturbance envelope, then the Contractor must identify an alternative 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 made using semi-permeable materials. See Fig. 17 for an example.

Figure 17: An image of roads associated with minimal edge effects.

Discussion of alternatives: The impact in Table 6 below indicates that the proposed development could be a Moderate negative impact, but that this can also be mitigated to a residual impact of Minor negative. A residual impact in this report simply means the significance of an impact after mitigation is applied.

Table 6: Construction Impact 1 – Permanent Loss of Terrestrial Biodiversity and Habitats.

CONSTRUCTION	Without Mitigation	With Mitigation
Duration	Permanent	Permanent
Extent	Very limited	Very limited
Intensity	Moderate	Very low
Probability	Certain	Certain
SCORE	Moderate Negative: -84	Minor Negative: -70
Confidence	High	High
Reversibility	Low	Low
Resource irreplaceability	Moderate	Moderate

9.3.2 Construction Impact 2 – Permanent Loss of Stands of SCC and Important Plants.

Description: The permanent loss of SCC and other important 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 (with a botanist/ecologist on the site to provide guidance on best practice).
    a. Plants with a high likelihood of survival (Geophytes, succulents, and tree seedlings) 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 to preserve as much as possible of the soil around the roots of the plants. These could then be temporarily planted elsewhere for the duration of the construction phase.
    c. The rescued plants must be kept in a nursery that should preferably be set up on the site in an existing disturbed area. 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.
    d. 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 fynbos abound the developments and reduce the possibility of negative edge effects on the site.
    e. 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 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. Prior & during construction: Collect seeds from healthy fynbos populations, ensuring a diverse genetic pool. Consult with horticulturalists (e.g., Kirstenbosch) to obtain the best methods & timing for this). This is an optional step, as this will require a lot of effort, cost, & planning.

        ii. 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, A. muirii, Chironia baccifera, Watsonia pillansii, Chasmanthe aethiopica, Restio leptoclados, Passerina corymbosa*, etc.

        iii. Adaptive management – Be prepared to adapt strategies based on monitoring results and environmental conditions.

Discussion of alternatives: The impact in Table 7 below indicates that the proposed development could be a Moderate negative impact, but that this can also be mitigated to a residual impact of Minor negative.

Table 7: Construction Impact 2 – Permanent Loss of Stands of SCC and Important Plants.

CONSTRUCTION	Without Mitigation	With Mitigation
Duration	Permanent	Permanent
Extent	Very limited	Very limited
Intensity	Low	Negligible
Probability	Certain	Certain
SCORE	Moderate Negative: -77	Minor Negative: -63
Confidence	High	High
Reversibility	Low	Low
Resource irreplaceability	Moderate	Moderate

9.4 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 Impact 1 – Long-term Fragmentation & Habitat Loss from Landscaping.

Description: Ongoing and long-term habitat loss caused by landscaping and gardens. Fynbos / Strandveld here is negatively affected by the cultivation of species that are not indigenous to the vegetation type and surrounding landscape. Many of these species have the potential to become invasive and displace native species in the environment. 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 on Portion 76 of 216, especially where the habitat is becoming increasingly invaded in EN habitat (Hartenbos Dune Thicket & fynbos).
    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. 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. 18) 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 across Portion 76 of 216.

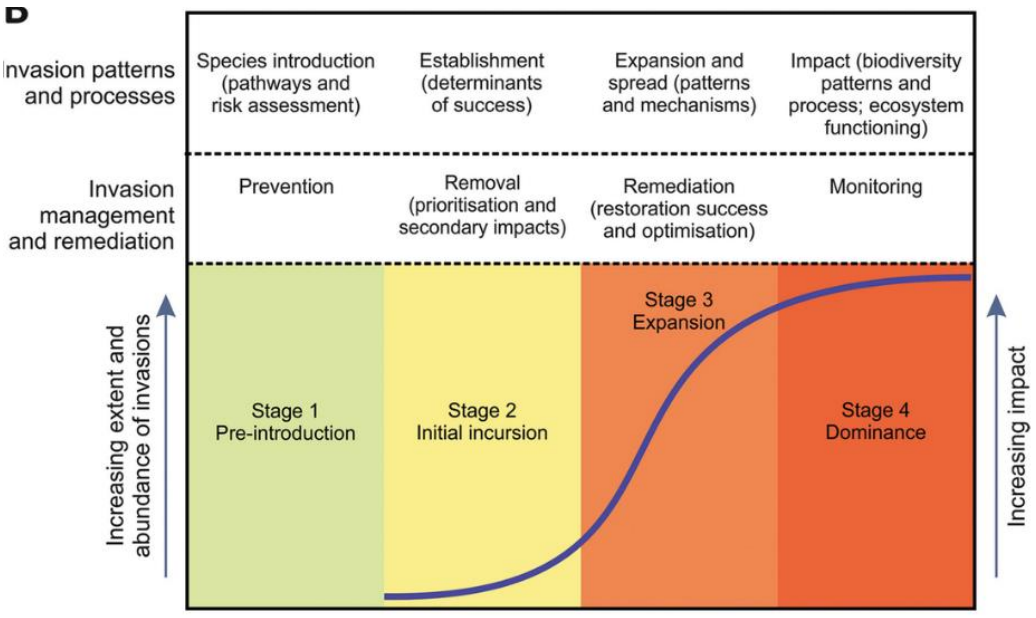

Figure 18: An infographic from the Centre for Invasion Biology showing how invasive alien plants should be managed depending on the degree of invasion severity (Van Wilgen et al., 2014).

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 & strandveld 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 environment. 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).

Discussion of alternatives: The impact in Table 8 below indicates that the proposed development could be a Moderate negative impact, but that this can also be mitigated to a residual impact of Minor negative. The No-go scenario, or status quo also has a minor negative impact as the vegetation and habitats are threatened by large established invasives, mainly Rooikrans, as well as garden escapee species from the surrounding Jongensfontein residential area.

Table 8: Operational Impact 1 – Long-term Fragmentation & Habitat Loss from Landscaping.

CONSTRUCTION	Without Mitigation	With Mitigation	No-go
Duration	Ongoing	Short term	Ongoing
Extent	Limited	Very limited	Very Limited
Intensity	Moderate	Low	Very Low
Probability	Certain	Almost Certain	Almost Certain
SCORE	Moderate Negative: -84	Minor Negative: -63	Minor negative: -54
Confidence	High	High	High
Reversibility	Low	Low	Low
Resource irreplaceability	Moderate	Moderate	Moderate

9.5.2 Operational Impact 2 – Loss of SCC and Diversity from Inappropriate Landscape Management and Use.

Description: Landscape management that negatively affects the vegetation and SCC of the property mainly includes inappropriate, or lacking fire management, inappropriate recreational use of the natural spaces, and road maintenance.

Mitigation:

1. The owner of the property will need to join a Fire Protection Association (FPA). Useful websites related to this include the FPA of Southern Africa, the Southern Cape FPA, Working on Fire (WoF), and Firestop.
2. Portion 101 of 489 will require a Fire Management Plan. A fire management plan starts with a fire risk assessment, however it is also important to understand that fynbos is a fire driven and fire dependent system.
    a. Risk management:
        i. Wildfire prevention measures, such as controlled burns, mechanical thinning, and the removal of dead or invasive vegetation must be included in the plan. Prevention measures also include firebreaks and establishing defendable spaces around buildings and infrastructure to protect from wildfire.
        ii. Wildfire response strategies include emergency planning & procedures, training & drills, and ensuring that firefighting resources are adequate and available.
    b. Ecological Management:
        i. Consider the readiness of the fynbos for a fire, as well as the ecological impacts on species when planning a controlled fire. Appendix 12.5 contains information for landowners when considering ecological burns,

and the principles included in the appendix must be worked into the fire management plan for Portion 101 of 489.

ii. Recovery strategies post-fire that are included in a Fire Management Plan includes rehabilitation plans for burned areas, monitoring and evaluation of the landscape.

3. 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.

    d. Stabilize disturbed soils promptly with native vegetation or erosion control materials. Erosion control measures are discussed in more detail in the aquatic specialist report.

4. Path design and maintenance must be done in an ecologically friendly manner

    a. Use signs to educate visitors about the sensitivity of the area and the importance of staying on designated paths.

    b. Add educational boards to the landscape about the fynbos of the area. Make use of a botanist, or CapeNature, or an ecologist to help inform and design these educational boards.

    c. Plan paths to avoid areas with rare or endangered species, wetlands, or fragile ecosystems. Utilize less sensitive areas where the vegetation is more resilient.

    d. Align paths to follow natural contours of the land, reducing erosion and water runoff, which can damage fynbos vegetation.

    e. Regularly maintain paths to avoid widening them, or too frequent repairs that leads to additional clearance of vegetation. A width of 50-60 cm is often sufficient for walking paths.

        i. Use natural, permeable materials like clean crushed stone or gravel to stabilize the path surface, reducing erosion while blending with the environment.

        ii. Apply a thin layer of organic mulch (e.g., wood chips) on the path to protect the soil, retain moisture, and prevent compaction. Ensure the mulch is free of seeds to avoid introducing non-native species.

        iii. Use rocks, or logs, to deter visitors from stepping off the path and trampling sensitive vegetation. Dense shrubbery may be a fire hazard, and visitors must be made aware of the risk of fire.

        iv. In areas prone to waterlogging, use stepping stones or flat rocks embedded in the soil to provide a stable surface without covering large areas.

v. Allow for natural regrowth of fynbos species along the edges of the path. This helps to integrate the path into the environment over time.

5. Monitoring of landscape paths & use
    a. Clearly state the legal consequences of removing plants or damaging the environment, and ensure that these are enforceable.
    b. Regularly monitor and walk around the landscape that is being utilised in order to identify and address any poaching if it is observed.
    c. In highly sensitive areas, consider limiting the number of visitors or implementing timed entry (day visitors) and paid entry (entry fee) to reduce the impact on the environment. Restrict the size of groups walking or cycling to minimize trampling and the temptation to leave the path.
    d. No motorcycles should be allowed in the landscape.
6. The roads (old and new extensions) of Portion 11 of 449 must be maintained and graded according to a plan
    a. Remove only necessary vegetation for road maintenance, avoiding unnecessary clearing of native plants.
    b. Use gravel or other stabilizing materials to reduce dust and prevent erosion of the road surface where problem areas are identified.
    c. Have speed bumps with visible low-speed limits to reduce dust generation and minimize disturbance.

Discussion of alternatives: The impact in Table 9 below indicates that the proposed development could be a Moderate negative impact, but that this can also be mitigated to a residual impact of Minor negative. The No-go scenario, or status quo also has a minor negative impact as the SCC are affected by the lack of active consideration for fire management etc.

Table 9: Operational Impact 2 – Loss of SCC and Diversity from Inappropriate Landscape Management and Use.

CONSTRUCTION	Without Mitigation	With Mitigation	No-go
Duration	Ongoing	Brief	Ongoing
Extent	Limited	Limited	Very Limited
Intensity	High	Low	Low
Probability	Certain	Certain	Probably
SCORE	Moderate Negative: -91	Minor Negative: -49	Minor negative: -40
Confidence	High	High	High
Reversibility	Low	Low	Low
Resource irreplaceability	Moderate	Moderate	Moderate

10. CONCLUSION

All of the impacts assessed in this report are likely to have a moderately negative significance if no mitigation is applied. With mitigation (i.e., the residual impacts), both the construction and operational phase impacts can be improved to minor negative impacts. As discussed in the layout and design phase discussion, this impact assessment is limited to the small development proposed for six glamping dwellings on Portion 101 of 489. The preferred alternative for the site (six glamping pods with access) is the only development part of this assessment, and the remainder of the property will remain Agriculture, and the site will not be rezoned as the development of six pods is regarded as a consent use under AGZII. Currently, the development is small enough that all impacts can be mitigated to Minor negative impacts, which is not significantly different from the no-go scenario (status quo). Because of this, the glamping development proposed will not trigger a biodiversity offset.

10.1 Cumulative impact considerations

Despite no applications existing currently, any future additional development to the scope / footprint of the current SDP will require further specialist assessment. Such possible future development scenarios will have a cumulative effect on the impacts assessed in this report and may trigger an offset due to the sensitive nature of the habitats and vegetation present here. Following a precautionary approach, it is recommended that no more than 3 ha out of the total 61 ha of Portion 101 0f 489 should be developed (that is ca. 5% of the total area). The current and planned development areas at the time of writing this report amount to:

- Dirt road along the south: ca. 709 sqm
- Daytona road: ca. 1502 sqm
- Main road & connecting road: ca. 21206 sqm
- Reservoir: ca. 196 sqm
- Proposed Project Area of Influence (PAOI): ca. 5070 sqm
- **TOTAL area: ca. 28 683 sqm (ca. 2.8 ha)**

The recommendation of a maximum of ca. 5% total development is to ensure that an average offset ratio of 20:1 can be applied if necessary in the future, without complicating offset requirements offsite (unless, of course, the portion is subdivided). For developments that impact endangered (EN) ecosystems, the offset ratio often ranges between 10:1 to 30:1, depending on several factors (National Environmental Management: National Biodiversity Offset Guideline; Moilanen & Kotiaho, 2018).

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12. APPENDIX

12.1 Provisional plant species list

A species accumulation curve for all the species recorded on the site during the assessment are presented in Fig. 19. All species that were observed during the site visit are in Table 10. The site assessment species list is not exhaustive.

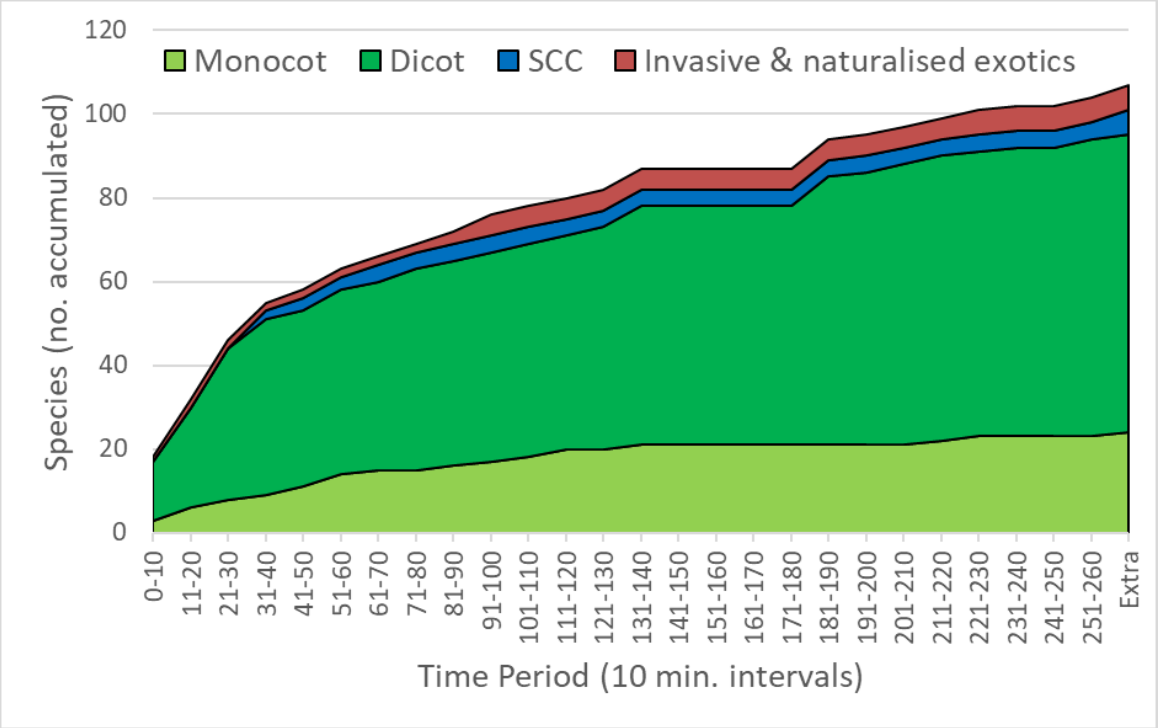

Figure 19: A plant species accumulation curve for the site assessment.

Table 10: A provisional species list made for the site assessment on Portion 101/489. The orange species are naturalised exotic and invasive species, in blue are all the species of conservation concern on the site (ranging from NT to EN) and in green is the protected tree species on the site.

Family	Species	Common name	No. agree-ments on iNat	Information
Liliopsida (Monocots)				
Amaryllidaceae	*Brunsvigia orientalis*	Candelabra lily	0	
Amaryllidaceae	*Haemanthus coccineus*	Spotted bloodlily	1	
Amaryllidaceae	*Haemanthus sanguineus*	Smooth bloodlily	1	
Asparagaceae	*Albuca cooperi*	Dainty soldier-in-a-box	0	
Asparagaceae	*Asparagus aethiopicus*	African asparagus	0	
Asparagaceae	*Asparagus rubicundus*	Redstem asparagus	1	
Asparagaceae	*Asparagus suaveolens*	Catthorn asparagus	0	
Asphodelaceae	*Aloe arborescens*	Candelabra aloe	0	
Asphodelaceae	*Caesia contorta*	Common grasslily	1	
Asphodelaceae	*Trachyandra divaricata*	Branch capespinach	0	
Commelinaceae	*Commelina africana*	African yellow dayflower	1	

Cyperaceae	*Ficinia ramosissima*	Branch clubrush	1	
Cyperaceae	*Hellmuthia membranacea*	Helmet sedge	1	
Haemodoraceae	*Wachendorfia paniculata*	Common butterflylily	1	
Iridaceae	*Aristea cf. ecklonii*	Blue brilliant	0	
Iridaceae	*Chasmanthe aethiopica*	Cobra lily	0	
Iridaceae	*Ferraria crispa*	Black flag	0	
Iridaceae	*Freesia leichtlinii alba*	White kammetjie	0	SANBI Red List: Near Threatened B1ab(ii,iii,iv,v)
Iridaceae	*Lapeirousia anceps*	Long kabong	1	
Iridaceae	*Moraea sp.*	Cape tulips	0	
Poaceae	*Briza maxima*	Greater quaking grass	2	Naturalised exotic (northern Africa, western Asia and southern Europe)
Poaceae	*Ehrharta calycina*	Perennial veldtgrass	0	
Poaceae	*Festuca sp.*	Fescues	0	
Poaceae	*Lolium sp.*	Ryegrasses	0	Naturalised exotic (Europe, Asia and northern Africa)
Restionaceae	*Restio eleocharis*	Beach pegreed	1	
Restionaceae	*Thamnochortus*	Thatching reeds	0	
Restionaceae	*Thamnochortus insignis*	True thatchreed	0	
Tecophilaeaceae	*Cyanella lutea*	Yellow ladieshand	1	
Magnoliopsida (Dicots)				
Aizoaceae	*Carpobrotus deliciosus*	Delicious sourfig	1	
Aizoaceae	*Cleretum bellidiforme*	Livingstone daisy	3	
Aizoaceae	*Conicosia pugioniformis*	Pig's-root	2	
Aizoaceae	*Drosanthemum intermedium*	Dewfig species	1	
Aizoaceae	*Lampranthus multiseriatus*	Dewplant species	3	
Aizoaceae	*Ruschia gracilis*	Tentfig species	2	
Aizoaceae	*Ruschia macowanii*	Beach tentfig	1	
Aizoaceae	*Tetragonia fruticosa*	Sprawling seacoral	1	
Amaranthaceae	*Exomis microphylla*	Brakbos	0	
Anacardiaceae	*Searsia crenata*	Crowberry	0	
Anacardiaceae	*Searsia glauca*	Blue kunibush	0	
Apocynaceae	*Carissa bispinosa*	Num-num	1	
Apocynaceae	*Cynanchum obtusifolium*	Roundleaf buckhorn	1	
Asteraceae	*Arctotheca prostrata*	Prostrate capeweed	0	
Asteraceae	*Chrysocoma ciliata*	Bitterbush	1	
Asteraceae	*Cineraria geifolia*	Hairy cineraria	0	
Asteraceae	*Crassothonna alba*	Succulent species	0	
Asteraceae	*Cullumia carlinoides*	Limestone snakethistle	0	SANBI Red List: Near Threatened B1ab(ii,iii,iv,v)
Asteraceae	*Dimorphotheca pluvialis*	Rain daisy	0	
Asteraceae	*Felicia amoena*	Soft felicia	0	
Asteraceae	*Helichrysum cochleariforme*	Gold-and-silver everlasting	0	SANBI Red List: Near Threatened B1ab(ii,iii,iv,v)

Asteraceae	*Helichrysum patulum*	Honey everlasting	0	
Asteraceae	*Helichrysum teretifolium*	Needle everlasting	0	
Asteraceae	*Metalasia muricata*	White bristle bush	0	
Asteraceae	*Osteospermum moniliferum*	Bietou	0	
Asteraceae	*Othonna undulosa*	Clambering babooncabbage	1	
Asteraceae	*Senecio elegans*	Red-purple ragwort	0	
Asteraceae	*Seriphium cinereum*	Karoo snakebush	0	
Asteraceae	*Sonchus oleraceus*	Common sow-thistle	0	Naturalised exotic (Europe & western Asia)
Brassicaceae	*Heliophila linearis*	Needle sunspurge	1	
Campanulaceae	*Wahlenbergia subulata*	Capebell species	0	
Celastraceae	*Cassine peragua*	Cape saffron	1	
Celastraceae	*Lauridia tetragona*	Climbing saffron	1	
Celastraceae	*Mystroxylon aethiopicum*	Kooboo-berry	0	
Celastraceae	*Pterocelastrus tricuspidatus*	Candlewood	0	
Celastraceae	*Putterlickia pyracantha*	Bastard spikethorn	1	
Crassulaceae	*Cotyledon orbiculata*	Pig's ear	1	
Crassulaceae	*Crassula expansa*	Fine stonecrop	1	
Ebenaceae	*Diospyros dichrophylla*	Poison starapple	0	
Ebenaceae	*Euclea racemosa*	Dune gwarrie	1	
Euphorbiaceae	*Euphorbia burmannii*	Sweet milkbush	0	
Fabaceae	*Acacia cyclops*	Western coastal wattle	2	Listed invasive. NEMBA cat. 1b CARA cat. 2 (Australia)
Fabaceae	*Aspalathus alopecurus*	Foxtail capegorse	1	
Fabaceae	*Aspalathus quinquefolia virgata*	Fiveleaf capegorse	1	
Fabaceae	*Dipogon lignosus*	Okie bean	1	
Fabaceae	*Lessertia frutescens*	Cancer bush	2	
Fabaceae	*Melilotus indicus*	Small melilot	1	Naturalised exotic (northern Africa, Europe and Asia)
Fabaceae	*Podalyria myrtillifolia*	Myrtle capesweetpea	1	
Fabaceae	*Psoralea brilliantissima*	Brilliant fountainbush	1	
Fabaceae	*Tephrosia capensis*	Cape hoarypea	1	
Gentianaceae	*Chironia baccifera*	Christmas berry	0	
Geraniaceae	*Geranium incanum*	Carpet crane's-bill	1	
Geraniaceae	*Pelargonium capitatum*	Rose-scented geranium	1	
Geraniaceae	*Pelargonium triste*	Night-scented pelargonium	2	
Lamiaceae	*Leonotis ocymifolia*	Rock lionspaw	0	
Menispermaceae	*Cissampelos capensis*	Cape moonseed vine	0	
Oleaceae	*Chionanthus foveolatus*	Pock-ironwood	0	
Oleaceae	*Olea exasperata*	Dune olive	0	
Oxalidaceae	*Oxalis sp.*	Woodsorrels	1	
Papaveraceae	*Papaver somniferum*	Opium poppy	2	Naturalised exotic (Mediterranean & Europe)
Polygalaceae	*Muraltia spinosa*	Tortoise berry	0	

Polygalaceae	*Polygala myrtifolia*	Sweet pea shrub	1	
Primulaceae	*Myrsine africana*	African boxwood	0	
Proteaceae	*Leucadendron salignum*	Common sunshine conebush	0	
Proteaceae	*Leucospermum praecox*	Mossel bay pincushion	0	SANBI Red List: Vulnerable A2c+3c+4c
Rhamnaceae	*Phylica ericoides*	Heath hardleaf	0	
Rhamnaceae	*Trichocephalus stipularis*	Dogsface	0	
Rubiaceae	*Rubia petiolaris*	Madder species	1	
Rutaceae	*Agathosma imbricata*	Tile buchu	1	
Rutaceae	*Agathosma muirii*	Heart buchu	2	SANBI Red List: Vulnerable A4abc
Salvadoraceae	*Azima tetracantha*	Needle bush	0	
Santalaceae	*Colpoon compressum*	Cape sumach	0	
Santalaceae	*Thesium fragile*	Beach rootthug	2	
Sapotaceae	*Sideroxylon inerme inerme*	Southern white milkwood	0	
Scrophulariaceae	*Hebenstretia integrifolia*	Summer slugwort	0	
Scrophulariaceae	*Manulea caledonica*	Phloxes	0	SANBI Red List: Near Threatened B1ab(ii,iii,iv,v)
Scrophulariaceae	*Nemesia affinis*	Common lionface	0	
Thymelaeaceae	*Passerina rigida*	Beach gonna	0	
Thymelaeaceae	*Struthiola argentea*	Evening capespray	0	
Vitaceae	*Rhoicissus digitata*	Baboon grape	0	
Zygophyllaceae	*Roepera morgsana*	Salad twinleaf	0	

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**	**Class I:** **RESIDUAL**	**Class II:** **MODIFIED**	**Class III:** **TRANSFORMED**	**Class IV:** **REPLACED -ADVENTIVE**	**Class V:** **REPLACED -MANAGED**	**Class VI:** **REMOVED**
		Areas where native vegetation does not naturally persist	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	Native vegetation community structure, composition and regenerative capacity intact—perturbed by land use or land management practice	Native vegetation community structure, composition and regenerative capacity significantly altered by land use or land management practice	Native vegetation replacement—species alien to the locality and spontaneous in occurrence	Native vegetation replacement with cultivated vegetation	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

12.5 Fact Sheet by Cape Nature Explaining the Need for Ecological Fire Management

FACT SHEET

What a landowner needs to know about FIRE MANAGEMENT

CapeNature

Periodic natural fires have always occurred in fynbos and renosterveld ecosystems. In fact, fires are vital to retain fynbos and renosterveld in an ecologically healthy condition. Fire is an important ecological driver required to maintain the species richness in these ecosystems. Many plants actually need fires to reproduce and ensure their longterm survival. The challenge today is how to use fire in a fragmented and highly modified modern landscape to ensure the survival of all plant and animal species. Although fynbos is a fire-adapted system, just one or two inappropriate fires at the wrong time of year, or no fire at all, can cause the local extinction of species. However, local differences in habitat, geology and climate preclude a 'recipe' approach.

The most important use of fire in conservation management is to maintain viable and healthy populations of all plant and animal species present. Other objectives may include: reduction of fuel load to prevent unmanageable wildfires; control of invasive alien plants; promotion of desirable plants for the flower-picking industry; or safeguarding property and infrastructure. Using fire to improve grazing or increase water yield in catchments can be disastrous and may cause local extinction of species. Furthermore, high grazing pressure after a fire can have a worse affect on veld condition than the fire itself.

Principles of Fire Management

Frequency

The interval between fires should largely be determined by the growth rate of natural, existing plants. No fire should be permitted in fynbos until at least 50% of the population of the slowest-maturing species in an area have flowered for at least three successive seasons (or at least 90% of the individuals of the slowest maturing species in the area have flowered and produced seed). Similarly, a fire is probably not necessary unless a third or more of the plants of these slow-maturing species are senescent (i.e. dying or no longer producing flowers and seed).

Research suggests that, under natural conditions the ***minimum*** fire return interval for moist mountain and lowland fynbos should be between 12 and 20 years and arid mountain fynbos 25 years, whilst that of moist renosterveld (e.g. in coastal plain areas) should be around 10 years and arid renosterveld (e.g. the inland areas) between 15 or more years. The variance in the length of the interval will be dependant on climatic and rainfall cycles, as well as the aspect on which the vegetation occurs. Arid fynbos, from e.g. the Cederberg and Koue Bokkeveld, has a significantly longer fire cycle of up to 50 years. Fire at intervals greater than 25 years may result in fynbos from moist climates becoming senescent but, generally, the greatest challenge is to protect fynbos from fires that are too frequent.

Although not much research has been conducted on the role of fire in renosterveld, it is likely that the above guidelines are a good starting point. Again, regional variances in renosterveld habitats preclude a 'recipe' approach. As renosterveld can contain a high proportion of grasses that are fast growing and highly flammable, it can burn more frequently than fynbos. It should however be noted that there are often individuals of *Protea* species present in some renosterveld areas, and these species are good indicators for determining fire intervals. However, renosterveld is less dependent on fire than fynbos and too frequent fires could be detrimental for the ecosystem. Fires are nevertheless very important for many species to stimulate seed germination, especially those species that are dependent on ants for seed dispersal. While fire will promote grass regeneration and can temporarily improve grazing, regular burning in renosterveld to promote a 'green flush' can result in the disappearance of a number of plants that require longer fire cycles (e.g. the legumes that fix nitrogen into the soil).

Intensity

Fire intensity is closely associated with season of burn. The intensity of a fire is influenced by the fuel load, fuel moisture, relative humidity and wind speed. The intensity can be manipulated by either reducing the fuel load (i.e. burning more often) or by selecting conditions that will lead to the desired type of fire. Most fynbos species require high intensity fires for survival, however low intensity burns are often favoured for safety reasons. This is however not recommended as such burns could lead to loss of species that do need high intensity fires (e.g. *Leucospermum* (Pincushions), *Mimetes* (Pagoda), etc.) and favour small-seeded, often weedy or pioneer species such as *Helichrysum* spp. (everlastings) and *Stoebe* (slangbos). Repeated, low intensity fires will result in an increase in these weedy species, which will increase the flammability of the veld at an early age. Alien plants impact significantly on intensity (and consequently frequency) due to their flammable oils and the greater biomass created by the density of invasion.

Season

Due to the Mediterranean climate (summer drought) over most of the Fynbos biome, natural fires occur mainly in sum-

mer but can occur at any time under suitable weather conditions. Prescribed burning in the summer months (Dec– Feb) is seldom done due to the risk of runaway fires. Burning is usually only feasible in March and early April. Generally, fire experts consider late summer and early autumn (February to early April) the best time to burn. Seedlings that establish after such fires have the best chance of survival, because they have the generally cooler and wet months during late autumn, winter and spring to manifest themselves, before the following summer.

Proportion of area burned - maintaining a landscape mosaic

On large properties (1000+ ha) it is advisable to maintain a mosaic of different vegetation ages. Block burns are however expensive to implement. Weighing up ecological need, financial implications and practical reality, it is recommended that land managers aim at fire management blocks of 300-500 hectares, if possible. If the property is less than 300 hectares, make the fire management blocks as large as possible – preferably more than 100 hectares each. Any area of less than 50 hectares, should be burnt in one fire event - ***do not subdivide the area into smaller blocks***. Small fires of limited extent are problematic because of the significant loss of seeds to seed eaters (e.g. rodents) after the fire. The other problem pertains to the fire intensity – fires take time to build up adequate energy and gain momentum to create a clean burn. If need be (and possible), consider consolidation into larger management units with neighbouring properties.

Authority to burn

In order to undertake a burn during the prescribed season, permission must be obtained from the local Fire Protection Association (if operational) and the District Municipality. CapeNature should also be notified.

Do's and Don'ts of Fire Management

DO ✔

- Burn vegetation at the end of summer or early autumn.
- Ensure you have adequate firebreaks to be able to fight runaway fires – NOTE: firebreaks do not stop/prevent fires – they simply create access points to fight fires from. The Veld and Forest Fire Act states that owners must pay attention to weather, climate, terrain and vegetation in deciding how to prepare a firebreak. If optimal firebreak position is not along a common boundary with neighbours, decide on relocation of fire breaks in collaboration with neighbouring landowners - consider relocating firebreaks to a point where it would be practical to access the area (e.g. existing roads)

  A firebreak must:
  - be wide enough and long enough to have a reasonable chance of accessing the area to fight the fire (NOTE: Bear in mind that under extreme fire conditions, particularly during strong winds, the widest possible fire breaks will not stop the spread of a fire.)
  - not cause soil erosion (it is not advisable to bulldoze firebreaks)
  - be reasonably free of inflammable material
- Inform property neighbours of your intention to burn at least two weeks prior to the event.
- Maintain fire fighting equipment and ensure that it is in working order and that people are trained in fire fighting.
- Keep accurate records of fires, using a map of veld age as a basis. Note the date and time of ignition, weather conditions, etc.
- Join a local Fire Protection Association (FPA) or initiate one, as FPA's encourage neighbouring landowners to work together on common fire management issues.

DON'T ✘

- Never burn vegetation in late autumn, winter or spring.
- Don't place livestock onto vegetation during the first 2 years following a fire. Many of the bulbous species need to have adequate time to flower and set seed; small herbaceous species (e.g. buchu, legume, *Erica* species) need adequate time to properly manifest themselves; grass species need to establish and build up their tussocks; many bulbous species that flower after fire are also toxic to domestic animals. After the 2 years, graze veld only during December to March.
- In fynbos, don't burn vegetation unless you can see that at least 90% of the individuals of the slowest-maturing (e.g. non-sprouting Protea, Leucadendron) species have flowered.
- In renosterveld, don't burn vegetation that is shorter than 50cm and that lacks mature shrubs of a number of different species.
- Don't allow the fuel load to accumulate to dangerous levels.
- Don't leave fires unattended.
- Don't burn on Fridays, weekends and holidays.
- Don't leave an extinguished fire unguarded for at least two days after the burn.

Landowners should devise an appropriate burning strategy, with input from CapeNature on both legal and practical management requirements.

For more information, contact the Fire Management Programme Manager at CapeNature (082 414 6344) or refer to the CapeNature pamphlet 'The Landowner & Fire Protection Associations'.