Impact Assessment for Portion 11 of 449, called Melkhoutefontein, located adjacent to the Gouritz River, 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
FPA	Fire Protection Association
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
VAST	Vegettion Assets, States & Transitions

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: 06 August 2024

BIANKE FOUCHE ABRIDGED CV

Qualifications

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

SACNASP Registration No: 141757 (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 SACNASP, the International Association for Impact Assessment (IAIA) in South Africa, Botanical Society of South Africa, and the custodians for rare and endangered wildflowers (CREW-Outramps) in George.

References

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1. INTRODUCTION

1.1 Background

Confluent Environmental was contracted by the Applicant on the recommendation of Cape EAPrac to undertake an Impact Assessment for botanical and terrestrial sensitivity of Portion 11 / 449 (called Melkhoutefontein) near Vleesbaai in the Hessequa local Municipality. This Portion covers a total area of 105.6 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 Portion 11 of 449. 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 Portion being mapped as:

- Terrestrial critical biodiversity areas (CBA1 & CBA2), and ecological support areas (ESA 2) that are part of the biodiversity spatial plan (BSP) for the Western Cape.
- The Portion also forms part of a mapped freshwater ecosystem priority area (FEPA) sub-catchment.
- The area is mapped as part of endangered (EN) Hartenbos Dune Thicket, EN Cape Lowland Alluvial vegetation, and EN Albertinia Sand Fynbos.

1.2 General Site Location

Portion 11 / 449, west of Vleesbaai is located on a sandy substrate. The portion borders on the Gourits River and is approximately 5.5km north of the coastline (Fig. 1). The R325 road passes through Portion 11 of 449 from the north to the south. This is the main road from which the eastern and western portions of the Portion can be accessed. Apart from the R325 road, the roads on the Portion are informal gravel roads. A servitude area crosses the eastern portion of the Portion (Fig. 1); however, this servitude area is covered by rooikrans and a thicket, and there is no path where it is mapped. One of the proposed development sites is located near this servitude area, across from the existing dwelling.

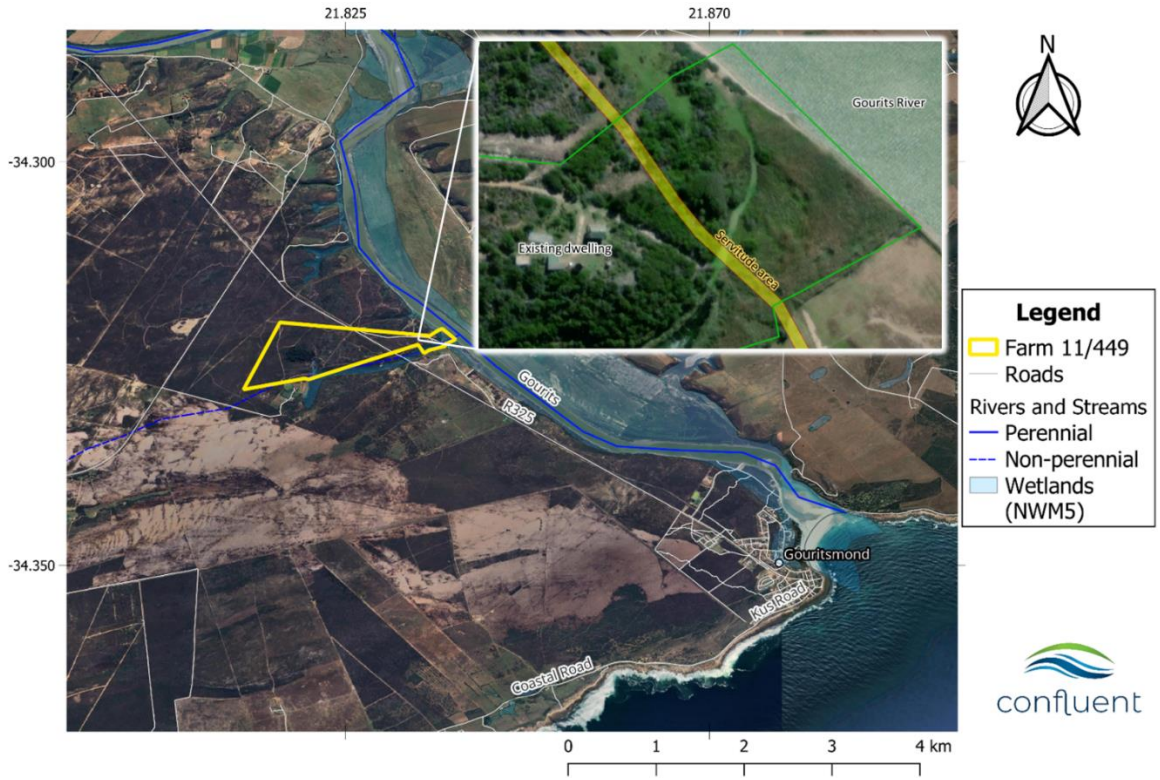


Figure 1: The general location of Portion 11 / 449 near Vleesbaai.

1.3 Site Development Plan

The initial botanical assessment for Portion 11 of 449 was part of a site sensitivity verification process. During this process site constraints and potential no-go areas were identified and discussed. The current site development plan (SDP) has been made to consider multiple specialist reports that have been produced for the portion. The current plan is to develop six cottages / tents in two main “nodes”.

1. The River Node is located near the existing farmhouse at Eastern side of the property next to the Gouritz River (Fig. 2). This is referred to as the River Node.
2. The Eucalyptus Node is located North of a large blue gum (*Eucalyptus*) patch on the Western side of the property (Fig. 2). This is referred to as the Eucalyptus Node.

The current SDP states that each cottage has a footprint of 100 sqm, a 3m by 6m carport, a surrounding area of short groundcover (ca. 5m wide based on observation of the SDP), and a 2500 L water tank for each unit. Each unit will also have a septic tank. New sections of access roads will also need to be constructed, and these will be 3m wide.

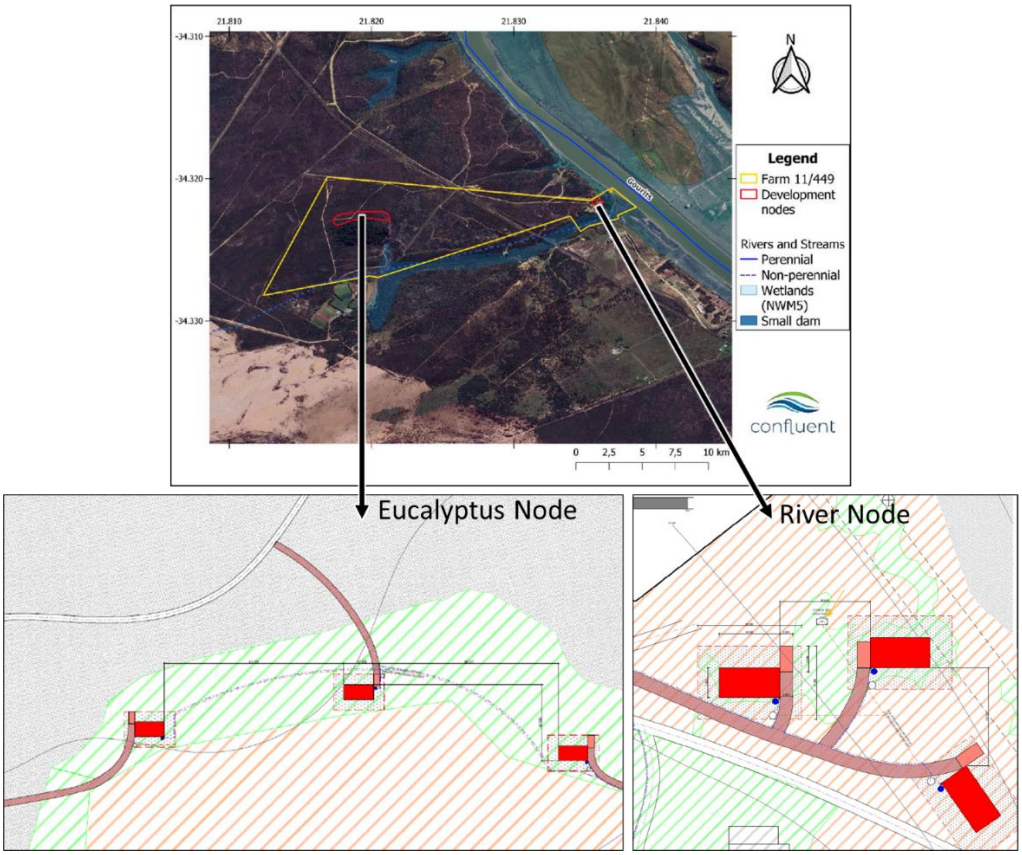


Figure 2: The approximate areas proposed for cottages / camping areas (plans provided are from July 2024). The plans show the proposed layout and location of the septic tanks (open white circles), water tanks (blue circles), and one Ecorock 3000 sewer treatment facility (yellow arrow).

1.4 Alternative: Non-Mitigated SDP

The alternative, non-mitigated SDP for the site covers nearly an identical footprint to the mitigated SDP discussed in Fig. 2. The main difference between the two SDPs is that one cottage within the Eucalyptus node is placed slightly differently, as well as an alteration to the access road serving this cottage (Fig. 3). These adjustments do not significantly alter the overall impact or outcome of the assessment, as the ecological and environmental considerations remain largely unchanged from the preferred alternative.

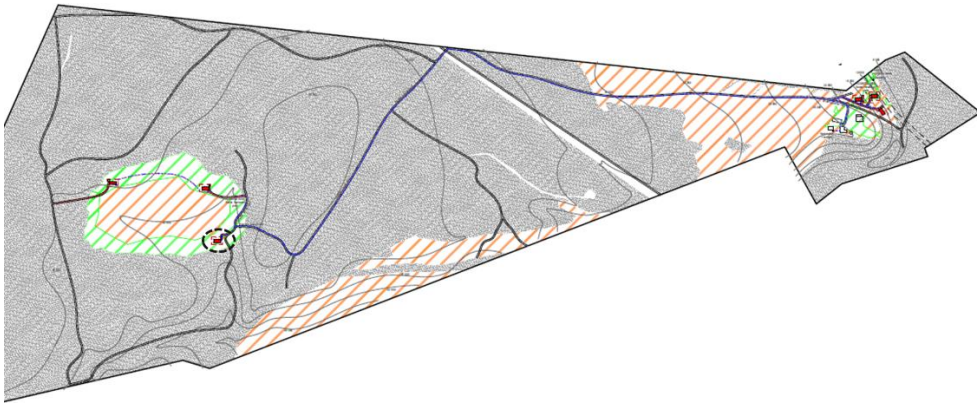


Figure 3: The alternative SDP, where the cottage outlined in a black dotted line on the left represents the design difference between the non-mitigated and preferred mitigated SDPs.

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.
Freshwater Ecosystem Catchments (terrestrial)	Freshwater ecosystem catchments, determined through the National Freshwater Ecosystem Priority Area (NFEPA) process.
Red Listed Ecosystems	Any ecosystem that is listed as Vulnerable, Endangered, or Critically Endangered according to the "Revised National List of Ecosystems that are Threatened and in Need of Protection (NEM:BA Act no.10 of 2004, as amended in November 2022)

3. METHODOLOGY

3.1 Desktop Assessment

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

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

Ecosystem/ vegetation type data was sourced from:

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

3.2 Field Assessment

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

3.3 Assumptions & Limitations

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

- Only one survey took place during winter on the 28th of September 2023. Seasonal and time constraints always play a role in limiting the findings of a terrestrial specialist report.
- Some rare and threatened plant species are difficult to locate and easily overlooked in the field (e.g., geophytes, small succulents, small shrubs, and cryptic spp.). The species list for the area is limited to the findings of the one field assessment, as well as past records on iNaturalist and the Plants of Southern Africa (POSA) database for the proposed development site and its surrounding areas. It is very likely that the species list and SCC reported are not exhaustive (Perret et al., 2023).
- Some species may not have been visible at the time of the site assessment (e.g., some geophytes, annuals, and parasitic plants).
- Many plant species flower seasonally and are therefore difficult to identify outside of their flowering season. Environmental factors such as the prevailing fire regime and level of alien invasion influence the successional stage of the vegetation present at the site, and therefore the species visible at the time of assessment (Cowling et al., 2010; Privett et al., 2001).
- The dense fynbos and thicket sections on the made it hard to gain access to some sections of the site. It is possible that the impenetrable nature of the vegetation in some places caused an SCC/ several SCC to be missed on the site.

4. RESULTS: DESKTOP ASSESSMENT

4.1 Terrestrial Biodiversity

4.1.1 Climate

The climate of Portion 11 / 449 is described as warm and temperate. The rainfall pattern is aseasonal, although two peaks are reflected during Autumn and Spring (see Fig. 4). The temperature throughout the year remains moderate, with sub-zero temperatures rarely occurring.

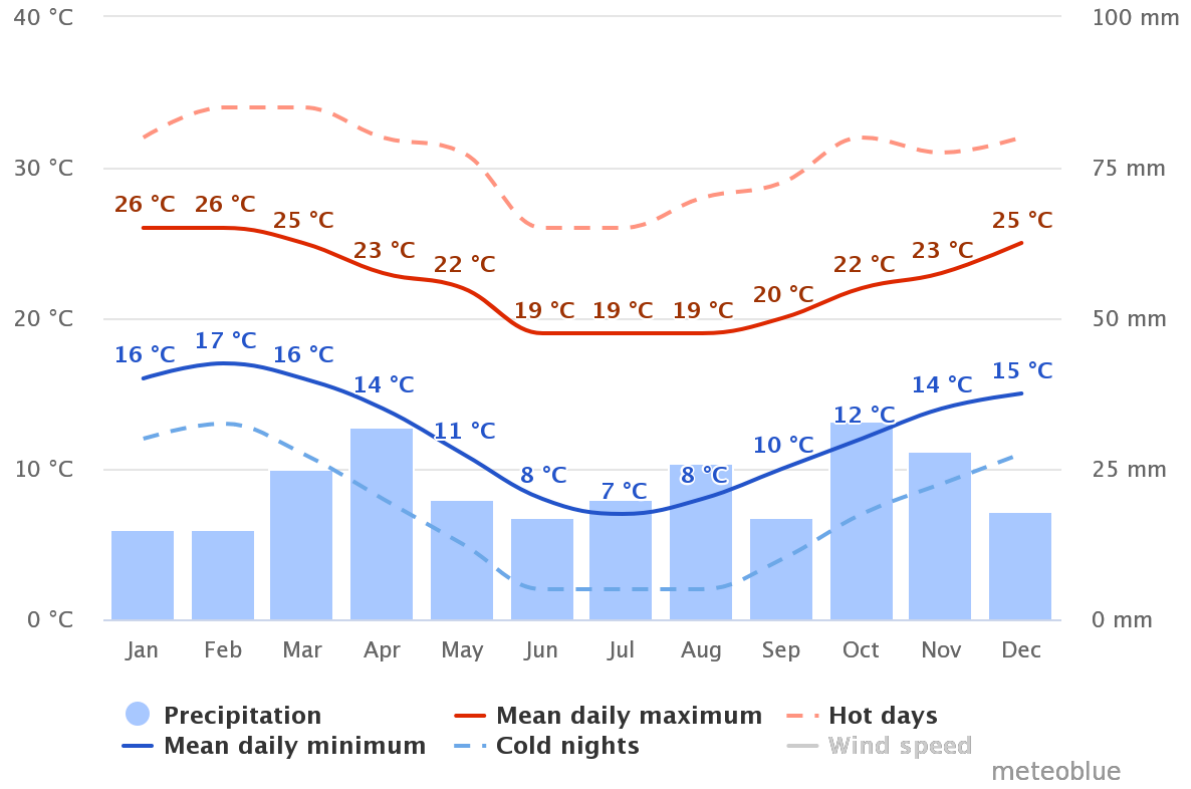


Figure 4: A summary graphic of Simulated historical climate & weather data for Vleesbaai - meteoblue.

4.1.2 Geology and Soil

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

4.1.3 Vegetation Type(s)

Portion 11 of 449 is largely mapped as forming part of the **endangered (EN) Albertinia Sand Fynbos** (Fig. 5; Dayaram et al., 2019; Mucina & Rutherford, 2006). The proposed glamping site within the western portion of the farm falls within this vegetation type. Some least threatened (LT) Canca Limestone Fynbos is also mapped further to the east; however, no development is planned aver that area. The easternmost part of the Portion is mapped as **EN Hartenbos Dune Thicket** with some estuarine / salt marsh vegetation right against the Gouritz River. The eastern glamping site is proposed within the area mapped as Hartenbos Dune

Thicket. The Vlok vegetation map is also available to this area and is also presented in Fig. 5. The Vlok vegetation map, in this instance, has divided Portion 11/449 into fewer vegetation communities, with the majority of the vegetation mapped as Gouritz Dune Thicket (and a small section in the north-west mapped as Canca Thicket-Sandplain vegetation). There is also a section of vegetation mapped as “Gouritz River and Floodplain” by the Vlok vegetation map.

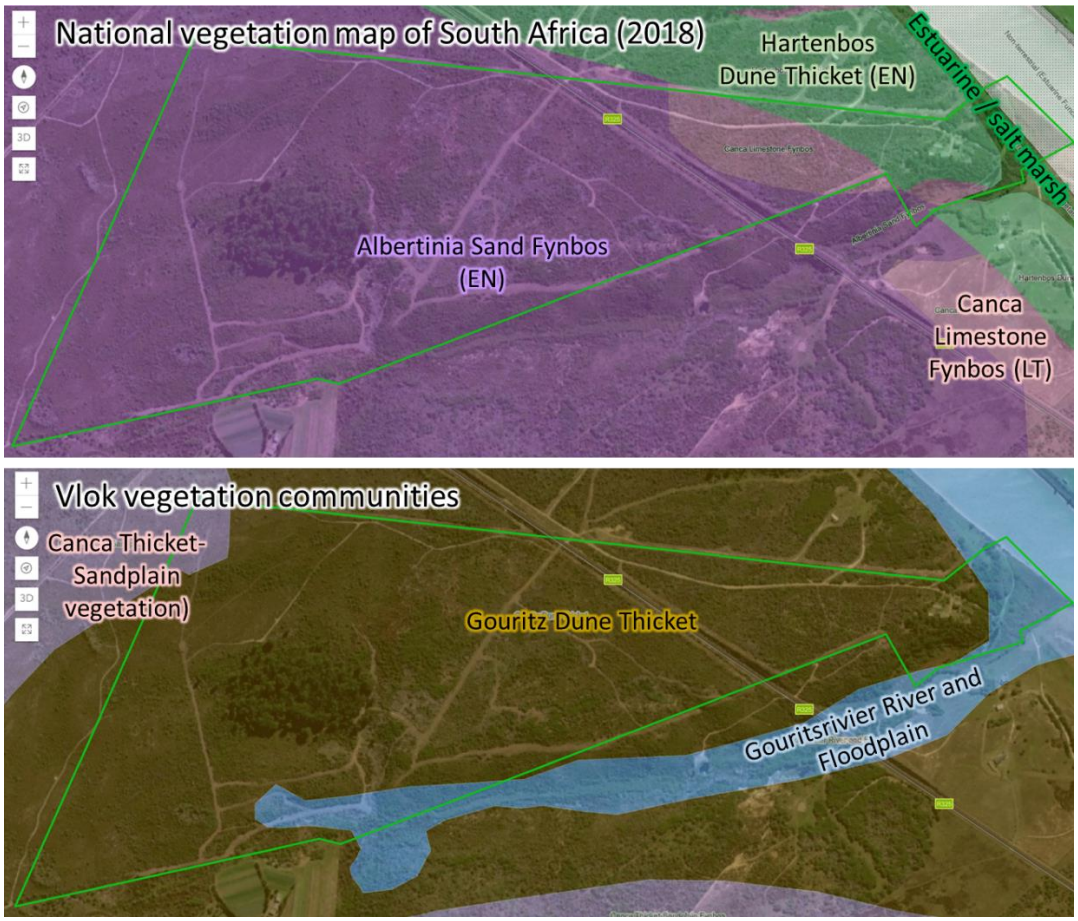


Figure 5: A) The mapped vegetation types according to the 2018 National Vegetation Map of South Africa (Dayaram et al., 2019; Mucina & Rutherford, 2006). B) The Vlok vegetation map categories for Portion 11 / 449 and the surrounding area.

4.1.3.1 EN Albertinia Sand Fynbos

This is the mapped vegetation type for the western proposed glamping site on Portion 11 of 449.

This vegetation type is found only in the western Cape. Some patches of this vegetation type remains unmapped near Great Brak. Patches of Albertinia Sand Fynbos (FFd 9) almost always border limestone vegetation units. This vegetation type is composed of an open shrub layer that can grow up to 1.5 to 2m tall. It is often a structurally a Proteoid fynbos, which was the case within the fynbos habitats on Portion 11 of 449. This vegetation type can also contain Restioid fynbos complexes along watercourses and coastal edges. 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):

Tall shrubs: *Cassine peragua* subsp. *peragua*, *Leucadendron eucalyptifolium*, *Metalasia densa*, *Protea repens*, *P. susannae*, *Nylandtia spinosa*, *Passerina corymbosa*, *Psoralea pinnata*

Low shrubs: *Agathosma bifida*, *A. scaberula*, *Amphithalea tomentosa*, *Anthospermum prostratum*, *Aulax umbellata*, *Carpacoce vaginellata*, *Chironia baccifera*, *Cliffortia ilicifolia*, *C. drepanoides*, *C. stricta*, *Chrysocoma ciliata*, *Diospyros dichrophylla*, *Erica discolor*, *Erica imbricata*, *E. pulchella*, *E. sessiliflora*, *E. versicolor*, *Euryops ericoides*, *Lachnaea axillaris*, *Leucadendron meridianum*, *L. salignum*, *Muraltia ciliaris*, *Passerina galpinii*, *P. rigida*, *Phylica parviflora*, *Psoralea laxa*, *Senecio ilicifolius*, *Staavia radiata*, *Struthiola ciliata* subsp. *incana*, *Syncarpha paniculata*, *Trichocephalus stipularis*, *Trichogyne repens*

Herbs: *Edmondia sesamoides, Senecio laevigatus*

Geophytic Herbs: *Pteridium aquilinum*, *Bobartia robusta*, *Bulbine frutescens*, *Romulea dichotoma*, *R. gigantea*

Graminoids: *Calopsis adpressa*, *Cynodon dactylon*, *Elegia muirii*, *E. stipularis*, *E. tectorum*, *Ischyrolepis leptoclados*, *Mastersiella purpurea*, *M. spathulata*, *Staberoha distachyos*, *Thamnochortus erectus*, *T. fruticusos*, *T. insigins*, *Willdenowia teres*.

4.1.3.2 EN Hartenbos Dune Thicket

This is the mapped vegetation type for the eastern proposed glamping site on Portion 11 of 449.

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 is the second largest mapped vegetation unit over Portion 11 of 449. 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 11 / 449 is given in BOX 1. The entire Portion 11 / 449 is mapped as a terrestrial and CBA 1 (i.e., natural Critical Biodiversity Area; Fig. 6) with small sections of CBA2 are also mapped. The reasons for its assignment of the BSP layers in this area are listed below (grey reasons either do not apply to the site, or are outside of the scope of this study to comment on):

- **Endangered (EN) Albertinia Sand Fynbos**. This mapped vegetation type covers the majority of Portion 11 of 449, including the entire western section of the site.
- **Critically Endangered (CR) Cape Lowland Alluvial Vegetation**. This vegetation is mapped along the easternmost boundary of Portion 11 of 449.
- **Endangered (EN) Hartenbos Dune Thicket**. Portion 11 / 449 is Hartenbos Dune Thicket 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.
- **Least Threatened (LT) Canca Limestone Fynbos**. This vegetation type is mapped on Portion 11 of 449.
- **Threatened plants recorded**. Threatened SCC are known to occur on this property, even before the site assessment of this report.
- **Climate adaption corridor**. This site is connected to the surrounding landscape, and it has been identified as an area of resilience for biodiversity given possible future habitat changes that will be caused by climate change. Comment on the validity of this BSP reason can not be debated in this report.
- **FEPA River corridor, Watercourse protection – Southern Coastal Belt, Southern Coastal Belt Ephemeral Upper Foothill River, and Southern Coastal Belt Permanent Lowland River**. This BSP trigger falls outside of the scope of this study. Refer to the aquatic specialist study for comment.
- **Gourits (Core) Estuary**. This BSP trigger falls outside of the scope of this study. Refer to the aquatic specialist study for comment.

- **South Coast Limestone Fynbos Floodplain Wetland & South Coast Sand Fynbos Channelled Valley Bottom Wetland**. This BSP trigger falls outside of the scope of this study. Refer to the aquatic specialist study for comment.
- **Bontebok natural & extended distribution range.**
- The area is mapped as being part of the **Bontebok extended distribution range**. This trigger falls outside of the scope of this study, as the author is not a mammal specialist.

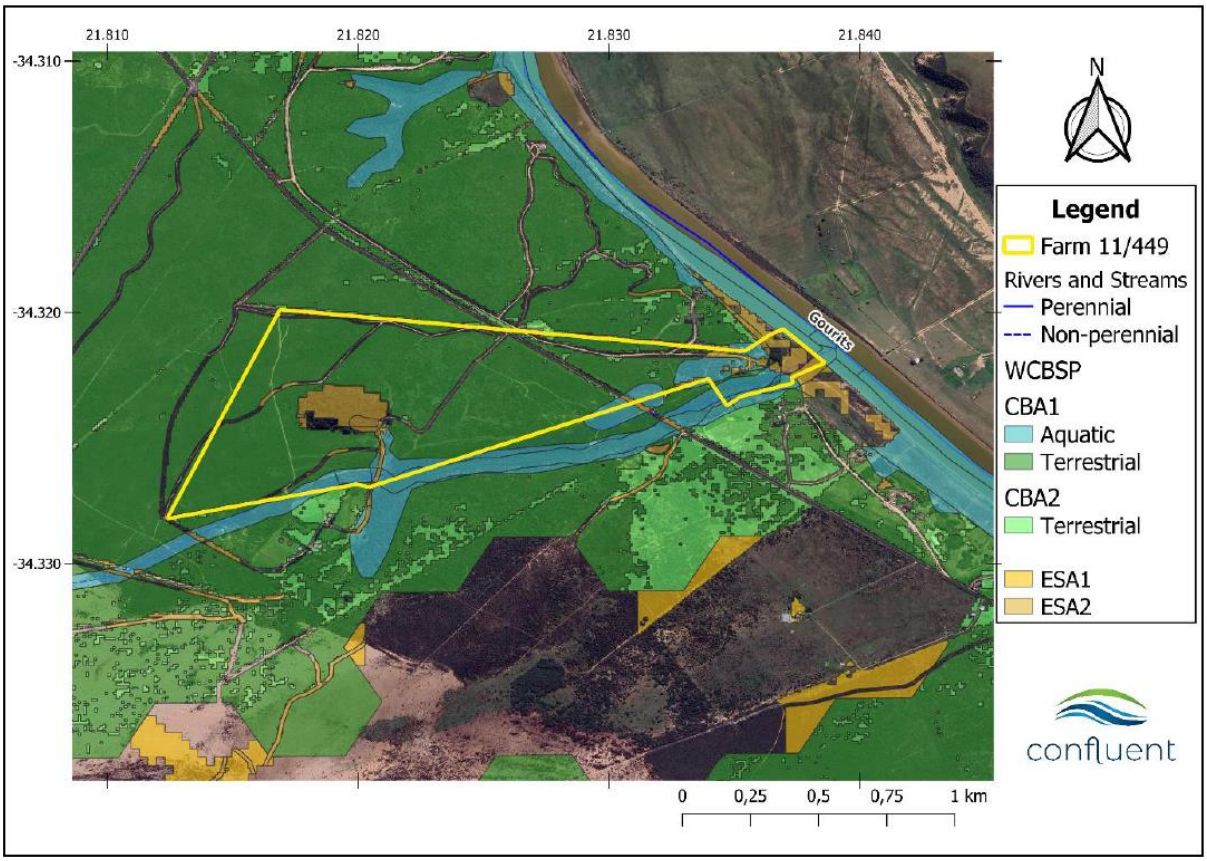


Figure 6: The mapped Western Cape Biodiversity Spatial Plan (WC BSP) categories that have been mapped for Portion 11 of 449 and adjacent surrounding landscape.

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. 7) can be sourced upon request from the CD: NGI Geospatial portal, or from their offices in Mowbray, Cape Town. Google Earth is also a repository of more recent historical images (after 2000). A summary of the imagery of Fig. 7 below is provided below.

1964

The vegetation on Portion 11 of 449 was not in a pristine condition at this time, with various disturbance marks present over the entire site. Invasive tree growth is already visible in the area that is today covered by the large *Eucalyptus* stand in the western section of the farm. It is difficutle to know if some of the disturbance over the site is due to fire, or anthropogenic causes.

1974

The vegetation across Portion 11 of 449 has recovered since the 1974 imagery, apart from the *Eucalyptus* stand, which still appears invaded.

1984

The main road that separates Portion 11 of 449 into western and eastern halves is under construction. Some additional disturbance is also visible over the landscape. This disturbance is vegetation cleared east of the road construction, and in the westernmost section of the farm.

1994

Clearing in the eastern section of the site has reduced in size and is only visible in the area that is currently occupied by the existing dwellings. In the west, however, the clearance of vegetation has increased significantly, including the area that was occupied by the invasive *Eucalyptus* stand.

2000 onwards

The vegetation has once again recovered over Portion 11 of 449; however, a large invasive *Eucalyptus* patch is once more visible in the western portion of the site, and it is seen expanding along its edges until the present day. In 2022 paths and fire breaks over the western section of Portion 11 of 449 was cut and the beginning of invasive alien clearing is visible in some sections of the site adjacent to some of the farm paths (mostly Rooikrans clearing).

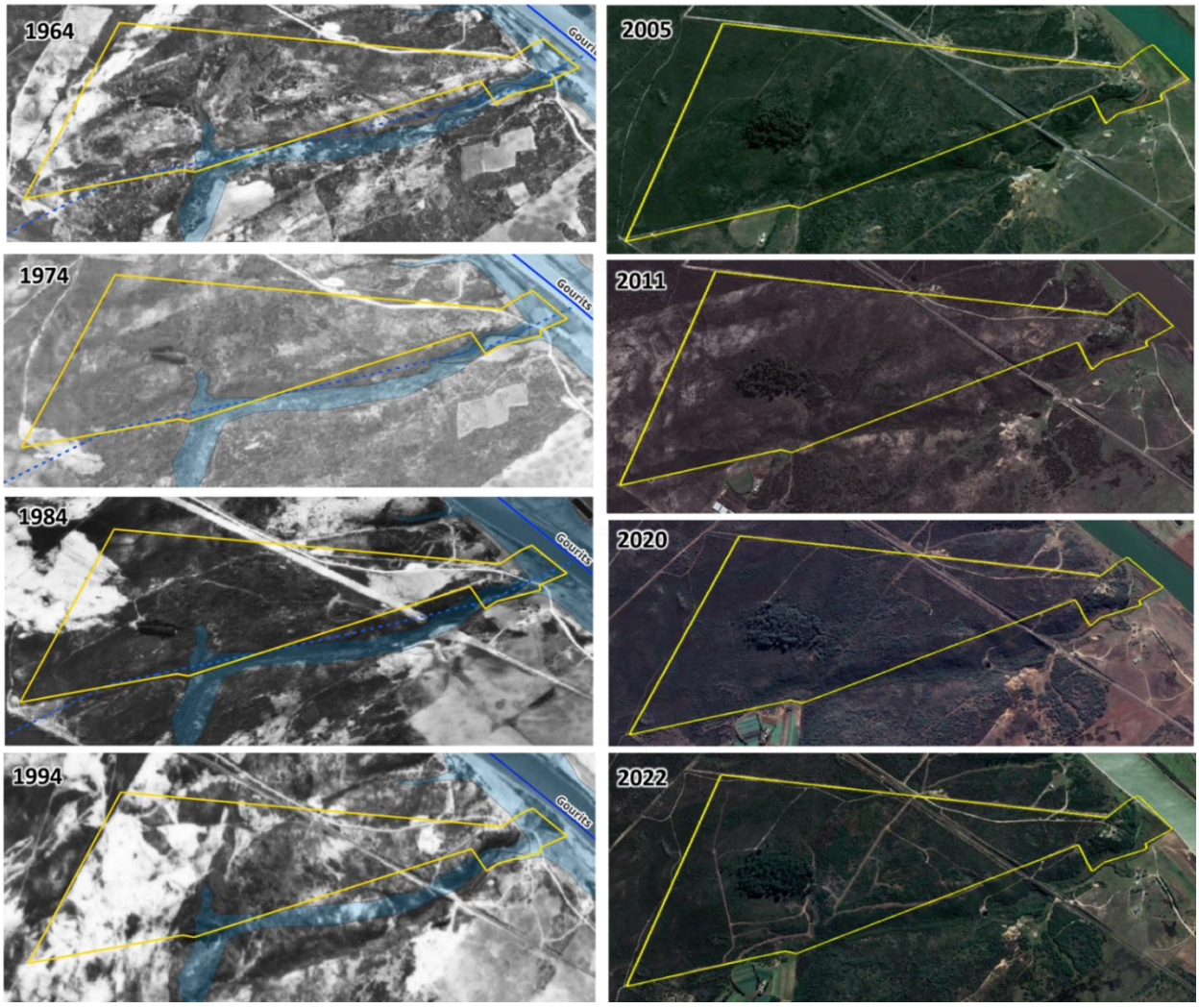


Figure 7: A series of historical imagery sourced from the CD: NGI geospatial portal (top row) and Google Earth (bottom row). The white polygons highlight the position of Portion 11 / 449.

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:

- *Agathosma eriantha*
- *A. muirii*
- *A. riversdalensis*
- *Argyrolobium harmsianum*
- *Aspalathus acutiflora*
- *A. arenaria*
- *A. obtusifolia*
- *A. odontoloba*
- *A. quadrata*
- *Athanasia cochlearifolia*
- *Cliffortia longifolia*
- *Cotula myriophylloides*
- *Diosma tenella*
- *Drosanthemum lavisii*
- *Duvalia immaculata*
- *Erica baueri* subsp*. baueri*
- *E. baueri* subsp*. gouriquae*
- *E. viscosissima*
- *Euchaetis albertiana*
- *Hermannia lavandulifolia*
- *Lampranthus ceriseus*
- *L. diutinus*
- *L. fergusoniae*
- *L. foliosus*
- *L. pauciflorus*
- *Lebeckia gracilis*
- *Leucadendron galpinii*
- *L. linifolium*
- *Leucospermum praecox*
- *Metalasia luteola*
- *Polygala pubiflora*
- *Ruschia leptocalyx*
- *Selago glandulosa*
- *S. villicaulis*
- Sensitive species 153
- Sensitive species 268
- Sensitive species 500
- Sensitive species 654
- Sensitive species 800
- *Thamnochortus muirii*
- *Wahlenbergia polyantha*
- *Zostera capensis*

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

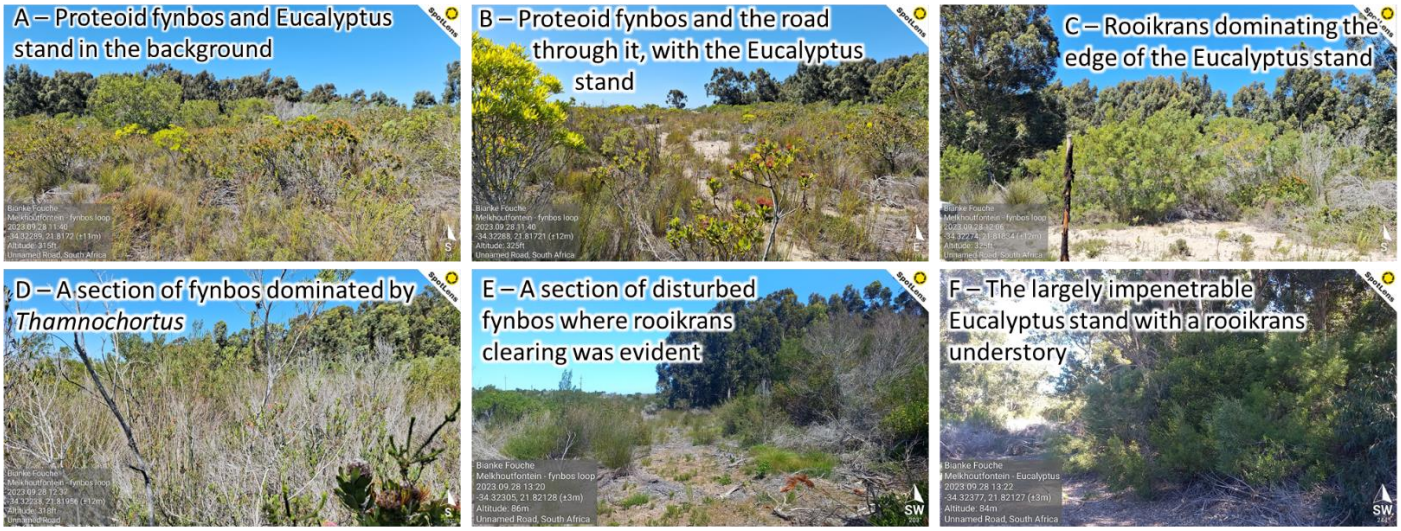
- *Acmadenia densifolia*
- *Agathosma robusta*
- *Agathosma scaberula*
- *Aspalathus sanguinea*
- *A. calcarea*
- *A. zeyheri*
- *Asparagus lignosus*
- *Capnophyllum africanum*
- *Carpobrotus muirii*
- *Cliffortia schechteri*
- *Cullumia carlinoides*
- *Cyclopia genistoides*
- *Erica dispar*
- *E. arenaria*
- *Freesia caryophyllacea*
- *F. leichtlinii*
- *Gnidia chrysophylla*
- *Heliophila linearis*
- *Ixia micrandra*
- *Jamesbrittenia calciphila*
- *Lachnaea axillaris*
- *Lampranthus explanatus*
- *Leucadendron meridianum*
- *Lobostemon belliformis*
- *Phylica nigrita*
- *Protea obtusifolia*
- *P. susannae*
- *Psoralea muirii*
- *Romulea jugicola*
- *Satyrium muticum*
- *Selago diffusa*
- *S. ramosissima*
- *Senecio lycopodioides*
- *Thamnochortus pluristachyus*
- *Watsonia aletroides*

5. RESULTS: FIELD ASSESSMENT

5.1 Vegetation

Some of the landscape features observed on Portion 11 of 449 are illustrated in Fig. 8 below. Near pristine fynbos is shown contrasting sharply with the highly invaded *Eucalyptus* stand for the western proposed glamping development site (Fig. 8 A & B). Some sections of the fynbos along the east of the *Eucalyptus* stand was dominated by *Thamnochortus* (Fig. 8 D). The disturbed fynbos vegetation may be the result of concentrated efforts to rid sections of the habitat from rooikrans (*Acacia cyclops*; Fig. 8 C & E). However, the *Eucalyptus* stand was made nearly impenetrable due to the dense growth of Rooikrans in the understory (Fig. 8 F). The fynbos vegetation here is consistent with natural Albertinia Sand Fynbos, which is endangered (EN).

West



East

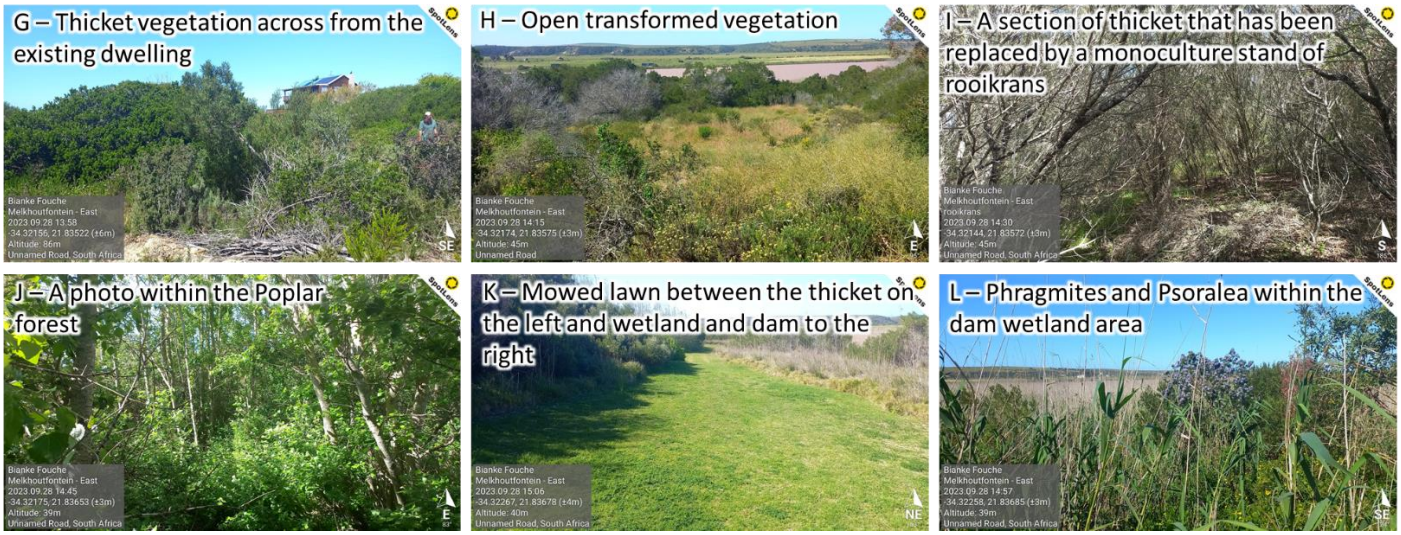


Figure 8: Images taken illustrating the various landscapes and habitats present on Portion 11 of 449

The vegetation of the eastern section of Portion 11 of 449 was very different from the vegetation observed in the western section. Some small sections of semi-natural thicket

remained on the site near the Gouritz River (Fig. 8 G), but the majority of the site was heavily invaded by rooikrans or a secondary unnatural open vegetation containing a host of invasive and exotic plant species (Fig. 8 H, I, & K). Rooikrans was also problematic here, having taken over large areas that were likely thicket vegetation before (Fig. 8 I). A large Poplar forest has also established near the dam and within a wetland habitat on the site (Fig. 8 J & L). The revised vegetation map, as made after the site assessment had been completed, is illustrated in Fig. 9.The difference is plant species make-up between the western and eastern proposed development footprints is also illustrated in the species accumulation curves that are presented in Appendix 12.1.

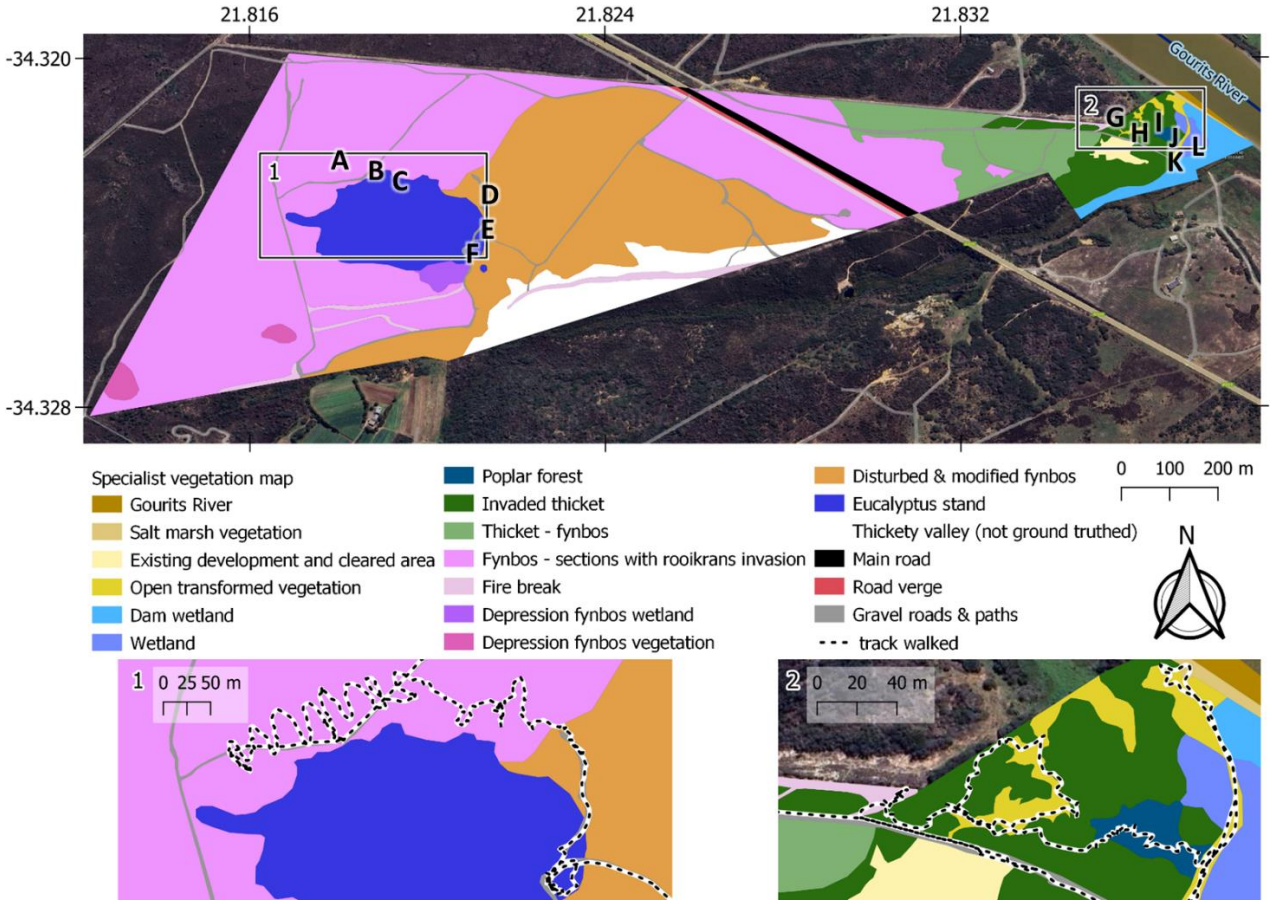


Figure 9: A revised vegetation map for the entire Portion 11 / 449 with the track walked during the site assessment. The letters on the map indicates the approximate locations of each photo illustrated in Fig. 8 above.

5.2 Species of Conservation Concern Found

The fynbos north of the *Eucalyptus* stand contained a high volume and diversity of threatened SCC (Fig. 10). Two endangered (EN) plant species were recorded within the fynbos north of the *Eucalyptus* stand (Fig. 11), as well as four vulnerable (VU) plant species, and four near threatened species (NT; Fig. 12). It is not yet confirmed if the *Lampranthus* observed on the site was *L. bicolor* or the Rare *L. fergusoniae* (Fig. 12). One protected milkwood tree (*Sideroxylon inerme inerme*; protected tree no. 579) was also observed in the western half of Portion 11 of 449, however the thicket in the eastern section contained the most Milkwood trees. Almost no SCC were observed in the eastern section, and a preliminary identification of

the near threatened (NT) *Jamesbrittennia calciphila* was made in open vegetation adjacent to a thicket patch (Fig. 12).

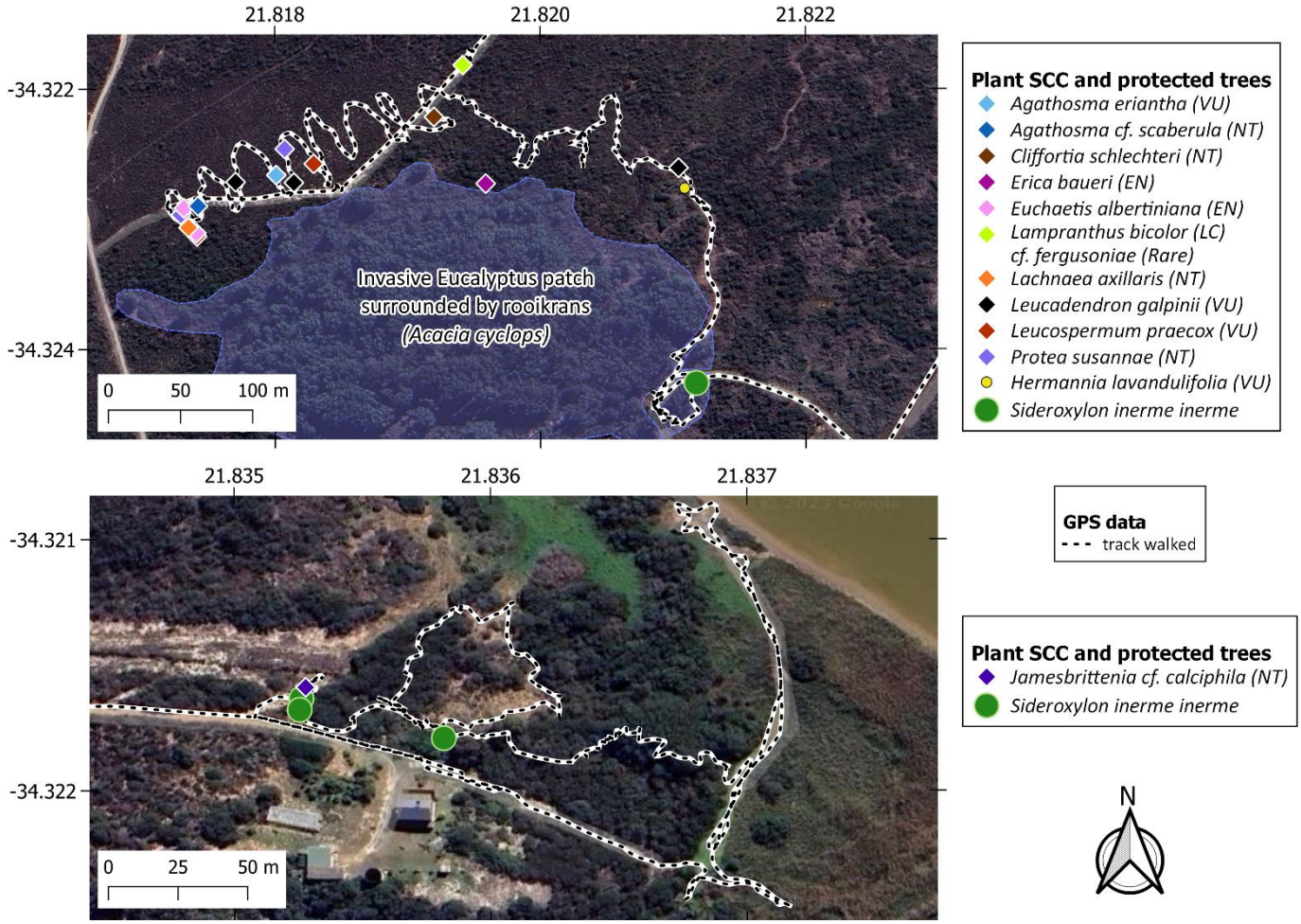


Figure 10: A map showing iNaturalist observations made of the various SCC on Portion 11 of 449 during the site assessment late in September of 2023.

Figure 11: Photos of the two endangered (EN) species of conservation concern that were observed in the fynbos vegetation in the western section of Portion 11 of 449

Figure 12: Photos of the rest of the species of conservation concern (VU, NT, and possibly one rare sp.) that were observed in the fynbos vegetation north of the *Eucalyptus* patch on Portion 11 of 449. Only *Jamesbrittenia* cf. *calciphila* was observed on the eastern part of the site.

5.3 Alien and Invasive Plant Species

The invasive species that were found on Portion 11 of 449 are listed in Table 2. Only rooikrans (Acacia cyclops) and *Eucalyptus grandis* were observed in the western section, while all of the inavsive species were seen in the eastern section of the site. BOX 2 describes the different NEMBA categories for the various invasive and exotic naturalised plant species on the site. The permits in BOX 2 are required to legally grow any listed invasive species, and further enquiries about this can be sent to CapeNature.

Table 2: A list of the alien and invasive plant species on Portion 11 of 449. All of these species are also in the species list in Appendix 12.1.

Species	Common name	Family	NEMBA	CARA
Acacia cyclops	Rooikrans	Fabaceae	1b	2
Agave americana	Spreading century plant	Asparagaceae	3 in Western Cape. Not listed Elsewhere	NA
Argemone ochroleuca	White-flowered mexican poppy	Papaveraceae	1b	1
Brassica tournefortii	Saharan mustard	Brassicaceae	NA	NA
Cenchrus clandestinus	Kikuyu Grass	Poaceae	1b	1
Cirsium vulgare	Bull Thistle	Asteraceae	1b	1
Datura stramonium	Jimsonweed	Solanaceae	1b	1
Eucalyptus grandis	Saligna gum	Myrtaceae	1b	2
Ficus carica	Common fig	Moraceae	NA	NA
Helminthotheca echioides	bristly oxtongue	Asteraceae	NA	NA
Lysimachia foemina	Blue pimpernel	Primulaceae	NA	NA
Populus alba	White poplar	Salicaceae	2	2
Raphinistrum rugosum	Wild radish /Annual bastard cabbage	Brassicaceae	NA	NA
Vicia satava	Common vetch	Fabaceae	NA	NA

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.

Category 2

Any species listed under Category 2 requires a permit issued by the Department of Forestry, Fisheries and the Environment (DFFE) to carry out a restricted activity (See Permit Applications.)

- A permit is required to carry out any restricted activity.
- No person may carry out a restricted activity in respect of a Category 2 listed invasive species without a permit.
- 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 (Table 3). The probability of occurrence is reported as medium where the site meets the habitat requirements of a species, and recent observations have been made nearby. It is always possible that a species assessed as having a low probability of occurrence (meaning the habitat seems unsuitable for the species to occur there) can still occur on the site, and therefore the list of species in Table 3 below must only be used as a guideline only.

Table 3: Plant SCC probability of occurrence on Portion 11 / 449.

Species	Common name	Family	Growth form	Source	SANBI Red List status	Probability of occurrence
Agathosma eriantha	Ridged buchu	Rutaceae	Shrub	Screening Tool	Vulnerable B1ab(ii,iii,iv,v)	**Confirmed** This SCC was found within the proposed development footprint (Western section)
Cliffortia schechteri	Limestone Capegorse	Rosaceae	Shrub	iNaturalist	Near Threatened B1ab(iii)	**Confirmed** This SCC was found within the proposed development footprint (Western section).
Euchaetis albertiana	Albertina mothflower	Rutaceae	Shrub	Screening Tool	Endangered A2c	Confirmed This SCC was found within the proposed development footprint (Western section)
Hermannia lavandulifolia	Lavender dollrose	Malvaceae	Herbaceous perennial	Screening Tool	Vulnerable A2c	**Confirmed** This SCC was found within the proposed development footprint (Western section)
Lachnaea axillaris	Teeny stripper	Thymelaeaceae	Shrub	iNaturalist	Near Threatened B1ab(ii,iii,iv,v)	**Confirmed** This SCC was found within the proposed development footprint (Western section)
Leucadendron galpinii	Hairless conebush	Proteaceae	Shrub	Screening Tool	Vulnerable A4c	**Confirmed** This SCC was found within the proposed development footprint (Western section)
Leucospermum praecox	Mossel Bay pincushion	Proteaceae	Shrub	Screening Tool	Vulnerable A2c+3c+4c	Confirmed This SCC was found within the proposed development footprint (Western section)
Protea susannae	Foetid-leaf Sugarbush	Proteaceae	Shrub	iNaturalist	Near Threatened A2c+3c+4c	**Confirmed** This SCC was found within the proposed development footprint (Western section)
Erica baueri subsp. baueri	Albertinia white bridal heath	Ericaceae	Shrub	Screening Tool	Endangered A2c; B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v); C1+2a(ii)	**Confirmed: *Erica baueri* (subsp. to be determined)** *E. baueri* was found within the proposed development footprint (Western section)
Erica baueri subsp. gouriqu	Gourikwa bridal heath	Ericaceae	Shrub	Screening Tool	Endangered B1ab(iii)+2ab(iii)	**Confirmed: *Erica baueri* (subsp. to be determined)** *E. baueri* was found within the proposed development footprint (Western section)
Agathosma scaberula	Buchu species	Rutaceae	Shrub	iNaturalist	Near Threatened B1ab(ii,iii,iv,v)	**Likely confirmed.** This SCC was found within the proposed development footprint (Western section)
Jamesbrittenia calciphila	Lime Jaybee	Scrophulariaceae	Herbaceous perennial	iNaturalist	Near Threatened B1ab(iii)	**Likely confirmed.** This species was provisionally IDed between the thicket vegetation along the eastern potion of the site.

Species	Common name	Family	Growth form	Source	SANBI Red List status	Probability of occurrence
Lampranthus fergusoniae	Limestone brightfig	Aizoaceae	Succulent	Screening Tool	Rare	**Likely confirmed.** The species observed was given a preliminary ID of *L. bicolor*, but it could be *L. fergusoniae*. The ID of this observation will need to be confirmed to be certain.
Agathosma muirii	Heart buchu	Rutaceae	Shrub	Screening Tool	Vulnerable A4abc	**Very High** This species is known to occur nearby, but was not found during the site assessment.
Carpobrotus muirii	Vyerank	Aizoaceae	Succulent	iNaturalist	Near Threatened B1ab(ii,iii)+2ab(ii,iii)	**Very High** *C. deliciosus* was observed on the site, which is very similar to *C. muirii*. *C. muirii* has also been observed nearby and may very likely be present on the site in fynbos and transitional habitats between fynbos and thicket.
Erica arenaria	Heath species	Ericaceae	Shrub	iNaturalist	Vulnerable B1ab(ii,iii,iv,v)	**Very High** This species has been observed nearby.
Erica dispar	Stillbay minor disowned heath	Ericaceae	Shrub	iNaturalist	Near Threatened B1ab(ii,iii,iv,v)+2ab(ii,iii,iv,v)	**Very High** This species has been observed nearby.
Erica viscosissima	Heath species	Ericaceae	Shrub	Screening Tool	Vulnerable B1ab(ii,iii,v)+2ab(ii,iii,v)	**Very High** This species has been observed nearby.
Freesia caryophyllacea	Fragrant kammetjie	Iridaceae	Geophyte	iNaturalist	Near Threatened B1ab(i,ii,iii,iv,v)	**Very High** This species has been observed nearby.
Freesia leichtlinii	Dune kammetjie	Iridaceae	Geophyte	iNaturalist	Near Threatened B1ab(ii,iii,iv,v)	**Very High** This species has been observed nearby.
Gnidia chrysophylla	Gold capesaffron	Thymelaeaceae	Perennial	iNaturalist	Near Threatened B1ab(i,ii,iii,iv,v)	**Very High** This species has been observed nearby.
Lebeckia gracilis	Slender ganna	Fabaceae	Shrub	Screening Tool	Endangered A2bc; B1ab(ii,iii,iv,v)	**Very High** This species has been recorded nearby and is widespread.
Leucadendron meridianum	Limestone conebush	Proteaceae	Shrub	iNaturalist	Near Threatened B1ab(iii)+2ab(iii)	**Very High** This species has been recorded nearby and is widespread.
Protea obtusifolia	Bredasdorp sugarbush	Proteaceae	Shrub	iNaturalist	Near Threatened A2c+3c+4c	**Very High** This species has been recorded nearby and is widespread.
Sensitive species 654		Orchidaceae	Geophyte	Screening Tool	Vulnerable C2a(i)	Very High This species has been recorded nearby and is widespread.

Species	Common name	Family	Growth form	Source	SANBI Red List status	Probability of occurrence
Thamnochortus pluristachyus	Thatching reed species	Restionaceae	Graminoid	iNaturalist	Vulnerable B1ab(iii,v)	**Very High** An unidentified *Thamnochortus sp*, as well as *Thamnochortus insignis* was present on the site, although it was not identified as *T. pluristachyus*. Given that there is a possibility that the species on the site might be this species, the precautionary approach is followed, and a very high likelihood of occurrence is assigned.
Acmadenia densifolia	Wankoe porcelainflower	Rutaceae	Shrub	iNaturalist	Near Threatened B1ab(ii,iii,iv,v)	**High** Following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.
Agathosma robusta	Buchu species	Rutaceae	Shrub	iNaturalist	Vulnerable D2	**High** Following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.
Argyrolobium harmsianum	Limestone silverpod	Fabaceae	Herbaceous perennial	Screening Tool	Endangered B1ab(ii,iii)	**High** Following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.
Aspalathus acutiflora	Capegorse species	Fabaceae	Herbaceous perennial	Screening Tool	Endangered B1ab(ii,iii,iv,v)+2ab(ii,iii,iv,v)	**High** Following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.
Aspalathus arenaria	Sand capegorse	Fabaceae	Herbaceous perennial	Screening Tool	Vulnerable B1ab(ii,iii,iv,v)	**High** Following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.
Aspalathus calcarea	Capegorse species	Fabaceae	Herbaceous perennial	iNaturalist	Vulnerable B1ab(iii,v)+2ab(iii,v)	**High** It is known to occur near Stilbaai, and following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.
Aspalathus obtusifolia	Capegorse species	Fabaceae	Herbaceous perennial	Screening Tool	Vulnerable B1ab(ii,iii,v)+2ab(ii,iii,v)	**High** Following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.
Aspalathus odontoloba	Capegorse species	Fabaceae	Herbaceous perennial	Screening Tool	Endangered B1ab(iii)+2ab(iii)	**High** Following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.

Species	Common name	Family	Growth form	Source	SANBI Red List status	Probability of occurrence
Aspalathus quadrata	Capegorse species	Fabaceae	Herbaceous perennial	Screening Tool	Vulnerable B1ab(iii,v)+2ab(iii,v)	**High** Following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.
Aspalathus sanguinea	Capegorse species	Fabaceae	Herbaceous perennial	iNaturalist	Subsp. *foliosa*: Vulnerable B1ab(ii,iii,v)+2ab(ii,iii,v) Subsp. *sanguinea*: Near Threatened B1ab(ii,iii,v)	**High** Following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.
Asparagus lignosus	Fire asparagus	Asparagaceae	Herbaceous perennial	iNaturalist	Near Threatened A2c	**High** Following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.
Cullumia carlinoides	Coastal spikedaisy	Asteraceae	Shrub	iNaturalist	Near Threatened B1ab(ii,iii,iv,v)	**High** Following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.
Diosma tenella	Clay bitterbuchu	Rutaceae	Shrub	Screening Tool	Endangered B1ab(i,ii,iii,iv,v)	**High** Following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.
Drosanthemum lavisii	Scarlet dewfig	Aizoaceae	Succulent	Screening Tool	Endangered B1ab(ii,iii,iv,v); C2a(i)	**High** Following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.
Duvalia immaculata	Succulent	Apocynaceae	Succulent	Screening Tool	Endangered B1ab(ii,iii,iv,v)	**High** Following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.
Heliophila linearis	Needle sunspurge	Brassicaceae	Herbaceous	iNaturalist	Var. *reticulata*: Vulnerable B1ab(ii,iii,v)	**High** Following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.
Lampranthus ceriseus	Cerise brightfig	Aizoaceae	Succulent	Screening Tool	Vulnerable B1ab(ii,iii,iv,v)	**High** Following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.

Species	Common name	Family	Growth form	Source	SANBI Red List status	Probability of occurrence
Lampranthus diutinus	Brightfig species	Aizoaceae	Succulent	Screening Tool	Endangered B1ab(ii,iii,iv,v)	**High** Following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.
Lampranthus pauciflorus	Beach brightfig	Aizoaceae	Succulent	Screening Tool	Endangered B1ab(ii,iii,iv,v)	**High** Following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.
Lobostemon belliformis	Beaut healthbush	Boraginaceae	Shrub	iNaturalist	Critically Endangered A2c; D	**High** Although this species is known from only one small sandstone outcrop near Gouriqua, following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.
Metalasia luteola	Yellow blombush	Asteraceae	Shrub	Screening Tool	Vulnerable B1ab(iii,v)+2ab(iii,v)	**High** Following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.
Phylica nigrita	Black hardleaf	Rhamnaceae	Shrub	iNaturalist	Near Threatened B1ab(ii,iii,iv,v)	**High** Following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.
Polygala pubiflora	Hairyflower falsepea	Polygalaceae	Herbaceous perennial	Screening Tool	Vulnerable B1ab(ii,iii,iv)+2ab(ii,iii,iv)	**High** Following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.
Psoralea muirii	New fountainbush species	Fabaceae	Shrub	iNaturalist	Endangered B1 ab (iii, v) according to Bello et al. (2017)	**High** Following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.
Romulea jugicola	Froetang species	Iridaceae	Geophyte	iNaturalist	Vulnerable B1ab(ii,iii,v)	**High** Following the precautionary approach, this species is highly likely to be present within the fynbos habitats on the site.
Ruschia leptocalyx	Tentfigs	Aizoaceae	Succulent	Screening Tool	Endangered B1ab(ii,iii,iv,v)	**High** Following the precautionary approach, this species has a high likelihood of being on the site
Selago diffusa	Bitterbushes	Scrophulariaceae	Herbaceous perennial	iNaturalist	Vulnerable B1ab(ii,iii,iv,v)+2ab(ii,iii,iv,v)	**High** Following the precautionary approach, this species has a high likelihood of being on the site

Species	Common name	Family	Growth form	Source	SANBI Red List status	Probability of occurrence
Selago glandulosa	Bitterbushes	Scrophulariaceae	Herbaceous perennial	Screening Tool	Vulnerable B1ab(ii,iii,iv,v)	**High** Following the precautionary approach, this species has a high likelihood of being on the site
Selago ramosissima	Bitterbushes	Scrophulariaceae	Herbaceous perennial	iNaturalist	Endangered B1ab(iii)	**High** Following the precautionary approach, this species has a high likelihood of being on the site
Selago villicaulis	Dune bitterbush	Scrophulariaceae	Herbaceous perennial	Screening Tool	Vulnerable B1ab(ii,iii,iv,v)	**High** Following the precautionary approach, this species has a high likelihood of being on the site
Senecio lycopodioides	Groundsel daisy species	Astaeraceae	Herbaceous perennial	iNaturalist	Vulnerable B1ab(iii,v)	**High** Following the precautionary approach, this species has a high likelihood of being on the site
Sensitive species 1024	-	Orchidaceae	Tuberous geophyte	iNaturalist	Endangered B1ab(iii,v)+2ab(iii,v); C2a(ii)	**High** Following the precautionary approach, this species has a high likelihood of being on the site
Sensitive species 153		Ruscaceae	Geophyte	Screening Tool	Endangered B1ab(ii,iii,v)+2ab(ii,iii,v)	**High** Following the precautionary approach, this species has a high likelihood of being on the site
Sensitive species 268		Asphodelaceae	Succulent	Screening Tool	Endangered B1ab(iii,iv,v)	**High** Following the precautionary approach, this species has a high likelihood of being on the site
Sensitive species 500		Orchidaceae	Geophyte	Screening Tool	Endangered C2a(i)	**High** Following the precautionary approach, this species has a high likelihood of being on the site
Sensitive species 800		Iridaceae	Geophyte	Screening Tool	Vulnerable B1ab(iii)	**High** Following the precautionary approach, this species has a high likelihood of being on the site
Thamnochortus muirii	Thatching reeds	Restionaceae	Graminoid	Screening Tool	Vulnerable B1ab(i,ii,iii,iv,v)	**High** Following the precautionary approach, this species has a high likelihood of being on the site
Wahlenbergia polyantha	Capebells	Campanulaceae	Herbaceous perennial	Screening Tool	Vulnerable B1ab(ii,iii,iv,v)	**High** Following the precautionary approach, this species has a high likelihood of being on the site
Watsonia aletroides	Renoster watsonia	Iridaceae	Geophyte	iNaturalist	Near Threatened A2cb	**High** *Watsonia pillansii* was observed on the site. And it is likely that *W. aletroides* may also be present on the site.
Agathosma riversdalensis	Buchu species	Rutaceae	Shrub	Screening Tool	Vulnerable B1ab(ii,iii,iv,v)	**Medium** Found along arid transitions between limestone and sand plain fynbos, and it is conceivable that this species could be present on the site.

Species	Common name	Family	Growth form	Source	SANBI Red List status	Probability of occurrence
Aspalathus zeyheri	Capegorse species	Fabaceae	Herbaceous perennial	iNaturalist	Data Deficient - Taxonomically Problematic	**Medium** Poorly known species, only known from the type, collected around 1863. Considered a synonym of the widespread A. peduncularis (Goldblatt and Manning 2000, Germishuizen et al. 2006), but not formally reduced to synonymy. C.R. Scott-Shaw (pers. comm.) believes that it is a valid taxon that is rare and probably threatened.
Lampranthus foliosus	Brightfig species	Aizoaceae	Succulent	Screening Tool	Endangered B1ab(ii,iii,iv,v)	**Medium** It is conceivable that this species might be present in fynbos habitats on the site.
Leucadendron linifolium	Line-leaf sugarbush	Proteaceae	Shrub	iNaturalist	Vulnerable A2c	**Medium** It is conceivable that this species might be present in fynbos habitats on the site.
Athanasia cochlearifolia	Kanniedood species	Asteraceae	Shrub	Screening Tool	Endangered B1ab(ii,iii,v)	**Low** Associated with limestone outcrops, mostly in renosterveld.
Cliffortia longifolia	Longleaf River Capegorse	Rosaceae	Sprawling shrub	Screening Tool	Vulnerable B1ab(ii,iii,iv,v)	**Low** The habitat requirements of this species are not quite met here.
Cotula myriophylloides	Watergras	Asteraceae	Hydrophyte	Screening Tool	Critically Endangered B2ab(iii)	**Low** The habitat requirements of this species are not quite met here.
Cyclopia genistoides	Common Honeybush tea	Fabaceae	Shrub	iNaturalist	Near Threatened A2bcd	**Low** This species of Honeybush is unlikely to naturally occur here.
Ixia micrandra	Minimal kalossie	Iridaceae	Geophyte	iNaturalist	Near Threatened B1ab(i,ii,iii,iv,v)	**Low** The site is outside of the distribution range for this species.
Lampranthus explanatus	Sandveld brightfig	Aizoaceae	Succulent	iNaturalist	Near Threatened A4c; B1ab(i,ii,iii,iv,v)	**Low** The site is outside of the distribution range for this species.
Capnophyllum africanum	Celery species	Apiaceae	Herb	iNaturalist	Near Threatened B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)	**Very Low** This species does not occur here
Zostera capensis	Cape dwarf-eelgrass	Zosteraceae	Hydrophytic graminoid	Screening Tool	Global IUCN: Vulnerable B2ab(ii,iii); SANBI regional listing: LC	**Very Low** The freshwater aquatic habitat requirements of this species is not met by the site.

6. SITE SENSITIVITY VERIFICATION

6.1 Terrestrial Biodiversity

The sensitivity of the terrestrial biodiversity theme for the site is confirmed as **Very High** as the sensitivity triggers highlighted in the screening tool report were present on the site, i.e., the proposed glamping sites form part of a terrestrial CBA 1 and is part of the endangered (EN) Albertinia Sand Fynbos and Hartenbos Dune thicket respectively. The western section of the site is the most sensitive from a terrestrial biodiversity perspective, while the eastern section of the site is nearby wetlands and the Gourits River. The site contains a worrying diversity and density of invasive plant species. The spread of invasive species must be stopped on the site, and the control of alien and invasive species in accordance with a management plan is a requirement by law.

6.2 Botanical Diversity

The site sensitivity in terms of the terrestrial plant species theme is confirmed as **High** across the entire Portion 11 of 449 where natural and near-natural vegetation persists (more in-depth studies will be needed to establish the importance of the fynbos here to the conservation of the two EN plant species that were found on the site). Areas that have been invaded for over 20 years and that represent transformed vegetation have a **Low** botanical sensitivity. This site contained a high diversity and density of SCC, especially within the fynbos vegetation.

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 4 below.

Table 4: 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 5. 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 5: 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 12.2, 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 76/216 reflects the sensitivity of the site (Fig. 13). The recommended SEI mitigation per category is in Table 6 and the reasoning behind the map is provided in Table 7.

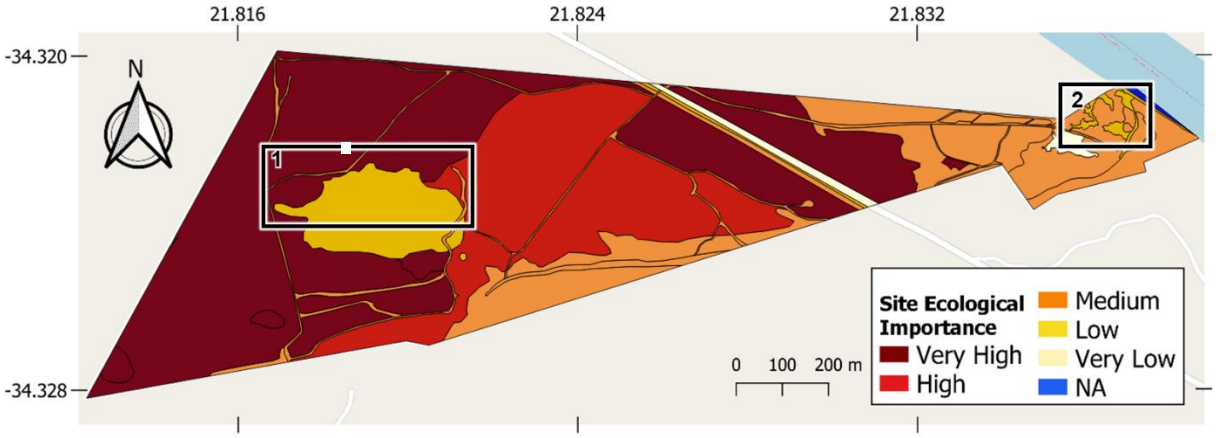


Figure 13: A zoomed-out SEI map for the property, with the Eucalyptus Node indicated by box 1, and the River note represented by box 2.

Table 6: 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.
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
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 7: 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)
Depression Fynbos vegetation; Depression fynbos wetland; & Fynbos – sections with rooikrans invasion	**High** Confirmed and highly likely habitat of EN, VU and NT SCC that have a EOO of > 10 km^2. The ecosystem type is EN Albertinia Sandstone Fynbos	**High** > 10 ha for EN ecosystem type. Good habitat connectivity with potentially functional ecological corridors. Only minor current negative ecological impacts and good rehabilitation potential.	**Low** The fynbos here is unlikely to fully recover even after a long period. Species that have a low likelihood of remaining on a site during an impact, and species that are unlikely to return to the site following disturbance.	**Very High** BI: High RR: Low
Disturbed & modified fynbos	**High** Highly likely habitat of EN, VU and NT SCC that have a EOO of > 10 km2. The	**Medium** Mostly minor current negative ecological impacts with some major impacts (established	**Low** The fynbos here is unlikely to fully recover even after a long period. Species that have a low likelihood of remaining	**High** BI: Medium RR: Low

Vegetation	Conservation Importance (CI)	Functional Integrity (FI)	Receptor Resilience (RR)	Site Ecological Importance (SEI)
	ecosystem type is EN Albertinia Sandstone Fynbos	population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.	on a site during an impact, and species that are unlikely to return to the site following disturbance.	
Thickety valley (not ground truthed)	**Medium** > 50% of receptor contains natural habitat with potential to support SCC.	**High** Good habitat connectivity with potentially functional ecological corridors. Only minor current negative ecological impacts and good rehabilitation potential.	**Medium** Species that have a moderate likelihood of remaining when a disturbance is occurring, and that have a moderate likelihood of returning following disturbance	**Medium** BI: Medium RR: Medium
Gravel Roads & paths	**Medium** > 50% of receptor contains natural habitat with confirmed presence and potential to support SCC.	**Medium** Mostly minor current negative ecological impacts with some major impacts (established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.	**Medium** Still a lot of natural plant growth. Species here have a moderate likelihood of remaining when a disturbance is occurring, and that have a moderate likelihood of returning to the paths if given enough chance	**Medium** BI: Medium RR: Medium
Thicket – fynbos & & Fire breaks	**Medium** > 50% of receptor contains natural habitat with potential to support SCC.	**High** Good habitat connectivity with potentially functional ecological corridors. Only minor current negative ecological impacts and good rehabilitation potential.	**Medium** Species that have a moderate likelihood of remaining when a disturbance is occurring, and that have a moderate likelihood of returning following disturbance	**Medium** BI: Medium RR: Medium
Invaded thicket	**Medium** > 50% of receptor contains natural habitat with potential to support SCC.	**Medium** Mostly minor current negative ecological impacts with some major impacts (established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.	**Medium** Sections are dominated by rooikrans and may struggle to recover in the near future. Species that have a moderate likelihood of returning following disturbance.	**Medium** BI: Medium RR: Medium
Wetland & Dam wetland	**Medium** > 50% of receptor contains natural habitat with potential to support SCC.	**Medium** The surrounding area has relatively poor habitat connectivity. Mostly minor current negative ecological impacts with some major impacts (established	**Medium** Species that have a moderate likelihood of remaining when a disturbance is occurring, and that have a moderate likelihood of returning following disturbance	**Medium** BI: Medium RR: Medium

Vegetation	Conservation Importance (CI)	Functional Integrity (FI)	Receptor Resilience (RR)	Site Ecological Importance (SEI)
		population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.		
Eucalyptus stand	**High** If cleared of invasives, this area is a highly likely habitat of EN, VU and NT SCC that have a EOO of > 10 km2. The ecosystem type if aliens are controlled is EN Albertinia Sandstone Fynbos	**Low** Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat. Several minor and major current negative ecological impacts. Low rehabilitation potential.	**High** The invasive species in this *Eucalyptus* forest has become the new receptor. The invasive plants will return quickly if they are removed, and there is a high likelihood that the large *Eucalyptus* trees will remain on the site, with only the edges being actively managed in the foreseeable future.	**Low** BI: Medium RR: High
Road verge	**Low** < 50% of receptor contains natural habitat with limited potential to support SCC.	**Low** Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential.	**Medium** Species that have a moderate likelihood of remaining when a disturbance is occurring, and that have a moderate likelihood of returning following disturbance	**Low** BI: Low RR: Medium
Open transformed vegetation; Poplar forest; & Salt marsh vegetation	**Low** < 50% of receptor contains natural habitat with limited potential to support SCC.	**Medium** Mostly minor current negative ecological impacts with some major impacts (established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.	**Medium** Species that have a moderate likelihood of remaining when a disturbance is occurring, and that have a moderate likelihood of returning following disturbance	**Low** BI: Low RR: Medium
Main road	**Very Low** No natural habitat remaining	**Very Low** No habitat connectivity except for flying species or flora with wind-dispersed seeds.	**Very High** There are no plants growing on a tarred road, and this will remain true for a long time into the future.	**Very Low** BI: Very Low RR: Very High
Gouritz River	NA	NA	NA	NA

8. PROJECT AREA OF INFLUENCE (PAOI)

The PAOI for this development is already clearly shown in the site development plan (SDP) for the site, as the SDP includes an area that is going to be maintained around each of the cottages (5m wide envelope from the edge of the 100 sqm cottages). The PAOI presented in Fig. 14 also includes a 2m buffer around the new access roads and services to be installed for the cottages.

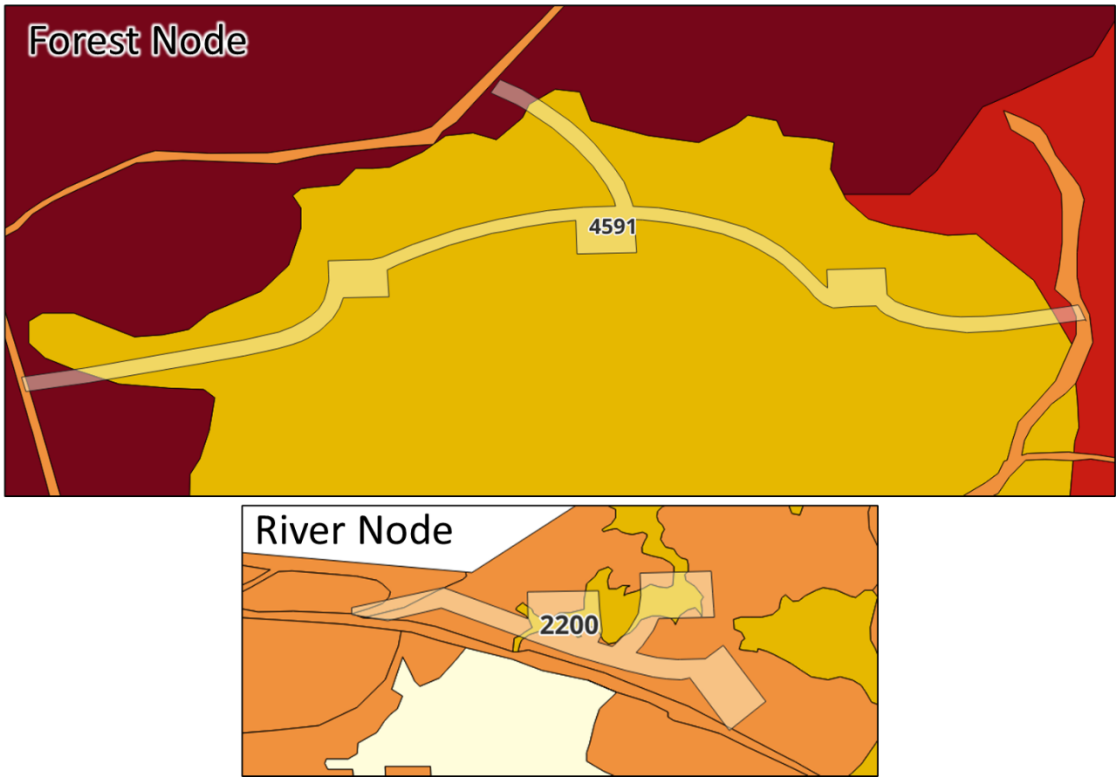


Figure 14: An illustration of the PAOI for both nodes. The total PAOI area calculated for each node is in sqm (square meters). The PAOI is illustrated on the SEI map.

The PAOI for the Eucalyptus Node is ca. 4591 sqm, and for the River node is 2200 sqm. The total area of Portion 11 of 449 is ca. 105.61 ha. That means this entire development will cover an area that covers less than 1% of the total area of the property (ca. 0.6%). The breakdown of the areas covered by each node per SEI category is presented in Table 8 below.

Table 8: A breakdown of the PAOI areas per SEI class identified for the two development nodes.

SEI Category	Eucalyptus Node Areas (sqm)	River Node Areas (sqm)
Very High	304	0
High	57	0
Medium	33	1731
Low	4197	469
Very Low	0	0
TOTAL	**4591**	**2200**

9. IMPACT ASSESSMENT

The methods that were used for calculating impact significance is provided in Appendix 12.3.

9.1 Layout and Design Phase

An impact assessment is required due to the high sensitivity of the fynbos vegetation of Portion 11 of 449. Currently the only alternative to the proposed development is the no go scenario. It is also useful to note that the SDP has already progressed through a few iterations of design in order to avoid sensitive areas that have been identified by specialists during the initial site sensitivity verification process. Due to this process that has already been underway, it is likely acceptable that only one SDP is provided as a development option in this impact assessment. The mitigation hierarchy is an important part of the planning of a project, as well as in the consideration of an impact assessment (Fig. 15)

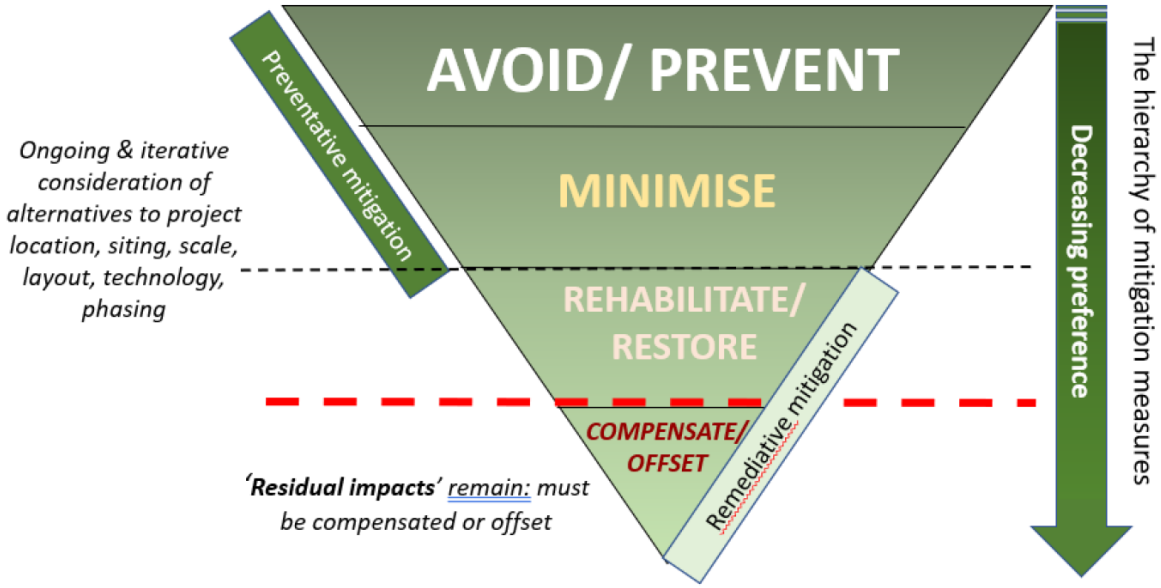


Figure 15: The mitigation hierarchy as presented in (Brownlie et al., 2023). Mitigation steps are illustrated in a hierarchy. The lower steps in the diagram should only be considered once the steps above have been duly considered.

9.2 Current Impacts

Portion 11 of 449 already has some negative environmental impacts that affect the ecosystems and plant species diversity of the property. Some of these impacts on the site included:

1. Established stands of multiple invasive species, including
    a. In the fynbos near the "Eucalyptus Node": mainly the large stand of *Eucalyptus* trees, and dense stands of Rooikrans (*Acacia cyclops*) etc.
    b. Near the "River Node": Plume albizias (*Paraserianthes lophantha*), the Poplar forest (*Populus alba*), kikuyu grass (*Cenchrus clandestinus*), thistles (*Cirsium vulgare*), *Agave americana*, *Eucalyptus* trees, etc.
2. Existing roads and built structures on the property are already contributing to some fragmentation on the property.

3. Nearby transformed farms west of the Gourits River. Portions east of the River (i.e., the ones surrounding Portion 11 of 449) are still largely natural, save for maintained fence lines.

9.3 Construction Phase

Construction of cottages will result in the permanent removal of some vegetation on Portion 11 of 449. The construction phase is the most intense phase of the proposed development. The impacts presented in this section are shown from the most significant to least significant in terms of the Terrestrial Biodiversity and Plant Species Themes assessed. An Environmental Control Officer (ECO) needs to be appointed to oversee and ensure compliance with management plans and mitigation measures throughout the construction phase.

9.3.1 Construction Impact 1 – Permanent Loss of Terrestrial Biodiversity

Description: The permanent loss of habitat and vegetation will occur due to earthworks and other construction related activities for the proposed development.

Mitigation:

1. Prior to construction: Ensure disturbance is limited largely to the SDP, and does not extend beyond the PAOI
    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. The 2m disturbance envelope is meant for roads and infrastructure, and is not applicable to gardens and lawns.
    c. 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.
    d. 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.
    e. 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: If possible, schedule vegetation clearance during autumn and winter in order to minimize impact on plant life cycles & pollination. This is not compulsory, but if implemented could reduce indirect negative impacts to the environment.
3. During construction: Topsoil management
    a. Topsoil under in-tact fynbos and thicket
        i. The topsoil will be vital for the success of rehabilitation of fynbos vegetation following construction processes and must therefore be treated with care.

ii. 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.

iii. 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.

iv. If the SDP of a proposed development does not have enough space for the storage and protection of topsoil within the disturbance envelope, then the Contractor must identify an alternative temporary stockpile area that is already transformed and where it can easily be retrieved for post-construction rehabilitation.

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

b. Topsoil under stands of invasive plants

i. Keep topsoil from areas with invasive species separate from other topsoil to prevent contamination.

ii. Remove the top 30 cm of the topsoil and transport this soil to areas where it can't contaminate other materials, and where the spread of invasive species is minimised in sensitive habitat.

iii. Regularly monitor storage areas for signs of invasive plant growth and manage accordingly.

iv. Before reusing the topsoil, treat it to eliminate invasive species through composting, solarization, or other methods.

v. After construction, use clean, treated topsoil for site rehabilitation

4. <u>During construction</u>: New roads must be constructed with minimal road edge disturbance (Fig. 16).

a. Dirt roads may not be made into tarred roads,

b. However, they may make use of open pavers or similar structures, as presented in Fig. 16 (these will also reduce runoff and dust pollution).

Figure 16: An image of a road with minimal edge effects adjacent to it in fynbos / strandveld vegetation.

Discussion of Alternatives: The residual impact (after mitigation) of construction is a minor negative impact (Table 9). This means that the mitigation proposed can decrease the impact significance if it is implemented. No impact is associated with the No-go scenario as there is no construction that will take place. It is important to understand, however, that the invasive stands on the property are already causing more significant ecosystem loss, but that this is outside of the scope of this impact assessment.

Table 9: Construction Impact 1 – Permanent Loss of Terrestrial Biodiversity.

CONSTRUCTION Impact no. 1	Site Development Plan (July 2024)		No-go Scenario
Mitigation	Without	With	Without
Duration	Permanent	Permanent	Immediate
Extent	Very limited	Very limited	Very limited
Intensity	Low	Very low	Negligible
Probability	Certain	Certain	Highly unlikely
SCORE	Moderate negative: -77	Minor negative: -70	Negligible negative: -3
Confidence	High	High	High
Reversibility	Moderate	Moderate	Moderate
Resource irreplaceability	Moderate	Moderate	Moderate

9.3.2 Construction Impact 2 – Fragmentation & Loss of Populations of Important Plant Species

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 of geophyte and succulent growth forms only must be conducted (with an experienced ECO or botanist / ecologist on the site to provide guidance on best practice).
    a. Plants with a high likelihood of survival in the 2m disturbance strip must be rescued, and specific important sections in the permanent disturbance footprint must be identified and added to the rescue operation prior to the commencement construction.
    b. If enough space for storage and care is available, stands of plants could be removed carefully with an excavator (Fig. 17) 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.

Figure 17: An example of an excavator carefully lifting plants in order to minimise soil disturbance.

    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 an ECO with proven botanical knowledge 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. Prior to construction: A forestry permit for trimming, altering or removing protected tree species may need to be obtained from DFFE for the River Node should any trees need to be trimmed or cut for the proposed project (Fig. 18).

    a. If the Milkwood trees are avoided during constriction and if these will not require maintenance later (i.e., trimming), then no licence need to be applied for.

    b. Some adaptive management is appropriate here in order to avoid these protected trees.

Figure 18: An image of the River Node PAOI, and the recorded Milkwood trees (green dots) and NT *Jamesbrittenia cf. calciphilla*. Note that more Milkwood trees may be present than those observed during the site assessment.

3. During construction: Materials used during construction must be sourced and transported responsibly to minimise the risk new invasive plants.

4. 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.

Discussion of Alternatives: The impact before and after mitigation is a minor negative impact (Table 10). The mitigation provided for this impact will reduce the impact significance from -66 to -50.

Table 10: Construction Impact 2 – Fragmentation & Loss of Populations of Important Plant Species.

CONSTRUCTION Impact no. 2	Site Development Plan (July 2024)		No-go Scenario
Mitigation	Without	With	Without
Duration	Permanent	Permanent	Immediate
Extent	Very limited	Very limited	Very limited
Intensity	Low	Very low	Negligible
Probability	Almost certain	Likely	Highly unlikely
SCORE	Minor negative: -66	Minor negative: -50	Negligible negative: -3
Confidence	High	High	High
Reversibility	Moderate	Moderate	Moderate
Resource irreplaceability	Moderate	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 – Landscaping Effects on Habitats & Plant Species

Description: Ecosystems and the species within these are negatively affected by inappropriate permanent landscaping and the associated potential long-term negative edge effects. Edge effects cause biodiversity loss from the cultivation of species that are not indigenous to the vegetation type and surrounding landscape. An increase in hard surfaces is also problematic, as it causes changes in microclimate and the interaction of water with the substrate adjacent to the built environment.

Mitigation:

1. 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.
    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.
        iv. If more plants are required for the successful coverage of disturbed areas, augmentation with sourced plants can be done.
            1. Some species that could be considered in the Eucalyptus Node include: *Osteospermum moniliferum*, *Haemanthus coccineus, Dicerothamnus rhinocerotis, Helichrysum teretifolium, Ursinia chrysanthemoides, Wahlenbergia tenella, Protea repens, Protea susannae* (be careful of cultivars such as “Pink Ice”), *Pelargonium grossularioides, Muraltia alopecuroides, Leucadendron salignum, Leucospermum praecox, Polygala myrtifolia, Colpoon compressum*, *Erica pulchella*, and *Passerina corymbosa*.
            2. In the “River node” species that could be planted are *Osteospermum moniliferum, Sideroxylon inerme inerme, Myrsine africana, Leonotis ocymifolia, Helichrysum teretifolium, Carissa bispinosa, Searsia lucida, Searsia pyroides, Searsia glauca*, and *Asparagus aethiopicus.*
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 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 enviornment. Some of the species that could be planted for this purpose include *Osteospermum moniliferum* (Bietou), *Diospyros dichrophylla*, *Searsia glauca*, *Pterocelastrus tricuspidatus* (Candlewood), *Ekebergia capensis* (Cape Ash), *Grewia occidentalis* (Crossberry), *Carissa bispinosa*, and *Euclea racemosa* (Gwarrie).

Discussion of Alternatives: The residual impact is significantly less and is considered a minor negative impact (Table 11). The No-go scenario is a negligibly negative impact as the existing development on the property is already in a more disturbed area and is concentrated in one area on the property.

Table 11: Operational Impact 1 – Landscaping Effects on Habitats & Plant Species.

OPERATIONAL Impact no. 1	Site Development Plan (July 2024)		No-go Scenario
Mitigation	Without	With	Without
Duration	Permanent	Short term	Brief
Extent	Limited	Very limited	Very limited
Intensity	High	Low	Very low
Probability	Certain	Almost certain	Almost certain
SCORE	Moderate negative: -98	Minor negative: -42	Negligible negative: -30
Confidence	High	High	High
Reversibility	Moderate	Moderate	Moderate
Resource irreplaceability	Moderate	Moderate	Moderate

9.5.2 Operational Impact 2 – Landscape Management & Recreational Use Effect on Habitats & Plant Species

Description: Landscape management that negatively affects the vegetation and SCC of the property mainly includes inappropriate, or lacking fire management, invasive and alien plant species control plans, and road maintenance.

Mitigation:

1. The owner of Erf 11 of 449 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 11 of 449 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 12.4 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 11 of 449.

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. Some recommendations for developing in fire prone areas include (Esler et al., 2014)
    a. Not building on hilltops,
    b. Clustering cottages as closely together as possible (in this case within the two identified “nodes”), and ensuring the units are placed at least 3x the height of the unit away from the fynbos / invasive plants edge.
    c. In the “Eucalyptus Node”, some clearing of *Eucalyptus* and Rooikrans will need to take place.
4. Portion 11 of 449 requires a practical and implementable Alien and Invasive Plant Species Control and Eradication Plan. General principles to consider and implement include:
    a. Contact an invasive unit (such as Stellenbosch University’s “Centre for Invasion Biology”) if alien clearing efforts are not progressing as desired.
    b. Clear small and new infestations first (Fig. 19). The cost & biodiversity loss of establishing invasive plant stands increases every year (Esler et al., 2014; Van Wilgen et al., 2014).
5. 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 the ECO, botanist, 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.

6. 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.

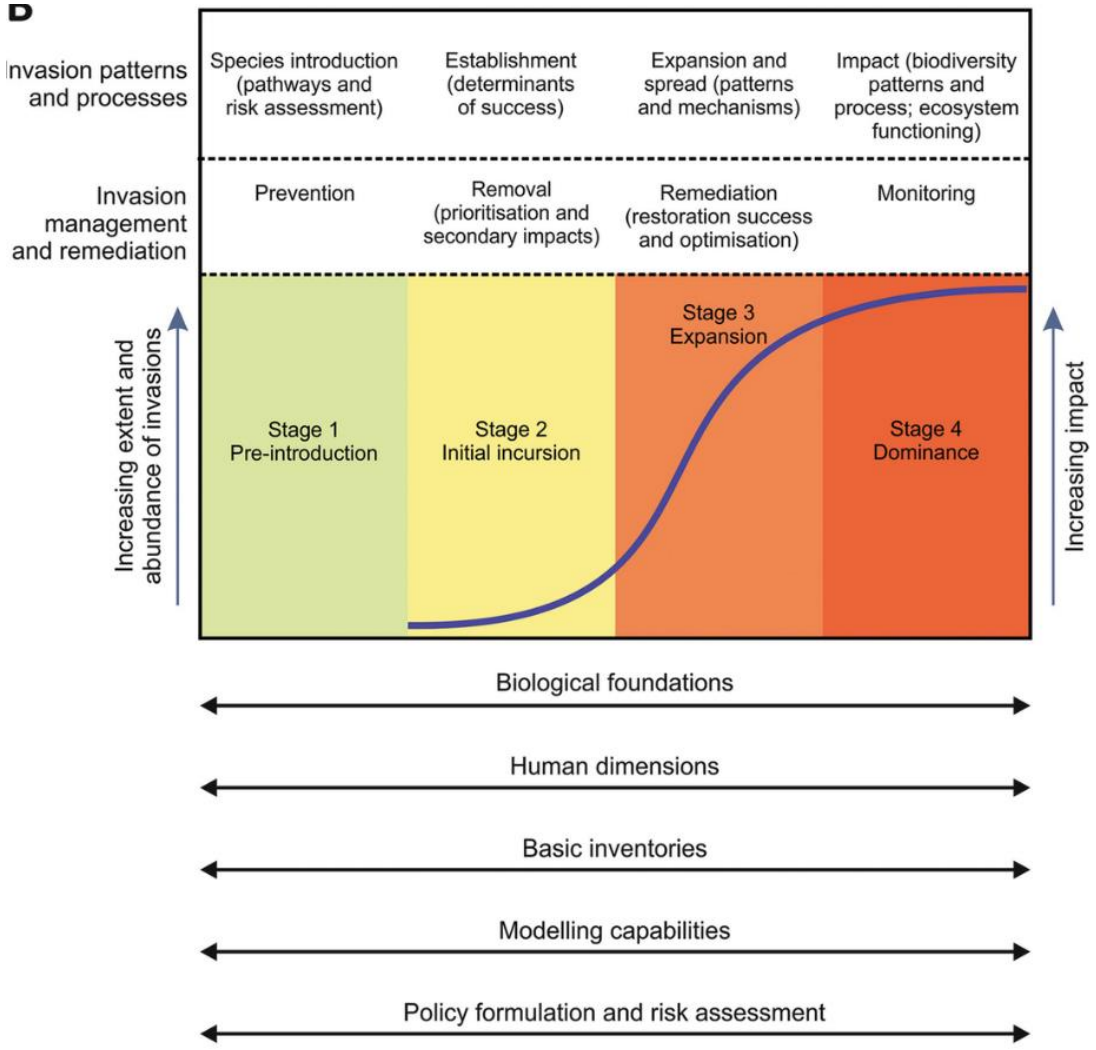


Figure 19: An infographic from the Centre for Invasion Biology showing how invasive alien plants should be managed depending on the degree of invasion severity (Van Wilgen et al., 2014).

e. However, the *Eucalyptus* and Rooikrans infestation around the PAOI of the Eucalyptus Node also requires a high priority for clearing.

i. Fynbos away from / beyond the *Eucalyptus* node must be targeted first for alien clearing, in order to avoid further loss of fynbos.

ii. Large Eucalyptus trees are likely to be on the site for long periods of time, however these should be limited to trees with a diameter of >400mm and height >1000mm, but excluding trees in riparian areas, PAs, within a listed ecosystem (i.e., the trees along the edges of the Eucalyptus node), and within the WC BSP priority CBA and ESA areas (NEMBA: Alien and Invasive Species Lists, 2020; NEMBA: Alien and Invasive Species Regulations, 2020).

f. Continuity and ongoing clearing effort is essential for the successful eradication of invasive plants. This is especially important in new post-fire environments.

g. Consider biological control.

h. Planning for alien clearing will need to include mapping of all the Invasive and Alien Plants, an attempt at including neighbouring properties in the plan, planning for the timing of clearing efforts, cost calculations, and an estimation of when control will result in invasions that have been reduced to <1%.

7. 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.

8. 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.

Discussion of Alternatives: The residual impact is significantly less and is considered a minor negative impact (Table 12). The No-go scenario is only slightly less (still a minor negative) than the residual impact of the proposed development as current management

practices on the property still requires some improvement (stands of invasive plants, multiple roads and cleared areas, etc.).

Table 12: Operational Impact 2 – Landscape Management & Recreational Use Effect on Habitats & Plant Species.

OPERATIONAL Impact no. 2	Site Development Plan (July 2024)		No-go Scenario
Mitigation	Without	With	Without
Duration	Ongoing	Ongoing	Ongoing
Extent	Limited	Limited	Very limited
Intensity	High	Low	Very low
Probability	Almost certain	Likely	Likely
SCORE	Moderate negative: -78	Minor negative: -55	Minor negative: -45
Confidence	High	High	High
Reversibility	Moderate	Moderate	Moderate
Resource irreplaceability	Moderate	Moderate	Moderate

9.6 Cumulative Impacts

Development in endangered (EN) fynbos vegetation has a cumulative impact affecting landscape level fragmentation, where over time more small developments in the general area could result in habitat reduction. Should alien clearing not take place during the critical times stipulated in a clearing plan, more established stands of invasive species could also threaten the high biodiversity of the Albertinia Sand Fynbos (EN) that occurs here. More development and installation of fence lines and infrastructure in the landscape will also mean slow changes to fire regimes and fire return intervals. Suppressing natural fires can lead to the accumulation of biomass, increasing the risk of more intense and damaging fires. More intense fires negatively affect our infrastructure, but it is also not beneficial to fynbos. Since these impacts are not directly related to the project being proposed, they are harder to assess or predict.

10. CONCLUSION

Portion 11 of 449 is a property with numerous ecosystems and a high diversity of plant species. The fynbos vegetation here (around the *Eucalyptus* stand of the “Eucalyptus Node development proposal) is part of EN Albertinia Sand Fynbos. The “River Node” proposed cottages is within a highly invaded (mostly Rooikrans; *Acacia cyclops*) section of EN Hartenbos Dune Thicket. Both development nodes have been planned in the leats sensitive areas on the Farm, and the owners and architects have managed to steer clear of the majority of the highly sensitive vegetation on the property.

Although the development of six cottages (three per node) is quite a small project, the main issues facing this property is from established and establishing stands of invasive plant species and fire risk. However, mitigation relating to alien and fire management require continued and concerted effort, which can be costly. It is therefore recommended that the landowners engage with the relevant authorities, as well as their neighbours, in order to find feasible management plans and solutions for these risks / impacts on the property.

The impact assessment clearly indicates that the residual impact of the current SDP (July 2024) is a minor negative for all the construction and operational phase impacts that have been assessed. The only alternative that was assessed together with the SDP provided was the No-go scenario. This is because the current SDP has already undergone several iterations which have been informed by specialist sensitivity verification reports. Comparing an older version of the SDP will not provide more clarity in this impact assessment and may only increase confusion.

11. REFERENCES

Bello, A., Stirton, C. H., Chimphango, S. B. M., & Muasya, A. M. (2017). Taxonomic revision of African Psoralea pinnata species complex (Psoraleeae, Leguminosae). *South African Journal of Botany*, *112*, 128–179.

Brownlie, S., Verburgt, L., Ralston-Paton, S., Day, K., Lewis, M., Little, I., & Patterson-Abrolat, C. (2023). *Best Practice Guidelines for Implementing the Mitigation Hierarchy in South Africa: Guidelines for implementing the mitigation hierarchy in impact assessment practice in South Africa*.

CapeNature. (2017). *An overview of the Western Cape Biodiversity Spatial Plan*.

Cowling, R. M., Knight, A. T., Privett, S. D. J., & Sharma, G. (2010). Invest in opportunity, not inventory of hotspots. In *Conservation Biology* (Vol. 24, Issue 2).

Dayaram, A., Harris, L. R., Grobler, B. A., Van Der Merwe, S., Rebelo, A. G., Powrie, L. W., Vlok, J. H. J., Desmet, P. G., Qabaqaba, M., Hlahane, K. M., & Skowno, A. L. (2019). Vegetation map of South Africa, Lesotho and Swaziland 2018: A description of changes since 2006. *Bothalia*, *49*(1), a2452.

de Villiers, C., Holmes, P., Rebelo, T., Helme, N., Brown, D.-E., Clark, B., Milton, S., Dean, W. R., Brownlie, S., Snaddon, K., Day, L., Ollis, D., Job, N., Dorse, C., Wood, J., Harrison, J., Palmer, G., Cadman, M., Maree, K., … Driver, A. (2016). *Ecosystem Guidelines for Environmental Assessment in the Western Cape* (M. Cadman, Ed.; 2nd ed.). Fynbos Forum.

Esler, K. J., Pierce, S. M., & de Villiers, C. (2014). *Fynbos Ecology and Management* (1st ed.). Briza Publications.

Garrard, G. E., Bekessy, S. A., McCarthy, M. A., & Wintle, B. A. (2008). When have we looked hard enough? A novel method for setting minimum survey effort protocols for flora surveys. *Austral Ecology*, *33*(8), 986–998.

Grobler, A., Vlok, J., Cowling, R. M., van der Merwe, S., & Skowno, S. (2018). *Technical Report: Integration of the Subtropical Thicket Ecosystem Project (STEP) vegetation types into the VEGMAP national vegetation map 2018*.

Lesslie, R., Thackway, R., & Smith, J. (2010). *A national-level Vegetation Assets, States and Transitions (VAST) dataset for Australia* (2nd ed., Issue 2). Bureau of Rural Sciences. http://www.ag.gov.au/cca.

Mucina, L., & Rutherford, M. C. (2006). *The Vegetation of South Africa, Lesotho and Swaziland*. Strelitzia.

National Environmental Management Act, 1998 (Act No. 107 of 1998): Procedures for Assessment and Minimum Criteria for Reporting on Identified Environmental Themes When Applying for Environmental Authorisation, Government Gazette of South Africa (2020).

NEMBA: Alien and Invasive Species Lists (2020).

NEMBA: Alien and Invasive Species Regulations (2020).

NEM:BA Act, 2004 (Act no. 10 of 2004). (2022). *The Revised National List of Ecosystems that are Threatened and in Need of Protection.*

Perret, J., Besnard, A., Charpentier, A., & Papuga, G. (2023). Plants stand still but hide: Imperfect and heterogeneous detection is the rule when counting plants. *Journal of Ecology*, 1–14.

Pierce, S. M., & Mader, A. D. (2006). *The Subtropical Thicket Ecosystem Programme Handbook: Integrating the natural environment into land-use decisions at the municipal level: towards sustainable development* (2nd ed.).

Pool-Sandvliet, R., Duffel-Canham, A., Pence, G., & Smart, R. (2017). *Western Cape Biodiversity Spatial Plan Handbook*.

Privett, S. D. J., Cowling, R. M., & Taylor, H. C. (2001). Thirty years of change in the fynbos vegetation of the Cape of Good Hope Nature Reserve, South Africa. *Bothalia*, *31*(1), 99–115.

Skowno, A. L., Poole, C. J., Raimondo, D. C., Sink, K. J., van Deventer, H., van Niekerk, L., Harris, L. R., Smith-Adao, L. B., Tolley, K. A., Zengeya, T. A., Foden, W. B., Midgley, G. F., Driver, A., Adams, J. B., Adams, R., da Silva, J. M., Fizzotti, B., Jansen van Vuuren, B., Kelly, C., … Whitehead, T. O. (2018). *National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity*.

Stewart, W., Bahindwa, A., Adams, A., Daniels, F., Nzimande, M., Job, N., Dabrowski, J., Ollis, D., & Palmer, R. (2021). *Environmental Assessment Guideline for Ecosystem-related aspects of the Terrestrial Biodiversity and Aquatic Biodiversity Protocols: Final Draft*.

Thackway, R., & Lesslie, R. (2006). *Reporting vegetation condition using the Vegetation Assets, States and Transitions (VAST) framework*.

Van Wilgen, B. W., Davies, S. J., & Richardson, D. M. (2014). Invasion science for society: A decade of contributions from the Centre for Invasion Biology. *South African Journal of Science*, *110*(7/8), 12–12.

Verburgt, L., McCleland, W., McKenzie, D., Laurence, S., Niemand, L., & Raimondo, D. (2020). *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.* SANBI.

Vlok, J. H. J., & Euston-Brown, D. I. W. (2002). *The patterns within, and the ecological processes that sustain, the Subtropical Thicket Ecosystem Planning (STEP) project.* .

Wintle, B. A., Walshe, T. v., Parris, K. M., & Mccarthy, M. A. (2012). Designing occupancy surveys and interpreting non-detection when observations are imperfect. *Diversity and Distributions*, *18*(4), 417–424.

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. 20. All species that were observed during the site visit are in Table 13. The site assessment species list is not exhaustive.

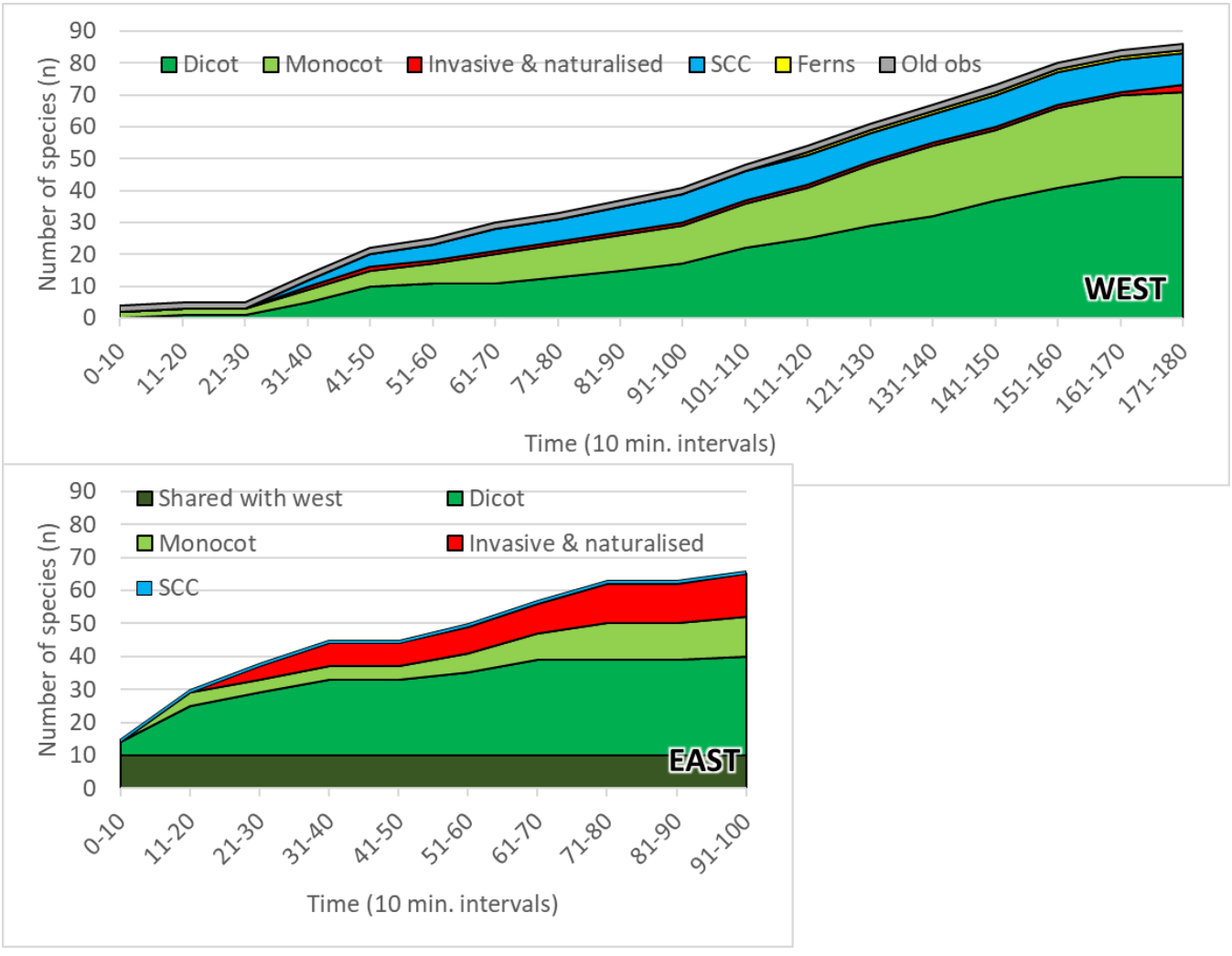


Figure 20: A plant species accumulation curve for the site assessment. The survey was split between the eastern and western halves of the property. Note for the western section that the *Eucalyptus* stand was not thoroughly included in the survey, which may mean that invasive species are underrepresented in this part of the site.

Table 13: A provisional species list made for the site assessment on Portion 11 / 449. 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	Survey area	iNat agreement	Another observer
Class Liliopsida					
Amaryllidaceae	Haemanthus coccineus	Spotted Bloodlily	West	1	
Asparagaceae	Agave americana	American century plant	East	1	
Asparagaceae	Albuca cooperi	Dainty Soldier-in-a-Box	West	0	
Asparagaceae	Asparagus aethiopicus	African Asparagus	East	0	
Asparagaceae	Asparagus asparagoides	Cape Smilax	West, East	1	
Asparagaceae	Asparagus rubicundus	Redstem Asparagus	West, East	0	
Asparagaceae	Drimia capensis	Maerman Squill	East	1	
Asparagaceae	Eriospermum sp. 1	Woolseeds	West	0	
Asparagaceae	Eriospermum sp. 2	Woolseeds	West	0	
Asparagaceae	Lachenalia cf. bulbifera	Cape Cowslips	East	0	
Asphodelaceae	Trachyandra ciliata	Common Capespinach	West	0	
Asphodelaceae	Trachyandra revoluta	Fold Capespinach	West	0	
Cyperaceae	Carex aethiopica	Sedge species	East	0	
Cyperaceae	Cyperus textilis	Mat Sedge	East	1	
Cyperaceae	Ficinia nigrescens	Black Clubrush	West	1	
Cyperaceae	Ficinia sp.	Star Grasses	West	0	
Iridaceae	Babiana cf. ambigua	Baboon Root	West	0	
Iridaceae	Gladiolus rogersii	Riversdale Bluebell	West	0	
Iridaceae	Ixia orientalis	Eastern Kalossie	West	0	
Iridaceae	Moraea collina	Cape Tulip	West	0	
Iridaceae	Moraea polyanthos	Manyflower Tulp	West, East	1	
Iridaceae	Romulea cf. rosea	Froetangs	East	0	
Iridaceae	Watsonia pillansii	Orange Watsonia	West	1	Jackie Dabrowski
Juncaceae	Juncus capensis	Cape Rush	East	1	
Juncaceae	Juncus kraussii	Sea Rush	East	2	

Family	Species	Common name	Survey area	iNat agreement	Another observer
Juncaceae	Juncus oxycarpus	Lax Rush	East	1	Jackie Dabrowski
Poaceae	Cenchrus clandestinus	Kikuyu Grass	East	1	
Poaceae	Ehrharta villosa	Pipe Grass	East	1	
Poaceae	Eragrostis capensis	Cape Love Grass	West	0	
Poaceae	Lolium perenne	Perennial Ryegrass	East	0	
Poaceae	Phragmites australis	common reed	East	1	
Poaceae	Urochloa serrata	Red-Topped Signal Grass	West	0	
Restionaceae	Elegia filacea	Slender Goldreed	West	0	
Restionaceae	Elegia microcarpa	Minihead Deckreed	West	0	
Restionaceae	Elegia stipularis	Cushion Goldreed	West	1	
Restionaceae	Hypodiscus aristatus	bristly pineapplereed	West	0	
Restionaceae	Restio eleocharis	Beach Pegreed	West	0	
Restionaceae	Restio vimineus	Spreading Capereed	West	0	
Restionaceae	Staberoha sp.	tassel reeds	West	0	
Restionaceae	Thamnochortus insignis	True Thatchreed	West	0	
Restionaceae	Thamnochortus sp.	Thatching Reeds	West	0	
Class Magnoliopsida					
Aizoaceae	*Aizoon secundum*	Comb Brakbush	East	0	
Aizoaceae	*Carpobrotus deliciosus*	Delicious Sourfig	West	1	
Aizoaceae	*Drosanthemum intermedium*	Succulent fig species	West	1	
Aizoaceae	*Lampranthus bicolor* cf. *fergusoniae*	Twocolour Brightfig	West	1	
Aizoaceae	*Mesembryanthemum aitonis*	Coast Solfig	West, East	0	
Amaranthaceae	*Salicornia sp.*	pickleweeds	East	0	
Anacardiaceae	*Searsia glauca*	Blue Kunibush	West, East	0	
Anacardiaceae	*Searsia lucida*	Glossy Currantrhus	West, East	1	

Family	Species	Common name	Survey area	iNat agreement	Another observer
Anacardiaceae	*Searsia pyroides*	Common currant-rhus	West	0	
Apocynaceae	*Carissa bispinosa*	num-num	West	1	
Apocynaceae	*Cynanchum obtusifolium*	Roundleaf Buckhorn	East	0	
Apocynaceae	*Gomphocarpus* cf. *fruticosus*	Balloon plant	East	0	
Asteraceae	*Chrysocoma ciliata*	Bitterbush	East	0	
Asteraceae	*Cirsium vulgare*	Bull Thistle	East	1	
Asteraceae	*Corymbium sp.*	Plampers	West	0	
Asteraceae	*Dicerothamnus rhinocerotis*	Renosterbush	East	0	
Asteraceae	*Felicia amoena*	Soft Felicia	East	0	
Asteraceae	*Gymnodiscus capillaris*	Cape Hairdaisy	West	0	
Asteraceae	*Helichrysum teretifolium*	Needle Everlasting	East	0	
Asteraceae	*Helminthotheca echioides*	bristly oxtongue	East	0	
Asteraceae	*Metalasia brevifolia*	Shortleaf Blombush	West	1	
Asteraceae	*Metalasia pungens*	Stink Blombush	West	3	
Asteraceae	*Nidorella ivifolia*	Ivy Vleiweed	East	0	
Asteraceae	*Oedera imbricata*	Scaly Perdekaroo	West	0	
Asteraceae	*Osteospermum moniliferum*	Bietou	West, East	1	
Asteraceae	*Ursinia chrysanthemoides*	Creeping Paraseed	East	0	
Brassicaceae	*Brassica* cf. *tournefortii*	Saharan Mustard	East	1	
Brassicaceae	*Heliophila linearis linearifolia*	Sunspurge species	West	1	
Brassicaceae	*Rapistrum rugosum*	annual bastard cabbage	East	1	
Bruniaceae	*Staavia radiata*	Mini Diamondeyes	West	1	
Campanulaceae	*Cyphia sylvatica*	Bush Baroe	NA	1	Nicola van Berkel
Campanulaceae	*Wahlenbergia tenella*	Fine Capebell	East	0	
Celastraceae	*Gymnosporia buxifolia*	Common Spikethorn	East	0	
Celastraceae	*Lauridia tetragona*	Climbing Saffron	West	1	

Family	Species	Common name	Survey area	iNat agreement	Another observer
Celastraceae	*Pterocelastrus tricuspidatus*	Candlewood	West	1	
Celastraceae	*Putterlickia pyracantha*	Bastard Spikethorn	West	1	
Ebenaceae	*Diospyros dichrophylla*	Poison Starapple	East	0	
Ericaceae	*Erica bauera*	Bridal Heath	West	1	Jackie Dabrowski
Ericaceae	*Erica lasciva*	Salt-and-Wind Heath	West	0	
Ericaceae	*Erica pulchella*	Beauty Heath	West	0	
Ericaceae	*Erica versicolor*	Twotone Heath	West	0	
Euphorbiaceae	*Euphorbia clandestina*	Ostrich Noors	West	2	
Fabaceae	*Acacia cyclops*	Rooikrans	West, East	2	
Fabaceae	*Indigofera nigromontana*	Swartberg Indigo	East	1	
Fabaceae	*Paraserianthes lophantha*	Plume Albizia	East	0	
Fabaceae	*Psoralea brilliantissima*	Brilliant Fountainbush	East	0	
Fabaceae	*Schotia afra*	Karoo Boerbean	East	1	
Fabaceae	*Vicia sativa*	Common Vetch	East	0	
Geraniaceae	*Pelargonium grossularioides*	Coconut Geranium	East	2	
Geraniaceae	*Pelargonium lobatum*	Vineleaf Storksbill	West	2	
Lamiaceae	*Leonotis ocymifolia*	Rock Lionspaw	East	0	
Malvaceae	*Abutilon sonneratianum*	Butter and cheese	East	1	
Malvaceae	*Hermannia* cf. *flammea*	Flaming Dollsrose	West	0	
Malvaceae	*Hermannia hyssopifolia*	Fat Dollsrose	West	1	
Malvaceae	*Hermannia joubertiana*	Lavender leaved dollsrose	East	1	
Malvaceae	*Hermannia lavandulifolia*	Lavender Dollsrose	West	1	
Moraceae	*Ficus carica*	common fig	East	1	
Myricaceae	*Morella quercifolia*	Oak Waxberry	West	2	Jackie Dabrowski
Myrtaceae	*Eucalyptus cf. grandis*	eucalyptus	West, East	1	

Family	Species	Common name	Survey area	iNat agreement	Another observer
Oxalidaceae	*Oxalis pes-caprae*	Bermuda buttercup	East	1	
Papaveraceae	*Argemone ochroleuca*	Mexican Poppy	East	1	
Polygalaceae	*Muraltia alopecuroides*	Foxy Purplegorse	West	1	Jackie Dabrowski
Polygalaceae	*Polygala myrtifolia*	Sweet Pea Shrub	West	1	
Primulaceae	*Lysimachia foemina*	Foemina Blue Pimpernel	East	0	
Primulaceae	*Myrsine africana*	African Boxwood	West	1	
Proteaceae	*Leucadendron eucalyptifolium*	Gumleaf Conebush	West	1	
Proteaceae	*Leucadendron galpinii*	Hairless Conebush	West	2	
Proteaceae	*Leucadendron meridianum*	Limestone Conebush		2	Craig Peter
Proteaceae	*Leucadendron salignum*	Common Sunshine Conebush	West	1	
Proteaceae	*Leucospermum praecox*	Mossel Bay Pincushion	West	2	
Proteaceae	*Protea repens*	Common Sugarbush	West	3	
Proteaceae	*Protea susannae*	stink-leaf sugarbush	West	1	
Rhamnaceae	*Phylica parviflora*	Mini Hardleaf	West	0	
Rhamnaceae	*Trichocephalus stipularis*	Dogsface	West	0	
Rosaceae	*Cliffortia schlechteri*	Limestone Caperose	West	0	
Rosaceae	*Cliffortia stricta*	Staid Caperose	West	0	
Rosaceae	*Cliffortia strobilifera*	Cone River Caperose	West	1	Jackie Dabrowski
Rubiaceae	*Galium tomentosum*	Velvet Bedstraw	East	0	
Rutaceae	*Agathosma capensis*	Cape Buchu	West	0	
Rutaceae	*Agathosma* cf. *scaberula*		West	0	
Rutaceae	*Agathosma eriantha*	Rigid Buchu	West	0	
Rutaceae	*Diosma echinulata*	Spiny Bitterbuchu	West	1	
Rutaceae	*Diosma sabulosa*	Sand Bitterbuchu	West	0	

Family	Species	Common name	Survey area	iNat agreement	Another observer
Rutaceae	*Euchaetis albertiniana*	Albertinia Beardbuchu	West	1	
Salicaceae	*Populus alba*	white poplar	East	0	
Salicaceae	*Scolopia zeyheri*	Thorn Pear	East	0	
Salvadoraceae	*Azima tetracantha*	Needle Bush	East	1	
Santalaceae	*Colpoon compressum*	Cape Sumach	West	1	
Sapotaceae	*Sideroxylon inerme inerme*	Southern White Milkwood	West, East	0	
Scrophulariaceae	*Jamesbrittenia* cf. *calciphila*	Lime Jaybee	East	0	
Scrophulariaceae	*Nemesia affinis*	Common Lionface	West	0	
Scrophulariaceae	*Selago dolosa*	Ball Bitterbush	East	0	
Solanaceae	*Datura stramonium*	jimsonweed	East	1	
Solanaceae	*Lycium afrum*	kraal honey-thorn	East	0	
Solanaceae	*Solanum linnaeanum*	Yellow Bitter-apple	East	0	
Solanaceae	*Solanum retroflexum*	Wonderberry	East	0	
Thymelaeaceae	*Gnidia squarrosa*	saffron bush	East	1	
Thymelaeaceae	*Lachnaea axillaris*	Teeny Stripper	West	0	
Thymelaeaceae	*Passerina corymbosa*	Common Gonna	West	0	
Zygophyllaceae	*Roepera flexuosa*	Thin Twinleaf	East	0	
Class Polypodiopsida					
Schizaeaceae	*Schizaea pectinata*	Toothbrush Fern	West	2	Jackie Dabrowski

12.2 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

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

12.3 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 14. 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 14: 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 15.

Table 15: 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 16).

Table 16: 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

12.4 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'.