Specialist Botanical and Terrestrial Impact Assessment for Erf 2833, Great Brak, Western Cape.

Prepared for Cape EAPrac

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ABBREVIATIONS

BSP	Biodiversity Spatial Plan
CBA	Critical Biodiversity Area
CD:NGI	Chief Directorate: National Geo-spatial Information
ESA	Ecological Support Area
IAP	Invasive Alien Plants
NEM:BA	National Environmental Management: Biodiversity Act
ONA	Other Natural Areas
PAOI	Project Area of Influence
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
SDP	Site Development Plan
SEI	Site Ecological Importance

DECLARATION OF SPECIALIST INDEPENDENCE

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

- I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP).
- At the time of conducting the field assessments 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: 20 November 2023

BIANKE FOUCHÉ ABRIDGED CV

Qualifications

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

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 have regularly taken part in alien clearing activities and helped to identify relevant listed invasive plants.
- I am currently a member of the Botanical Society of South Africa and the custodians for rare and endangered wildflowers (CREW) in George.

1. INTRODUCTION

1.1 Background

Confluent Environmental was contracted by New Care Innovations (Pty) Ltd. to conduct a Site Sensitivity Verification and full impact assessment for the "terrestrial plant species" and "terrestrial biodiversity" sensitivity of Erf RE/2833 in Great Brak. According to the DFFE Screening Tool, the impact assessment report is required because the site habitat has been modelled as potentially suitable habitat for several plant species of conservation concern (SCC), and the site is part of a CBA 1, ESA 2, National Forestry Inventory, and is mapped as an endangered ecosystem. The purpose of this impact assessment report is to verify the presence of the vegetation types on the property and confirm whether any plant SCC are present at the site that would confirm the plant sensitivity theme. The impact assessment section of the report assesses the various negative impacts, and relevant mitigation measures that apply to the site.

1.2 General Site Location

The property is located ca. 1.5 km west of the Great Brak River and ca. 1.1 km north of the coastline (Fig. 1).

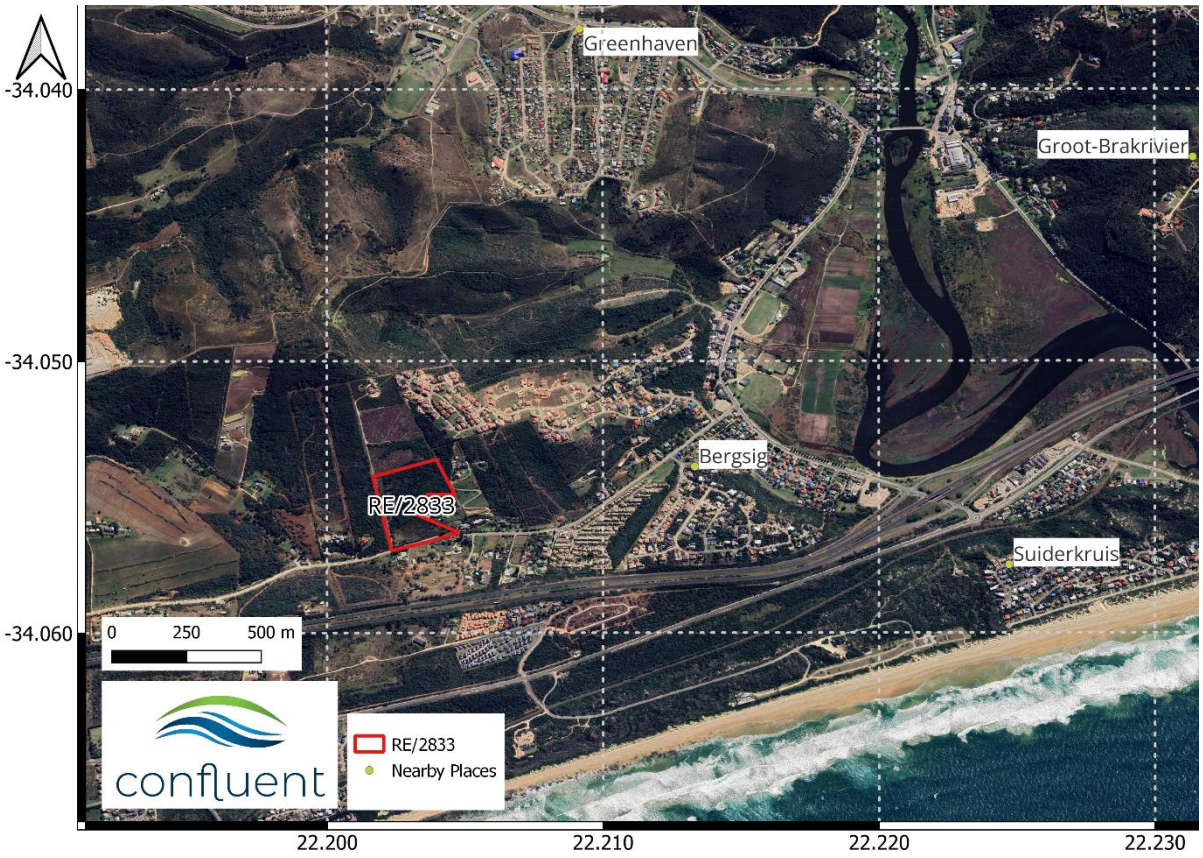
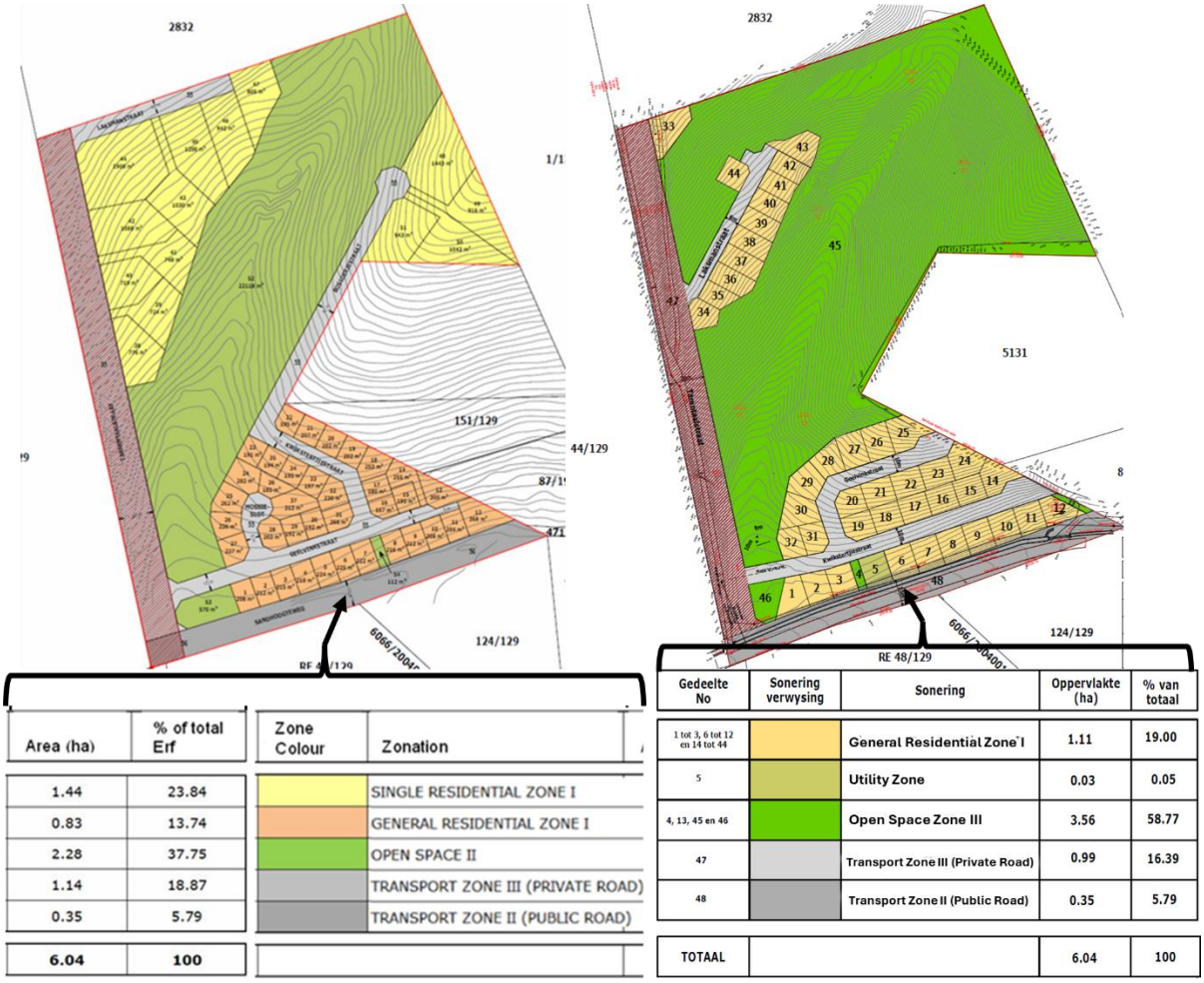


Figure 1: The general location of Erf RE/2833.

1.3 The development layout

Site development plans were provided in the form of proposed land zoning schemes (BOX 1; Fig. 2). Two alternative SDPs have been provided for the proposed development on Erf RE/2833, where one of the SDPs (top right map of Fig. 2) is partially the result of the site ecological importance (SEI) map that is presented later in this report. The planning for the site is mainly aimed at residential development, where the valley vegetation remains as a green belt between the proposed residential development zones. The top right map of Fig. 2 also indicates that access to the general residential zone 1 erven will

be via the existing narrow servitude along the western boundary of the site, which links in the south to Sandhoogte Road.



Area (ha)	% of total Erf	Zone Colour	Zonation
1.44	23.84		SINGLE RESIDENTIAL ZONE I
0.83	13.74		GENERAL RESIDENTIAL ZONE I
2.28	37.75		OPEN SPACE II
1.14	18.87		TRANSPORT ZONE III (PRIVATE ROAD)
0.35	5.79		TRANSPORT ZONE II (PUBLIC ROAD)
6.04	100		

Gedeelte No	Sonering verwysing	Sonering	Oppervlakte (ha)	% van totaal
1 tot 3, 6 tot 12 en 14 tot 44		General Residential Zone I	1.11	19.00
5		Utility Zone	0.03	0.05
4, 13, 45 en 46		Open Space Zone III	3.56	58.77
47		Transport Zone III (Private Road)	0.99	16.39
48		Transport Zone II (Public Road)	0.35	5.79
TOTAAL			6.04	100

Figure 2: The two proposed site development plans (SDPs) for Erf 2833. On the top left is the non-mitigated alternative plan, and the top right is the preferred alternative SDP. The zonation categories are given below the SDP maps.

2. TERMS OF REFERENCE

This screening site sensitivity verification report provides information on Terrestrial and Botanical diversity and sensitivity of the proposed development site. The results presented are based on desktop and field assessments, 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.
    - The protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial biodiversity.
- Additional guidelines for the terrestrial biodiversity theme:

- Ecosystem Guidelines for Environmental Assessment in the Western Cape (de Villiers et al., 2016).
- The Environmental Assessment Guideline for Ecosystem-related aspects of the Terrestrial Biodiversity and Aquatic Biodiversity Protocols: Final Draft (Stewart et al., 2023).
- 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. As discussed in the introduction, the highlighted rows of Table 1 were triggered for the site.

Table 1: Sources of BPA data for the Terrestrial Biodiversity Theme sensitivity (Stewart et al., 2021). Red rows indicate BPAs that have been triggered.

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.
Protected Areas (PAs)	Most recent update from the DFFE's "South African Protected Area Database".
Priority Areas for Protected Areas Expansion	The latest priority expansion areas for each province, as well as the expansion footprint for national parks as per the approved management plan for national parks.
Strategic Water Source Areas (SWSAs) (terrestrial)	Surface strategic water source areas, delineated by Mervyn Lotter in October 2020 with substantial input from the SWSA spatial task team as part of the SWSA spatial task team. Note that the protocol only applies to the terrestrial parts of the SWSAs.

Freshwater Ecosystem Catchments (terrestrial)	Freshwater ecosystem catchments, determined through the National Freshwater Ecosystem Priority Area (NFEPA) process.
Indigenous Forests	Indigenous forests or forest patches are mapped in detail by the Forestry section in the DFFE. The Forest biome makes up less than 1% of South Africa's land area and is protected in terms of the NFA. Consequently, because of their legal status and small spatial footprint, they are the only terrestrial biome that is included in the Screening Tool in its entirety. The latest available data set from the national forest inventory (NFI) is used to represent forests in the Screening Tool.
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". Vegetation data was sourced from the following sources:

- The 2018 updated South African National Vegetation Map from SANBIs Biodiversity GIS (BGIS) database.
- 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 Farm and surrounding areas.

Ecosystem data was sourced from:

- Shapefiles for the Western Cape Biodiversity Spatial Plan, i.e., information on PAs, CBAs, ESAs, and ONAs were downloaded from BGIS database.
- The Western Cape Biodiversity Spatial Plan (WC-BSP) of 2017 handbook and overview (CapeNature, 2017; Pool-Sandvliet et al., 2017).
- Cape Farm Mapper layers on the geology, soil, and SWSAs.
- 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 National List of Ecosystems that are Threatened and in need of protection (GN1002 of 2011), published under the National Environmental Management: Biodiversity Act (Act No. 10, 2004), and also using (Mucina & Rutherford, 2006) The Vegetation of South Africa, Lesotho, and Swaziland.

3.2 Field Assessment

Field work was undertaken on the 30th of March and 04th of April 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. This survey method tries to account for the short and single survey period, where detection probability of rare and threatened species are low (Garrard et al., 2008; Wintle et al., 2012). Observations of individual species and environmental characteristics were documented using both a Nikon Coolpix W300 camera, and an android app "Spot Lens". A provisional species list is provided in Appendix 9.1.

3.3 Assumptions & Limitations

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

- Two surveys took place during autumn on 30 March and 04 April 2023. Seasonal and time constraints always play a role in limiting the findings of a terrestrial specialist report.
- Rare and threatened plant species are difficult to locate and easily overlooked in the field. The species list for the area is limited to the findings of the two field assessments, as well as past records on iNaturalist and the Plants of Southern Africa (POSA) database for the proposed development site and its surrounding areas.
- Many plant species flower seasonally and are therefore difficult to identify outside of their flowering season. Environmental factors such as the 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).

4. RESULTS: DESKTOP ASSESSMENT

4.1 Terrestrial Biodiversity

4.1.1 Climate and soil

The climate of the area is mild temperate, with seasonal peaks in rainfall. Soils are generally well formed with a well-defined B horizon where there is marked clay accumulation below the elluviated horizon. The erodibility for the soils here is mapped as moderate (with an erodibility factor of 0.5).

4.1.2 Vegetation type(s)

The mapped vegetation type for Erf 2833 according to the 2018 National Vegetation Map of South Africa (Dayaram et al., 2019; Mucina & Rutherford, 2006) is Hartenbos Dune Thicket, which is an Endangered B1(iii) vegetation type. This vegetation has been mapped for the whole of Erf RE/2833 (Fig. 3).

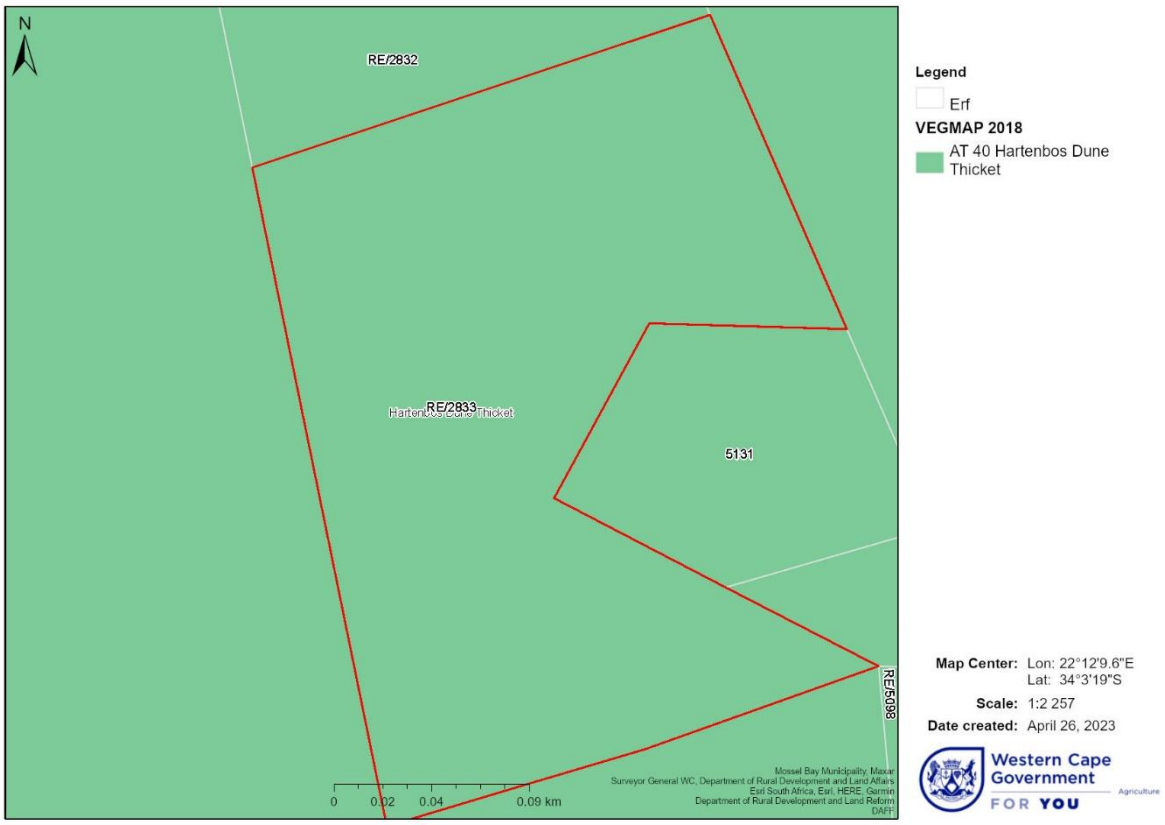


Figure 3: The vegetation types of Erf 2833 according to the National Vegetation Map of South Africa (Dayaram et al., 2019) as sourced from Cape Farm Mapper.

4.1.3 Western Cape Biodiversity Spatial Plan

The Biodiversity Spatial Plan for the Western Cape (WC BSP) shows that the majority of the area under Erf 2833 has been mapped as a Critical Biodiversity Area (CBA1 for terrestrial biodiversity as shown in Fig. 4). This specific CBA was mapped because, at a desktop level, the area was identified as being natural habitat that would be required to meet biodiversity targets (see BOX 2). The south-eastern corner of the site is mapped as a Forest CBA which represents forests that have been mapped according to a combination of the Indigenous Forest Inventory Map and the Western Cape 2013/14 Land cover product "natural forest" classes (Pool-Sandvliet et al., 2017). The south-western corner of the erf was mapped as an Ecological Support Area (ESA 2; see BOX 2). The recommended land-uses for the BSP is in Appendix 9.3, and the applicable reasons for the designated BSP layers over the site are:

1. Bontebok Extended Distribution Range
2. Water Source Protection – Groot-Brak
3. Watercourse Protection – Southern Coastal Belt
4. Western Cape Milkwood Forests (EN (C))

BOX 2: 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.

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.

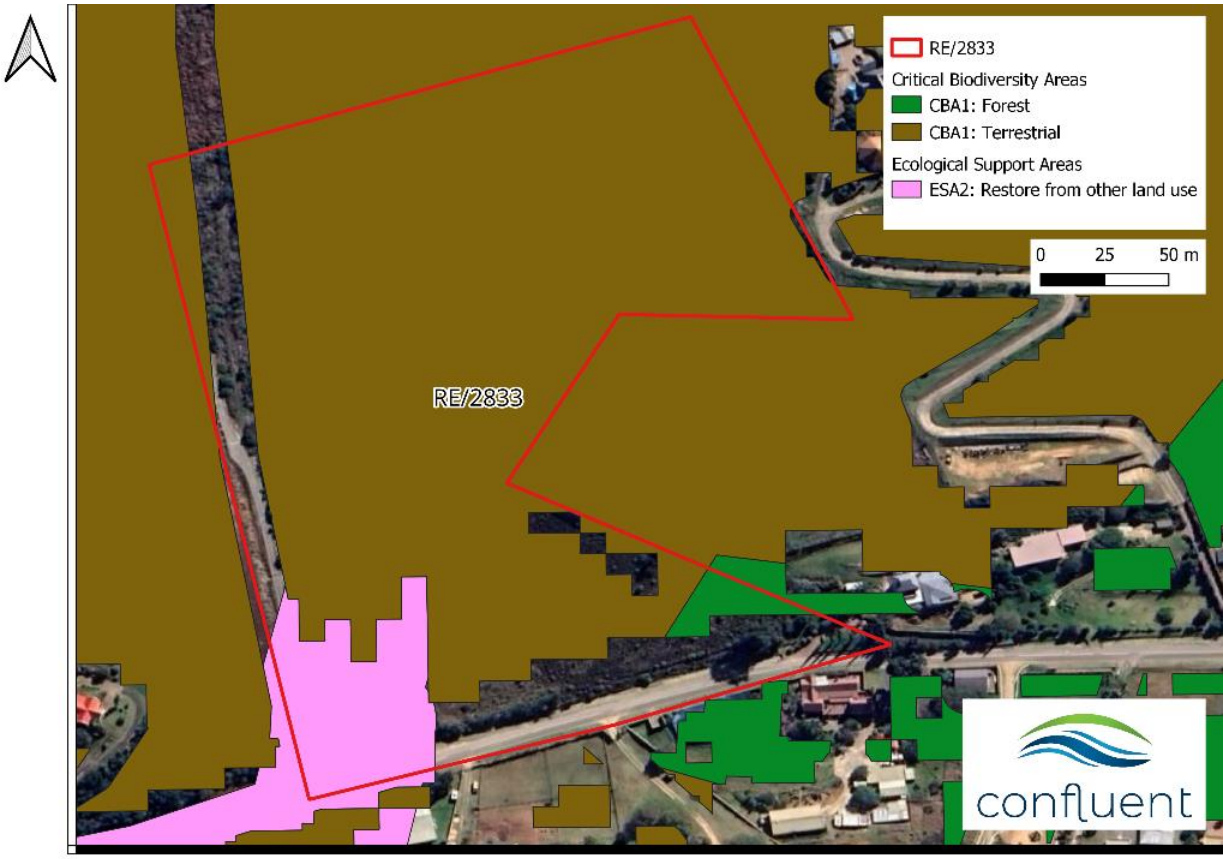


Figure 4: The mapped Western Cape Biodiversity Spatial Plan (WC BSP) categories that have been mapped for the site and surrounding landscape.

4.1.4 Historical Aerial Imagery

High resolution historical imagery (from Fig. 5) can be sourced upon request from the CD: NGI Geospatial portal, or from their offices in Mowbray, Cape Town.

1939 image

The imagery presented in Fig. 5 suggests that the property was transformed entirely for agricultural purposes during the 1930's, and perhaps even earlier than that. The surrounding landscape also seemed to have been transformed and were stripped of natural vegetation. On Erf 2833, the only remaining vegetation that was not part of agricultural fields was the valley vegetation. This is possibly because it was simply too steep and impractical to transform the valley.

1974 to 1991

Some of the surrounding properties had started to revegetation by 1979, however Erf 2833 was still largely an open field. By 1991 the vegetation had densified considerably, with only the southern section above the road still lacking woody growth (Fig. 5). This section continued to remain open and graminoid dominated.

2006 to the present (2023)

The graminoid dominated remaining field in the south of the site was again cleared at some point between 2006 and 2017 (Fig. 5). There is no evidence of a fire disturbance on the site since the site started to revegetate in the late 1970s. However, the vegetation that returned to the site included many black wattles, which today are established in the valley on the site. These black wattles dominate the thicket vegetation on the site and have done so for at least the past four decades (i.e., since the 1980's).

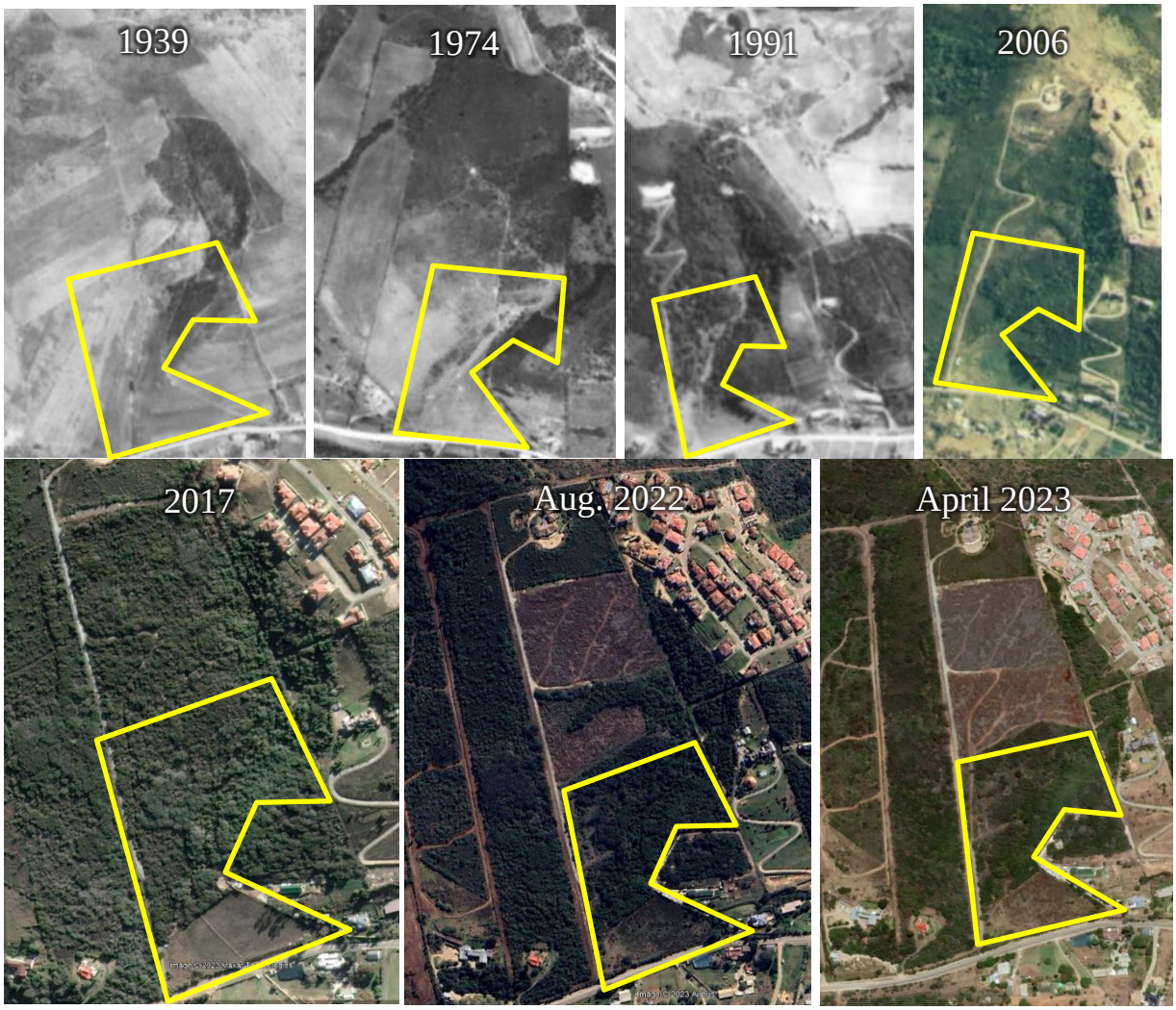


Figure 5: A series of historical imagery sourced from the CD: NGI geospatial portal, with the outline of Erf 2833 as a yellow outline on the images.

4.2 Terrestrial Plant Species

The reasons for the terrestrial plant sensitivity theme sensitivity in the Screening Tool Report are the possible occurrence of species of conservation concern (SCC) that were:

- *Agathosma eriantha,*
- *A. microcarpa*
- *A. muirii,*
- *Diosma passerinoides*
- *Duvalia immaculata,*
- *Erica glandulosa subsp. fourcadei,*
- *E. unicolor subsp. mutica,*
- *Euchaetis albertiana,*
- *Freesia fergusoniae,*
- *Hermannia lavandulifolia,*
- *Lampranthus fergusoniae,*
- *L. pauciflorus,*
- *Lebeckia gracilis,*
- *Leucospermum praecox,*
- *Muraltia knysnaensis,*
- *Selago villicaulis,*
- *Wahlenbergia polyantha,* and
- the SANBI sensitive species 153, 268, 500, 516, 633, 654, 800, and 1024

5. RESULTS: FIELD ASSESSMENT

5.1 Refined vegetation map and trajectory

The current state of the vegetation on the site is represented in the Fig. 6 below. The "**black wattle dominated thicket**" represents the valley thicket vegetation which is heavily invaded and dominated by black wattles. Many of the black wattles in the valley are large trees that have established and grown there for decades (see the woody vegetation densification from the historical aerial imagery). The disturbance of the site in the early 1900s has likely primed the site for opportunistic black wattles and rooikrans to establish more easily, and a lack of alien clearing since revegetation has left the site in a more permanent invaded state. Black wattle trees were also recorded as "**black wattle stands**" elsewhere on the site. A "**thicket**" was mapped to the south of the black wattle dominated thicket, as it seemed that the vegetation on the slope was less invaded and included more typical thicket species such as *Pittosporum viridiflorum, Diospyros dichrophylla, Buddleya saligna, Acokanthera oppositifolia,* and *Searsia spp*. The "**Secondary fynbos**" on the site was different from the "**Senescent *Erica peltata* dominated fynbos**" as it contained more disturbance loving species than true fynbos. The Senescent *Erica peltata* dominated fynbos was in a poor condition, and was near impenetrable, with serious rooikrans invasion in some sections. The "**grass dominated field**" contained a lot of invasive kikuyu grass, and the "**Roadside bushes**" do not represent natural thicket vegetation(hence the separate category).

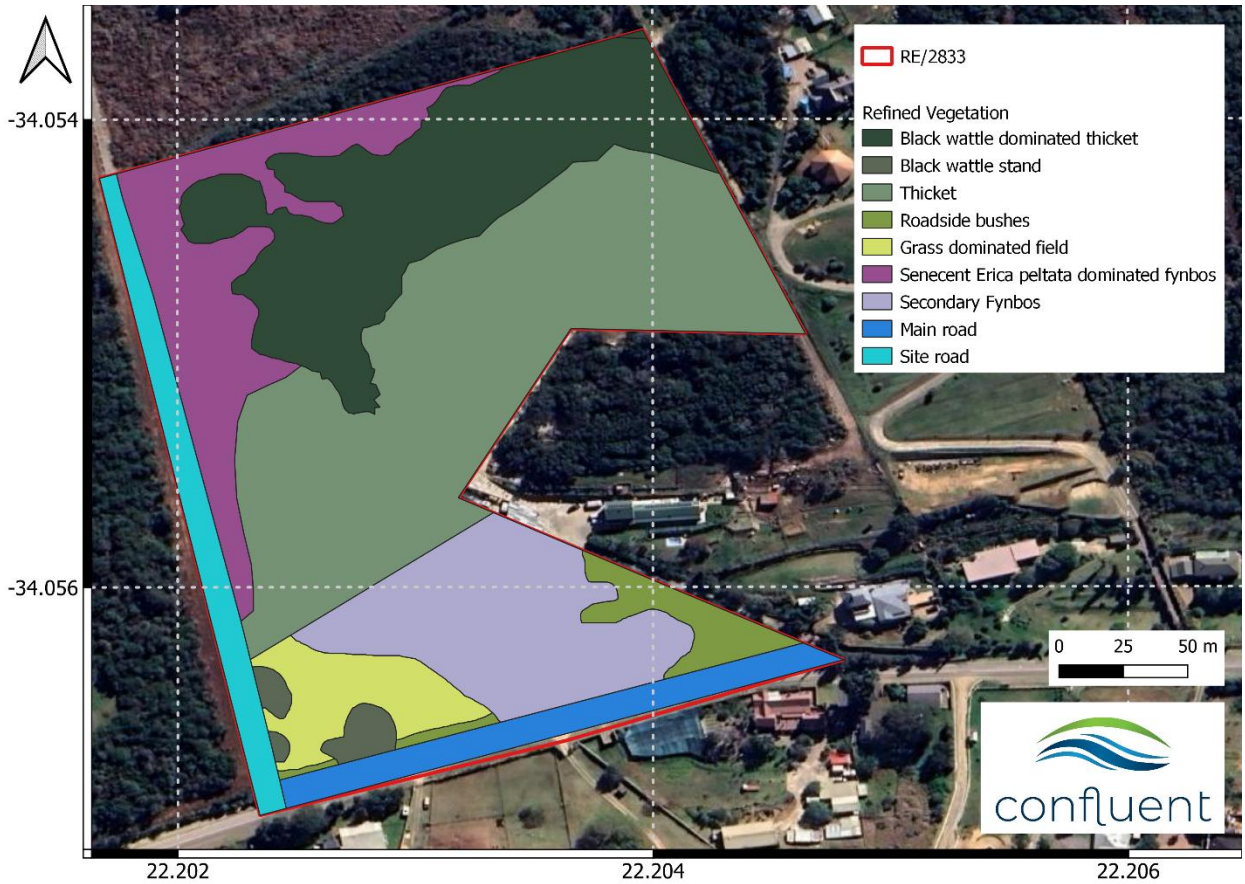


Figure 6: The ground truthed vegetation that was present on the site during the site visit (March/April 2023)

5.2 Nationally protected trees and SCC

The site assessment revealed that the "thicket" vegetation on the site contains Cheesewood trees (*Pittosporum viridiflorum,* with a national tree number of 139). It is still highly likely that Milkwood trees (not observed during the field assessments), and more Cheesewood trees might be present within the impenetrable thicket vegetation on the site. Only one species of conservation concern (SCC) was found during the site assessment, namely *Hermannia lavandulifolia*. Few individuals of this sp. were seen in the

northern section of the site, within the Senescent *Erica peltata* dominated fynbos (See Fig. 7). *H. lavandulifolia* (or the lavender-leaved dollrose) is an herbaceous perennial that is listed as Vulnerable A2c according to SANBI's red list of South African plants. This SCC was common on Erf 2833, which is the property just north of Erf 2833 (See Fig. 7).

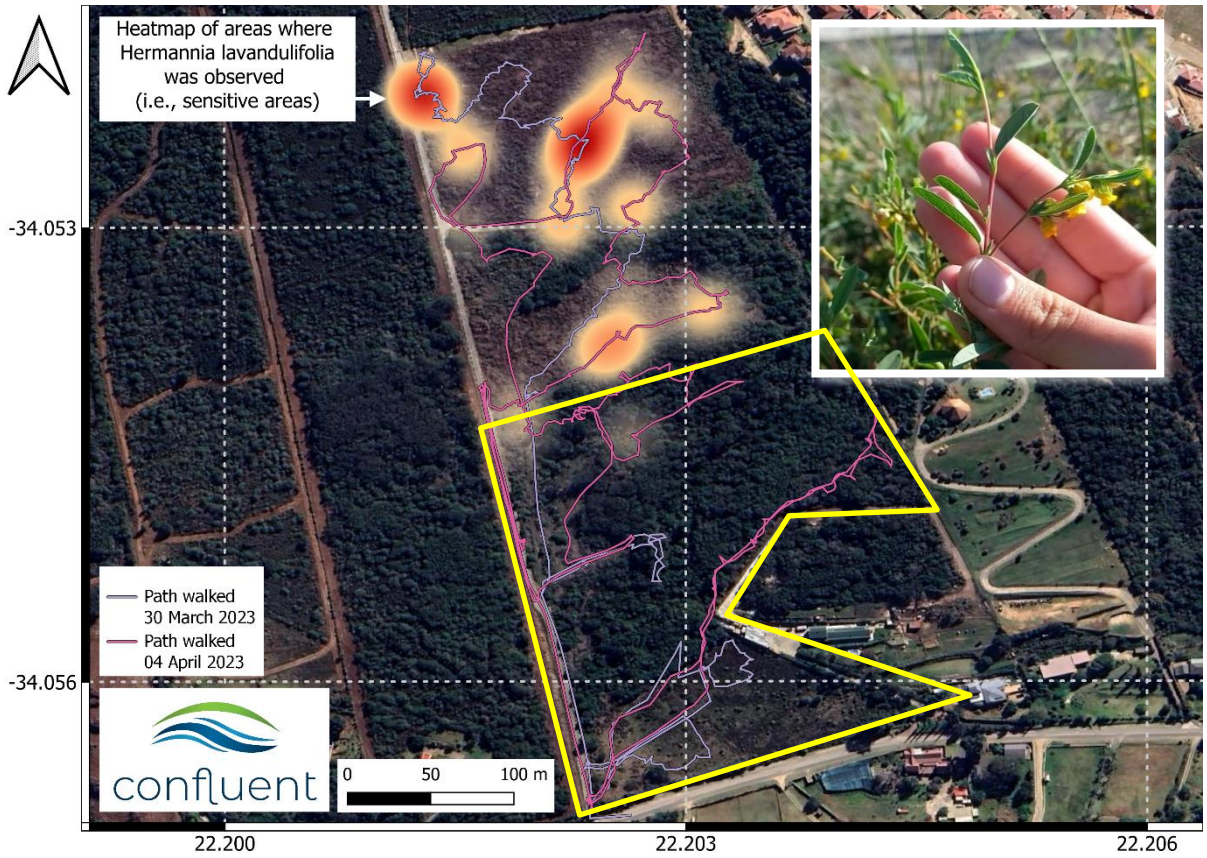


Figure 7: A heatmap of the areas where *Hermannia lavandulifolia* was observed, with an inset photo of the species. The outline of Erf 2833 is indicated as a yellow polygon on the map.

5.3 Introduced and invasive Alien Plants

Many IAPs were observed during the site assessment (Table 2 & Fig. 8). Alien clearing is the responsibility of landowners according to the Conservation of Agricultural Resources Act, 1983; Act No. 43 of 1983, and a description of the relevant NEMBA category requirements are described in BOX 2.

Table 2: The exotic species that were observed on Erf RE/2833. Listed IAPs are highlighted in red. The four bold entries indicate the most problematic species on the Erf.

Species	Common name	Family	NEMBA	CARA
Physalis peruviana	Cape gooseberry	Solanaceae	NA	NA
Acacia cyclops	**Rooikrans**	**Fabaceae**	**1b**	**2**
Acacia mearnsii	**black wattle**	**Fabaceae**	**2**	**2**
Cenchrus clandestinus	**Kikuyu Grass**	**Poaceae**	**1b**	**1**
Cirsium vulgare	Bull Thistle	Asteraceae	1b	1
Hakea sericea	Bushy needlebush	Proteaceae	1b	1
Phytolacca octandra	Inkweed	Phytolaccaceae	1b	NA

BOX 2: NEMBA categories for listed invasive alien plants (IAPs)

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.

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.

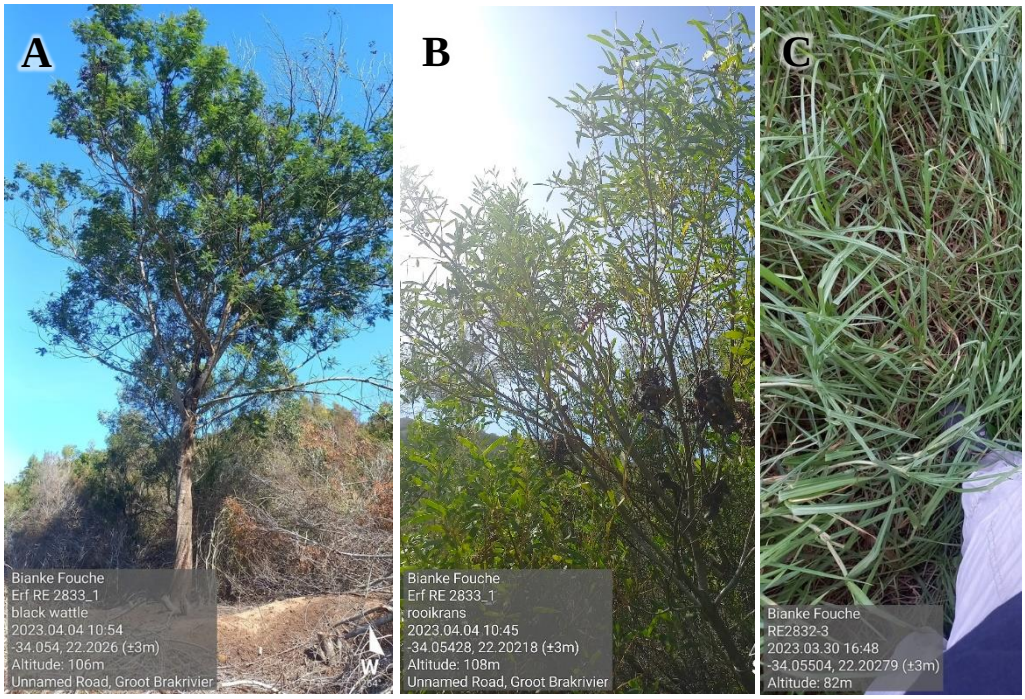


Figure 8: .Photos of the highlighted IAPs of Table 3. The photos show A) Black wattle (*Acacia mearnsii*), B) Rooikrans (*Acacia cyclops*) with viable seed pods, and C) Kikuyu grass.

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 current state of vegetation on the erf made it likely that numerous species were missed during the site assessment. All SCC that have been observed nearby on iNaturalist and POSA have been captured by the DFFE screening tool. The probability of occurrence that is stated in this section is a subjective assessment of SCC likelihood on the site.

Table 3: Plant SCC flagged for the site and nearby surroundings, but that were not observed during site assessment.

Species	Common name	Family	IUCN status	Distribution	Habitat	Probability of occurrence
Lampranthus fergusoniae	Limestone brightfig	Aizoaceae	Succulent	DFFE Screening tool	Rare	Medium
Lampranthus pauciflorus	Beach brightfig	Aizoaceae	Succulent	DFFE Screening tool	Endangered B1ab(ii,iii,iv,v)	Medium
Wahlenbergia polyantha	Capebells	Campanulaceae	Herbaceous perennial	DFFE Screening tool	Vulnerable B1ab(ii,iii,iv,v)	Medium
Erica glandulosa subsp. fourcadei	Ridges glandular heath	Ericaceae	Shrub	DFFE Screening tool	Vulnerable B1ab(ii,iii,iv,v)	Medium
Erica unicolor mutica	Two-onecolor heath	Ericaceae	Shrub	DFFE Screening tool	Endangered B1ab(ii,iii,v)	Medium
Lebeckia gracilis	Slender ganna	Fabaceae	Shrub	DFFE Screening tool	Endangered A2bc; B1ab(ii,iii,iv,v)	Medium
Sensitive species 1024	-	Orchidaceae	Tuberous geophyte	DFFE Screening tool	Endangered B1ab(iii,v)+2ab(iii,v); C2a(ii)	Medium
Muraltia knysnaensis	Garden Route purplegorse	Polygalaceae	Perennial	DFFE Screening tool	Endangered B1ab(ii,iii,iv,v)	Medium
Agathosma eriantha	Ridged buchu	Rutaceae	Shrub	DFFE Screening tool	Vulnerable B1ab(ii,iii,iv,v)	Medium
Agathosma microcarpa	Buchu	Rutaceae	Dwarf shrub	DFFE Screening tool	Vulnerable B1ab(i,ii,iii,iv,v)	Medium
Agathosma muirii	Heart buchu	Rutaceae	Shrub	DFFE Screening tool	Vulnerable A4abc	Medium
Diosma passerinoides	Silcrete bitterbuchu	Rutaceae	Shrub	DFFE Screening tool	Vulnerable A2c; C2a(i)	Medium
Selago villicaulis	Dune bitterbush	Scrophulariaceae	Herbaceous perennial	DFFE Screening tool	Vulnerable B1ab(ii,iii,iv,v)	Medium
Duvalia immaculata	Succulent	Apocynaceae	Succulent	DFFE Screening tool	Endangered B1ab(ii,iii,iv,v)	Low
Sensitive species 268	-	Asphodelaceae	Succulent	DFFE Screening tool	Endangered B1ab(iii,iv,v)	Low
Sensitive species 516	-	Asphodelaceae	Succulent	DFFE Screening tool	Endangered A2cd+4cd; B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)	Low
Sensitive species 633	-	Asphodelaceae	Succulent	DFFE Screening tool	Critically Endangered A2acd	Low
Freesia fergusoniae	Riversdale kammetjie	Iridaceae	Geophyte	DFFE Screening tool	Vulnerable B1ab(i,ii,iii,iv,v)	Low
Sensitive species 800	-	Iridaceae	Geophyte	DFFE Screening tool	Vulnerable B1ab(iii)	Low
Sensitive species 500	-	Orchidaceae	Tuberous geophyte	DFFE Screening tool	Endangered C2a(i)	Low
Sensitive species 654	-	Orchidaceae	Tuberous geophyte	DFFE Screening tool	Vulnerable C2a(i)	Low
Leucospermum praecox	Mossel Bay pincushion	Proteaceae	Shrub	DFFE Screening tool	Vulnerable A2c+3c+4c	Low
Sensitive species 153	-	Ruscaceae	Tuberous perennial	DFFE Screening tool	Endangered B1ab(ii,iii,v)+2ab(ii,iii,v)	Low
Euchaetis albertiana	Albertina beardbuchu	Rutaceae	Shrub	DFFE Screening tool	Endangered A2c	Low

6. SITE SENSITIVITY VERIFICATION

6.1 Terrestrial Biodiversity

Most of the property also falls into a CBA 1 (terrestrial) area. The CBA forest in the south-eastern part of the site is incorrectly mapped and would have made more sense if it was mapped over the currently black wattle infested valley vegetation. Only the valley vegetation, if cleared of aliens, might be considered as part of the National Forest Inventory (NFI), however the vegetation type here is not consistent with coastal forest, but rather EN Hartenbos Dune Thicket. Even though the author is confident in the thicket classification, there is similarity between thicket and forest with some ambiguity around the definitions of forest & thicket making it less clear to differentiate between the two. It is recommended that the valley vegetation on the site be considered sensitive regardless of its final classification as either recovering thicket or recovering coastal forest. The **terrestrial biodiversity sensitivity for the site is confirmed as Very High**, despite the historical disturbance and long-term occupation of some areas on the site by IAPs.

6.2 Botanical diversity

Although *Hermannia lavandulifolia* was also seen in the northern section of this property, it was not common, and entirely absent in the valley "Black wattle dominated thicket", "Thicket", "Secondary fynbos", and "Grass dominated field" (Fig. 6). The **sensitivity of the plant species theme is confirmed as High for the majority of Erf RE/2833** due to the fact that nationally protected trees are present on the site (*Pittosporum viridiflorum*) one or two *H. lavandulifolia* were present, and because there are some SCC with a high probability of occurrence for the site. However, areas **where the SEI is mapped as "Low" and "Very Low" have a botanical protocol sensitivity of Low**.

7. SITE ECOLOGICAL IMPORTANCE

The site ecological importance map is intended to provide a more refined overview of the sensitivity of the various habitats that have been identified on the site. The vegetation on the site has grown following the abandonment of agricultural fields at around the 1970's. Much of the vegetation that returned following the disturbance were IAPs. Note that the SEI that has been calculated for this site (Fig. 9 & Table 4) is specific to the proposed development, and cannot be compared between different proposed projects, however this SEI can be used if the same activities are planned with multiple alternative layouts. The mitigation recommended for different SEI categories are provided in Table 5. The SEI was calculated for taxa and habitats covering the entire Erf RE/2833. Methods for determining the SEI are provided in Appendix 9.2. The SEI for the site may change depending on the proposed activities that are provided as part of the in the SDP.

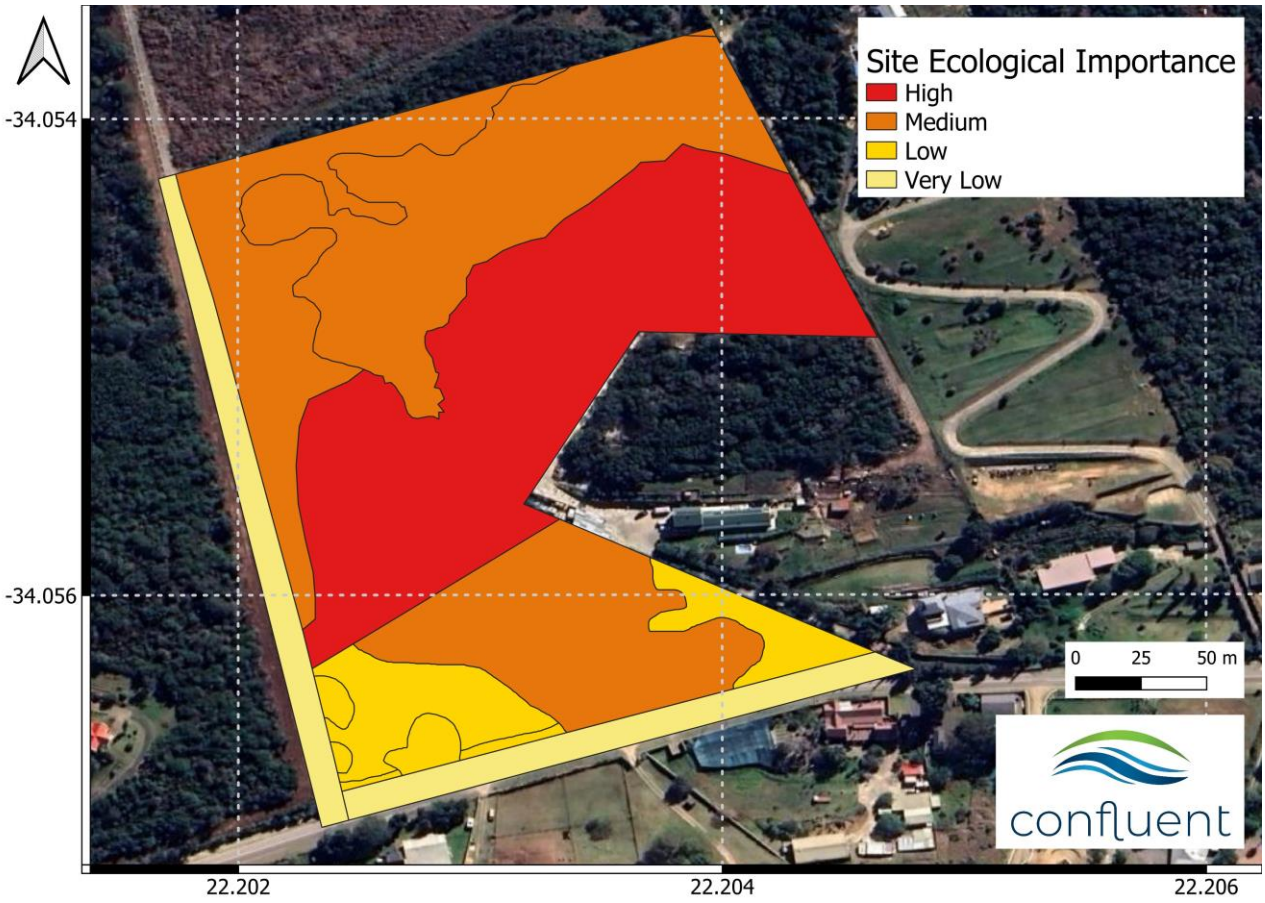


Figure 9: The SEI map for the proposed development on Erf RE/2833.

Table 4: The evaluation of the SEI for the various vegetation communities and habitats present within and surrounding the PAOI.

Vegetation type	Conservation Importance (CI)	Functional Integrity (FI)	Receptor Resilience (RR)	Site Ecological Importance (SEI)
Black wattle dominated thicket	**High** Habitat is considered part of a EN ecosystem type (Hartenbos Dune Thicket), with potential to support SCC.	**Medium** Mostly minor current negative ecological impacts with some major impacts (e.g., established population of alien and invasive flora) and signs of past disturbance. Moderate rehabilitation potential.	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, and species here have a moderate likelihood of remaining at a site when a disturbance is occurring	**Medium** BI – Medium RR – Medium
Black wattle stands	**Low** < 50% of receptor contains natural habitat with limited potential to support SCC.	**Medium** Mostly minor current negative ecological impacts with some major impacts (e.g., established population of alien and invasive flora) and signs of past disturbance. Moderate rehabilitation potential.	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, and species here have a moderate likelihood of remaining at a site when a disturbance is occurring	**Low** BI – Low RR – Medium
Thicket	**High** Habitat is considered part of a EN ecosystem type (Hartenbos Dune Thicket), with potential to support SCC.	**High** Good habitat connectivity with potentially functional ecological corridors. Minor current ecological impacts (presence of IAPs).	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, and species here have a moderate likelihood of remaining at a site when a disturbance is occurring	**High** BI – High RR – Medium
Roadside bushes	**Low** < 50% of receptor contains natural habitat with limited potential to support SCC.	**Medium** Mostly minor current negative ecological impacts with some major impacts (e.g., established population of alien and invasive flora) and signs of past disturbance. Moderate rehabilitation potential.	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, and species here have a moderate likelihood of remaining at a site when a disturbance is occurring	**Low** BI – Low RR – Medium
Grass dominated field	**Low** < 50% of receptor contains natural habitat with limited potential to support SCC.	**Medium** Mostly minor current negative ecological impacts with some major impacts (e.g., established population of alien and invasive flora) and signs of past disturbance. Moderate rehabilitation potential.	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, and species here have a moderate likelihood of remaining at a site when a disturbance is occurring	**Low** BI – Low RR – Medium
Senescent *Erica peltata* dominated fynbos	**Medium** Receptor somewhat invaded (mainly black wattles) with confirmed	**Medium** Mostly minor current negative ecological impacts with some major impacts (e.g.,	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, and species here have a	**Medium** BI – Medium RR – Medium

	VU SCC listed under criterion A only.	established population of alien and invasive flora). Moderate rehabilitation potential.	moderate likelihood of remaining at a site when a disturbance is occurring	
Secondary fynbos	**Medium** Receptor somewhat invaded (mainly black wattles).	**Medium** Mostly minor current negative ecological impacts with some major impacts (e.g., established population of alien and invasive flora). Moderate rehabilitation potential.	**Medium** Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, and species here have a moderate likelihood of remaining at a site when a disturbance is occurring	**Medium** BI – Medium RR – Medium
Main road and Site road	**Very Low** No natural habitat remaining	**Very Low** No habitat connectivity except for flying species or flora with wind-dispersed seeds.	**Very High** The roads are remaining where they are.	**Very Low** BI – Very Low RR – Very High

Table 5: Mitigation measures for the site based on the SEI ratings of the various vegetation types present on the site.

Site Ecological Importance (SEI)	Interpretation in relation to the proposed development activities
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.
Very Low	Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

8. IMPACT ASSESSMENT

8.1 Current impacts on the site

The biggest impact on the site at the moment is from invasive black wattle (*Acacia mearnsii*) trees that are threatening the natural thicket vegetation on the site. Other impacts include litter, and urban developments and roads surrounding Erf 2833. The southern section of this erf is already transformed into a grass dominated field and secondary fynbos which will require intensive and active restoration to conserve. It is also important to note that although alien clearing is a requirement by law, it almost never happens. This is also the reason that the valley on the site already has a serious and established black wattle (Acacia mearnsii) infestation problem. The no-go alternative (i.e., assuming no construction) is therefore assessed here in terms of the status quo on the site, assuming an ongoing lack of alien clearing. The options being assessed in the impact assessment below is therefore summarised as follows:

1. Alternative A: Original SDP provided (Fig. 2 top left) – This option will be associated with an approved Environmental Management Plan (EMPr) and management enforced by a homeowners association (HOA).
2. Alternative B: Adapted SDP (Fig. 2 top right) – This option will also be associated with an approved EMPr and management enforced by a HOA.
3. Alternative C: No-go option – This option will have no EMPr and no HOA to enforce ongoing and sufficient invasive alien plant control. Note that that the current owner is undertaking some control of alien and invasive plant species on the site.

8.2 Construction Phase

An Environmental Control Officer (ECO) must be appointed for the duration of the construction phase and should check on the site approximately once a week, especially following rainfall events.

8.2.1 A loss of SCC and nationally protected trees caused by the clearance of vegetation, construction site management, and general disturbance.

Description:

The construction of multiple houses on subdivided erven with a footpath in the open space area will result in an altered landscape with modified and transformed vegetation replacing some of the natural flora of the area. The transport of materials and construction staff could result in some vegetation loss outside of the PAOI, if they are not properly informed on the construction area. The section of remaining thicket is most sensitive on the site, especially since it is already heavily invaded with Alien invasives (mostly black wattles). The significance of this impact for the various alternative options are as follows (Table 6):

- Alternative A (Original SDP provided): Without mitigation is moderate negative and with mitigation is minor negative.
- Alternative B Adapted SDP: Without mitigation is moderate negative and with mitigation is minor negative.
- Alternative C (no-go): No construction will occur so this specific impact cannot be assessed for the no-go option.

Consequences if mitigation is poor:

1. A loss of sensitive tree species and SCC. *Hermannia lavandulifolia* may thrive in slightly disturbed areas but will disappear if the disturbance continues or where vegetation is completely transformed.
2. Fragmentation of SCC and protected trees.
3. A general loss of suitable habitat for SCC and other naturally occurring species on the site.
4. An increased risk of invasive plant species taking over and replacing natural vegetation.

Mitigation measures:

1. Plant search and rescues must be conducted whenever a new dwelling or structure is being constructed on any of the new sub-divided erven within Erf 2833.
    a. The construction area of influence must be clearly defined, and a nursery spot for rescued plants must be identified and used for each proposed development.
    b. Any additional SCC plants that are observed at any point during the construction of any of the proposed dwellings must be reported to the ECO.
    c. A maximum of a 2m disturbance envelope is allowed around proposed development footprints. This is the maximum project area of influence (PAOI) for the site.
    d. Naturally occurring plants that are rescued from the development footprints must be re-planted after construction within the 2m disturbance envelope.
2. Protection and re-use of topsoil
    a. The topsoil on the site contains valuable seeds and characteristics that will be vital for the success of rehabilitation of the site following construction processes. Topsoil in new excavation areas must be stripped to a depth of ca. 30cm and kept in designated piles on site within the footprint of the proposed development(s).
    b. Topsoil may not be removed from the site at all, to avoid contamination with any other material. Equipment used to handle and excavate the soil must be clean of any foreign material.
    c. The topsoil piles must be clearly labelled so that it does not mix with subsoils excavated or any other construction material for the site.
    d. Topsoil piles must be covered with plastic sheeting for the duration of the construction phase.
3. Weather forecasts should be checked on a daily basis, and work must stop during and following rainfall events.
4. The path made for in the open space planned on the property may not be accessible to construction staff working on other projects (housing) on the site. The path may only be accessed while it is being made and if alien clearing is required as per the alien management plan for the site.

Table 6: Construction phase impact 1: A loss of SCC and nationally protected trees caused by the clearance of vegetation, construction site management, and general disturbance.

Assessment	**Alternative A: Original SDP provided** (Fig. 2 top left)		**Alternative B: Adapted SDP** (Fig. 2 top right)	
Mitigation	Without	With	Without	With
Duration	Long term	Medium term	Long term	Medium term
Extent	Limited	Very limited	Limited	Very Limited
Intensity	Very high	High	High	Moderate

Probability	Certain	Certain	Certain	Certain
Confidence	High	High	High	High
Reversibility	Low	Low	Low	Low
Resource irreplaceability	Moderate	Moderate	Moderate	Moderate
Significance	Moderate Negative -91	Minor Negative -70	Moderate Negative -84	Minor negative -63

8.2.2 A loss of vegetation with restoration value within mapped Hartenbos Dune Thicket caused by the clearance of vegetation, construction site management, and general permanent disturbance.

Description:

The increase in human activity and foreign materials on the site during construction can exacerbate the existing problem the site faces with invasive plants (especially black wattles). The no-go option will result in a loss of natural vegetation on the site if alien and invasive plant management is not implemented on the site. Alien clearing is required by law. The significance of this impact for the various alternative options are as follows (Table 7):

- Alternative A (Original SDP provided): Without mitigation is moderate negative and with mitigation is minor negative.
- Alternative B Adapted SDP: Without mitigation is moderate negative and with mitigation is minor negative.
- Alternative C (no-go): No construction will occur so this specific impact cannot be assessed for the no-go option.

Consequences if mitigation is poor:

1. The creation of novel habitat that indigenous species cannot survive in, but where exotics and invasive plants thrive in.
2. A loss of vegetation resilience and habitat quality.
3. A loss of habitat in a threatened ecosystem category (Hartenbos Dune Thicket).

Mitigation measures:

1. Staff must be informed about the sensitivity of the remaining natural area on the site.
2. Ongoing monitoring and clearing of invasive alien plants during the construction phase.
3. No kikuyu grass (*Cenchrus clandestinus*) will be allowed anywhere, especially within riparian areas, as this is a listed invasive species.
4. Development and sub-divided erven to be developed must be outside of the sensitive valley vegetation with thicket on Erf 2833.
5. All new staff must be briefed about the layout of the construction site/s, and no-go natural areas must be clearly communicated.
6. Materials used during the construction phase must be sourced responsibly.
    a. No waste (including cleared invasive slash) dumping or burning may occur on the site, and especially not in the valley.

b. Regular cleaning of the construction site must take place (at the end of every day). Bins must be available on the construction site. Refuse must be disposed of at the appropriate waste disposal facility.

c. Danger tape that sis broken or that is starting to crumble must be disposed of and replaced. This applies to any construction material that has broken or become weathered.

d. Stockpiles and soil must all be placed within areas that will remain permanently transformed and must be covered by a geotextile or plastic covering, which must also be bunded (e.g., sandbags) when the piles are not in use on the site. This will prevent the material from washing away and contaminating the substrate of the site which likely still contains useful seeds and soil organisms.

7. Where vegetation will be cleared to make way for construction, a temporary ground net / cover should be placed to prevent potential erosion. Any observed erosion must be addressed immediately with the appropriate erosion control measures.
8. Construction vehicles should be checked on a daily basis at the start of the day for leaks and other faults.
    a. Sandbags or sawdust should be available on the site to ensure that any accidental oil or toxic material spills can be contained and stopped quickly.
    b. Any contaminated soil on the site must be removed by a registered hazardous waste service provider (Spill Tech, Interwaste, EnviroServ etc.).
    c. Vehicles with leaks must not be allowed to operate on the site until they have been repaired.
9. Adequate ablution facilities must be provided for every construction project.
    a. Toilets must be placed on a level platform before construction starts.
    b. Ablution facilities must be regularly maintained and cleaned.
10. At least one toilet per ten to fifteen construction staff should be available.

Table 7: Construction phase impact 1: A loss of SCC and nationally protected trees caused by the clearance of vegetation, construction site management, and general disturbance.

Assessment	**Alternative A: Original SDP provided** (Fig. 2 top left)		**Alternative B: Adapted SDP** (Fig. 2 top right)	
Mitigation	Without	With	Without	With
Duration	Long term	Medium term	Long term	Medium term
Extent	Limited	Very limited	Limited	Very Limited
Intensity	Very high	High	High	Moderate
Probability	Certain	Certain	Certain	Certain
Confidence	High	High	High	High
Reversibility	Low	Low	Low	Low
Resource irreplaceability	Moderate	Moderate	Moderate	Moderate
Significance	Moderate Negative -91	Minor Negative -70	Moderate Negative -84	Minor negative -63

8.3 Conclusion of construction

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.

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.
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 PAOI for the proposed developments.

8.4 Operational Phase

8.4.1 Hartenbos Dune Thicket, fynbos, and SCC on the site is negatively affected by inappropriate landscaping resulting in genetic pollution and potential long-term biodiversity loss from the replacement of species through cultivation non-indigenous species to the vegetation type and surrounding landscape.

Description:

Most landowners plant gardens with plants that are not native and indigenous to the area where they live. Furthermore, they often plant lawns that require a lot of care, fertiliser, and pesticides. Where inappropriate "indigenous" species are planted, landowners can accidentally add to the creation of Frankenflora, which is the result of genetic pollution that results in hybridisation and eventual species loss. The effect of genetic pollution can be cryptic, and hard to assess in a report like this. Planting of alien ornamental species displaces natural plants, pollinators, and habitats, causing a net loss of SCC around the development areas from increased negative edge effects. Once this happens, the vegetation and soil will be transformed, meaning the habitat no longer resembles a natural habitat. The significance of this impact for the various alternative options are as follows (Table 8):

- Alternative A (Original SDP provided): Without mitigation is moderate negative and with mitigation is minor negative.
- Alternative B Adapted SDP: Without mitigation is moderate negative and with mitigation is minor negative.
- Alternative C (no-go): The status quo impact without mitigation (assuming negligible alien clearing effort) is moderate negative, and with mitigation (and improved alien clearing) is minor negative.

Consequences if mitigation is poor:

1. A gradual increase in the number of negative edge effects that result from exotic garden plants outcompeting natural species in the environment.
2. Biodiversity loss from the introduction and establishment of invasive and alien plants in thicket and fynbos habitat.

3. A general loss of habitat, not only for plants, but important pollinator species too.

4. Eventual loss of any native vegetation remaining due to the gradual naturalisation of exotic garden plant varieties.

5. A loss of natural genetic variation, e.g., due to introgression (Cortés-Ortiz, 2017; Mitchell & Holsinger, 2018) between populations and species of plants.

6. Loss of specific adaptations that make plant species resilient.

7. Altered population and plant community structure and fragmentation of sub-populations of SCC.

8. Altered soil characteristics, including soil microbes, & seed bank changes.

9. Altered landscape-level fire regimes.

Mitigation measures:

1. Additional gardening should be avoided and limited per dwelling.

    a. Landscaped gardens are to be planted with naturally occurring species from the area, and lawns must be kept minimal or avoided.

    b. No listed invasive plants, like kikuyu grass, is allowed.

    c. No landscaping is allowed around the path proposed in the open space network on the site.

2. Only the rehabilitation of natural fynbos and thicket vegetation rescued from the site around the proposed developments in the 2m disturbance envelope is allowed.

3. Ongoing effort to remove all invasive plants species is a requirement by law. As mentioned before, no planting of kikuyu grass will be allowed. Black wattles require ongoing effort to eradicate in accordance with an invasive plant control and eradication plan.

4. Landowners are responsible to maintain their gardens, so that plants do not overgrow. No garden waste may be dumped in any remaining natural area and must be disposed of in a responsible manner.

5. Fertilisers and pesticides must be avoided, and only where absolutely necessary can they be used with due caution to avoid killing indigenous species and natural pollinators in the surrounding landscape.

6. Gardens 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, and therefore the author has borrowed an example from their website as a guideline for making the best environmentally friendly gardening decisions (Fig. 10). All these tips form part of the formal mitigation proposed in this report.

Table 8: Operational phase impact 1 –Hartenbos Dune Thicket, fynbos, and SCC on the site is negatively affected by inappropriate landscaping resulting in genetic pollution and potential long-term biodiversity loss from the replacement of species through cultivation non-indigenous species to the vegetation type and surrounding landscape.

Assessment	**Alternative A: Original SDP provided**		**Alternative B:** Specialist changes to SDP		**Alternative C:** No-go option	
Mitigation	Without	With	Without	With	Without	With
Duration	Permanent – no conscious vegetation monitoring	Medium term – phasing out of harmful / ignorant landscaping practices	Permanent	Medium term	Permanent	Long term
Extent	Limited (cumulative impacts hard to predict)	Very limited (cumulative impacts hard to predict)	Limited (cumulative impacts hard to predict)	Very Limited (cumulative impacts hard to predict)	Limited (cumulative impacts hard to predict)	Very limited (cumulative impacts hard to predict)
Intensity	Very High	High	High	Moderate	High	Moderate
Probability	Almost certain	Almost certain	Almost certain	Almost certain	Almost certain	Almost certain
Confidence	High	High	High	High	High	High
Reversibility	Medium	Medium	Medium	Medium	Medium	Medium
Resource irreplaceability	Medium	Medium	Medium	Medium	Medium	Medium
Significance	Moderate Negative -90	Minor negative -60	Moderate Negative -84	Minor Negative -54	Moderate Negative -84	Minor Negative -60

Figure 10: A illustration that can help guide future gardening decision making, as provided by the https://www.fynboslife.com/life-garden/ website.

9. CONCLUSION AND RECOMMENDATION

The author of this report recommends that the developments on Erf 2833 follow the preferred layout as in Fig. 2 (top right layout). This option has already been amended after following the SEI categories that have been worked out for the site. A large portion of this site is a valley which supports forest and thicket. Most of the vegetation on the site is consistent with Hartenbos Dune Thicket. The major threat to this ecosystem type, especially on this specific property, comes from encroachment by invasive alien plants. The valley vegetation on this site has also been heavily invaded by black wattles. Care should be taken when clearing the site of black wattle trees and saplings to avoid any further biodiversity loss on the site – to ensure that this is the case an alien and invasive plant control and eradication plan must be compiled and implemented. In the southern section of the site, a graminoid dominated disturbed secondary fynbos was present. Repeated disturbance in this section of the site has resulted in a shift to a more graminoid dominated disturbed vegetation, which contains some fynbos elements (see the historical images for the site below showing imagery from, 1939, 1974, 1991, and 2006 respectively). In the areas where the vegetation is transformed, as described above, the SEI is Low.

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11. APPENDIX

11.1 Provisional plant species list

All additional species that have not yet been mentioned that were observed during the site visit are in Table 9.

Table 9: A provisional plant species list based on the site assessment of Erf RE/2833.

Species	Common name	Family
Searsia sp.	Karees	Anacardiaceae
Searsia glauca	Blue Kunibush	Anacardiaceae
Searsia pallens	Ribbed Kunirhus	Anacardiaceae
Searsia pterota	Wing Currantrhus	Anacardiaceae
Acokanthera oppositifolia	bushmans poison	Apocynaceae
Cynanchum ellipticum	Monkeyrope Buckhorn	Apocynaceae
Cynanchum obtusifolium	Roundleaf Buckhorn	Apocynaceae
Gomphocarpus physocarpus	balloonplant	Apocynaceae
Asparagus sp.	Asparagus	Asparagaceae
Arctotheca prostrata	Prostrate Capeweed	Asteraceae
Berkheya sp.	African Thistles	Asteraceae
Delairea odorata	Cape-ivy	Asteraceae
Dicerothamnus rhinocerotis	Renosterbush	Asteraceae
Helichrysum sp.	Everlasting-flowers	Asteraceae
Helichrysum cymosum	Fume Everlasting	Asteraceae
Helichrysum patulum	Honey Everlasting	Asteraceae
Helminthotheca echioides	bristly oxtongue	Asteraceae
Metalasia sp.	Blombushes	Asteraceae
Metalasia acuta	Pointy Blombush	Asteraceae
Nidorella ivifolia	Ivy Vleiweed	Asteraceae
Osteospermum moniliferum	Bietou	Asteraceae
Senecio sp.	groundsels	Asteraceae
Senecio deltoideus	Climbing Ragwort	Asteraceae
Ursinia sp.	Paraseeds	Asteraceae
Monopsis unidentata unidentata		Campanulaceae
Gymnosporia buxifolia	Common Spikethorn	Celastraceae
Gymnosporia nemorosa	White Forest Spikethorn	Celastraceae
Mystroxylon aethiopicum aethiopicum	Cape Koobooberry	Celastraceae
Diospyros dichrophylla	Poison Starapple	Ebenaceae
Erica peltata	Shield Heath	Ericaceae
Indigofera nigromontana	Swartberg Indigo	Fabaceae
Pelargonium alchemilloides	Mantle Storksbill	Geraniaceae
Grewia occidentalis	Crossberry	Malvaceae
Hermannia sp.	Dollsroses	Malvaceae
Oxalis caprina	Goat's-foot	Oxalidaceae
Oxalis ciliaris	Fringe Sorrel	Oxalidaceae
Oxalis imbricata	Tile Sorrel	Oxalidaceae
Oxalis stellata	Star Sorrel	Oxalidaceae

Pittosporum viridiflorum	Cape Cheesewood	Pittosporaceae
Plantago lanceolata	ribwort plantain	Plantaginaceae
Ehrharta erecta	panic veldtgrass	Poaceae
Melinis sp.	Red Tops	Poaceae
Setaria megaphylla	Broadleaf Bristlegrass	Poaceae
Sporobolus africanus	Parramatta Grass	Poaceae
Scutia myrtina	cat-thorn	Rhamnaceae
Zanthoxylum capense	Small knobwood	Rutaceae
Buddleja saligna	False Olive	Scrophulariaceae
Chaenostoma caeruleum	Blue Skunkbush	Scrophulariaceae
Solanum nigrum	black nightshade	Solanaceae
Passerina sp.	Gonnas	Thymelaeaceae

11.2 Site Ecological Importance Methods

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 10 below.

Table 10: The matrix that defines the biodiversity importance (BI) of a given habitat type, as identified from the desktop and field assessments.

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 11. 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 11: The matrix that defines the site ecological importance (SEI) of a given habitat type, as identified from the desktop and field assessments.

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

11.3 Land use recommendations according to the WC BSP

Recommended acceptable land-uses for each BSP layer is outlined and summarised in Table 12 below.

Table 12: The land-use planning proposed by the Western Cape Biodiversity Spatial Plan. IUCN Red Listing Criteria for species

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

11.4 The IUCN Species Red List criteria summary

This section contains an extra summary explaining the very basics of the five Red List criteria used when assessing the Red List status of species. Note that this summary sheet does not provide detail on the "Near Threatened" category (sometimes also called an "Orange List" category) which comes before the "Vulnerable" category. These are the criteria that are used by the IUCN to assign the extinction threat status for individual plant species. In South Africa there are additional criteria (not shown on Fig. 11) for Rare and Critically Rare plant species.

SUMMARY OF THE FIVE CRITERIA (A-E) USED TO EVALUATE IF A TAXON BELONGS IN AN IUCN RED LIST THREATENED CATEGORY (CRITICALLY ENDANGERED, ENDANGERED OR VULNERABLE).[1]

A. Population size reduction. Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4

	Critically Endangered	Endangered	Vulnerable
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3 & A4	≥ 80%	≥ 50%	≥ 30%

A1 Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction are clearly reversible AND understood AND have ceased.

A2 Population reduction observed, estimated, inferred, or suspected in the past where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

A3 Population reduction projected, inferred or suspected to be met in the future (up to a maximum of 100 years) *[(a) cannot be used for A3]*.

A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

based on any of the following:

(a) direct observation *[except A3]*
(b) an index of abundance appropriate to the taxon
(c) a decline in area of occupancy (AOO), extent of occurrence (EOO) and/or habitat quality
(d) actual or potential levels of exploitation
(e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)

	Critically Endangered	Endangered	Vulnerable
B1. Extent of occurrence (EOO)	< 100 km²	< 5,000 km²	< 20,000 km²
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented **OR** Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** area, extent and/or quality of habitat; **(iv)** number of locations or subpopulations; **(v)** number of mature individuals			
(c) Extreme fluctuations in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** number of locations or subpopulations; **(iv)** number of mature individuals			

C. Small population size and decline

	Critically Endangered	Endangered	Vulnerable
Number of mature individuals	< 250	< 2,500	< 10,000
AND at least one of C1 or C2			
C1. An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
C2. An observed, estimated, projected or inferred continuing decline AND at least 1 of the following 3 conditions:			
(a) (i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
(ii) % of mature individuals in one subpopulation =	90–100%	95–100%	100%
(b) Extreme fluctuations in the number of mature individuals			

D. Very small or restricted population

	Critically Endangered	Endangered	Vulnerable
D. Number of mature individuals	< 50	< 250	**D1.** < 1,000
D2. *Only applies to the VU category* Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time.	-	-	**D2.** typically: AOO < 20 km² or number of locations ≤ 5

E. Quantitative Analysis

	Critically Endangered	Endangered	Vulnerable
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

1 Use of this summary sheet requires full understanding of the *IUCN Red List Categories and Criteria* and *Guidelines for Using the IUCN Red List Categories and Criteria*. Please refer to both documents for explanations of terms and concepts used here.

Figure 11: The IUCN summary for the five assessment criteria used during the species Red Listing process.

11.5 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 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*

The criteria and their associated ratings are shown in Table 13.

Table 13: 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 14.

Table 14: 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 15).

Table 15: 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