Specialist Botanical and Terrestrial Biodiversity Impact Assessment Report for Erf 301, Whites Road, Hoekwil.


Bonatea speciosa
Photo: @lindeq on iNaturalist


Disa sagittalis
Photo: B. Fouche


Liparis remota
Photo: B. Fouche

Prepared for Eco Route

Upon request from the applicant, Sean Holmes

Prepared by: Bianke Fouché
(MSc; *Pr.Sci.Nat.* No. 141757)

Confluent Environmental

May 2024

confluent
aquatic consulting & research

Tel: +27 66 009 0363

Email : bianke@confluent.co.za

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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
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
SSVR	Site Sensitivity Verification Report

DECLARATION OF SPECIALIST INDEPENDENCE

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

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

Signed: 31 May 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. Graduation is October 2023).

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

Skills and Core Competencies

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

References

Professor Michael D. Cramer
HW Pearson Building, University of Cape Town, Rondebosch
Phone: +27 21 650 2444
Email: michael.cramer@uct.ac.za

Professor Timm M. Hoffman
HW Pearson Building, University of Cape Town, Rondebosch
Phone: +27 21 650 5551
Email: timm.hoffman@uct.ac.za

Jan Vlok
Regalis Environmental Services, Oudshoorn
Phone: +27 44 279 1987
Email: janvlok@mweb.co.za

Dr David Hoare
David Hoare Consulting, Pretoria
Phone: +27 83 284 5111
Email: david@davidhoareconsulting.co.za

Dr. Paul-Pierre Steyn
Botany Building, Nelson Mandela University South Campus, Port Elizabeth
Phone: +27 41 504 4873
Email: paul.steyn@mandela.ac.za

Paula Strauss
Grootbos Foundation Conservation, Grootbos Private Nature Reserve, Overstrand
Phone: +27 72 611 7971
Email: paula@grootbosfoundation.org

Sean Privett
Grootbos Foundation Conservation, Grootbos Private Nature Reserve, Overstrand
Phone: +27 82 411 1008
Email: sean@grootbosfoundation.org

1. INTRODUCTION

1.1 Background

Confluent Environmental was contracted by the Applicant on the recommendation of Eco Route to undertake a botanical and terrestrial biodiversity assessment for Erf 301, Hoekwil. According to the Department of Forestry, Fisheries, and the Environment (DFFE) Screening Tool, the terrestrial plant species theme has been highlighted as having a Medium sensitivity, and the terrestrial biodiversity has a Very High sensitivity. The plant species theme is triggered due to several species of conservation concern (SCC) that are potentially present in the area. The terrestrial biodiversity theme sensitivity is due to the Erf having areas that are mapped as forming part of Critical Biodiversity Areas (CBA 1), Ecological Support Areas (ESA 2), Freshwater Ecosystem Priority Areas (FEPA) Sub-catchment, the National Protected Area Expansion Strategy (NPAES), and the SANParks buffer for the Garden Route National Park. The purpose of this report is to confirm the sensitivity of the plant species and terrestrial biodiversity of the property and compile the appropriate report.

1.2 General Site Location

Erf 301 of Hoekwil is just north of the Touws River estuary, east of Wilderness (Fig. 1). The Erf is situated below the upper south-facing portion of White's Road. The property is sizeable, covering a total of ca. 39322 m^2, and most of it is characterised by a relatively steep south-facing slope. The slope is ca. 10 m above sea-level at its lowest point, and ca. 90 m at its most elevated point.

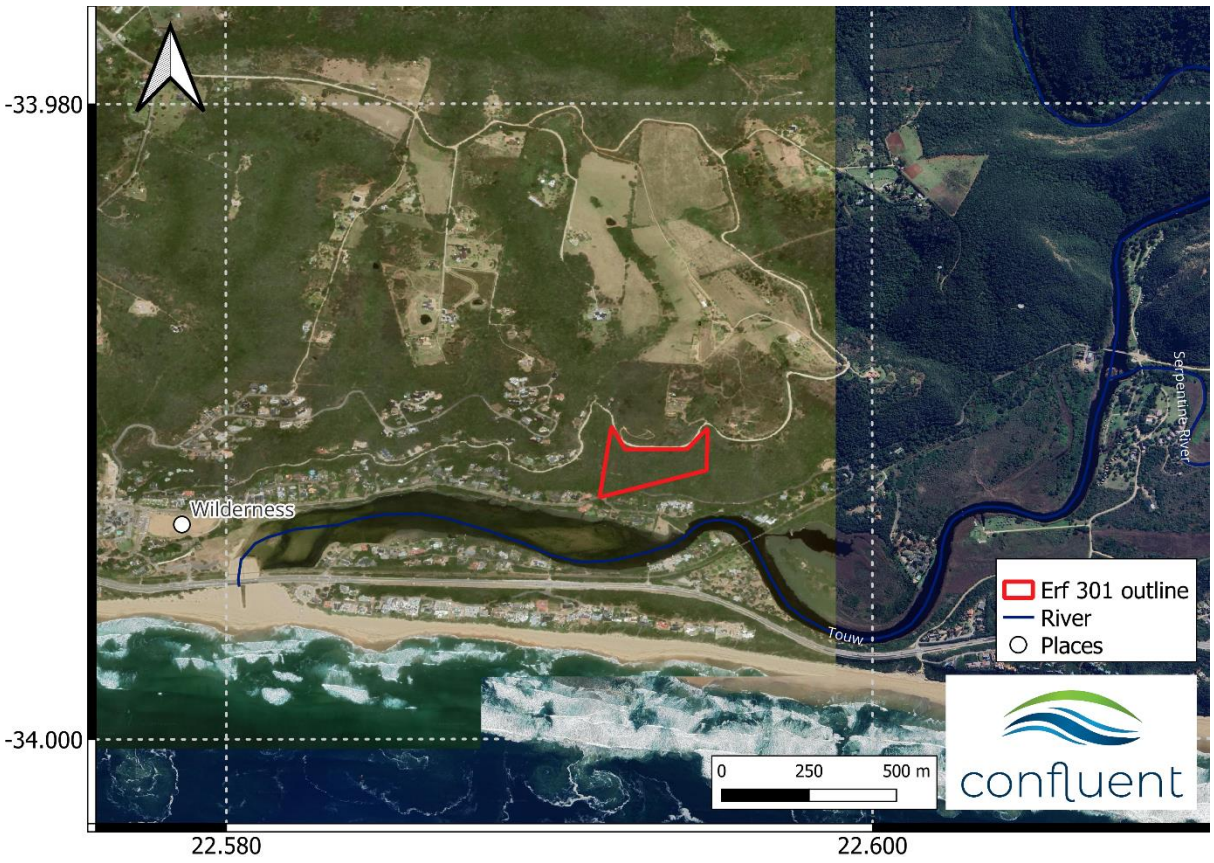

Figure 1: The general location of Erf 301 in Hoekwil, just north of the Touw River Estuary.

1.3 The Development Layout

The site development plan (SDP; Fig. 2) proposes the construction of a primary dwelling with six smaller dwellings (called "Pods"). Four of the six Pods, which are planned to the west of the primary dwelling, will be developed at the same time as the primary dwelling on the site. The two pods that are planned east of the primary dwelling will be developed at a later time during a second phase development on the site. The proposed sewer line will run diagonally from the north to the south of the property (Fig. 2). The detail provided for the proposed sewer is as follows:

> "*6kl septic tank without a French drain located at base of proposed development area. A 50mm Class 4 flexi overflow pipe to be surface laid and connected to a second conservancy tank located at the bottom end of property adjacent to Waterside Road. The second conservancy tank is a pre-manufactured 6000l HDPE underground conservancy tank with inspection manhole and suction pipe complete. Filling around tank to consist of cement stabilized GZ material.*"

The property will also include a driveway which will be accessed from Whites Road north of the Erf. The driveway will lead to the main dwelling. The primary dwelling (including a store and garage) will cover a total of 446 m^2. The front half of the dwelling will be constructed on columns to minimise the disturbance footprint of the house on the vegetation and habitats of the site. This reduces the permanent footprint of the house to ca. 200 m^2. The pods will cover ca. 38m^2 each, but again, only a quarter of that area will be levelled as the rest of the pod areas will also be constructed on columns.

An OSCAER Permit also needs to be acquired by the applicant for the development of the six Pods due to the Open Space II (Conservation) zoning that is being applied for in a separate Land-use Planning application. The owner of the site would like to protect the majority of Erf 301.

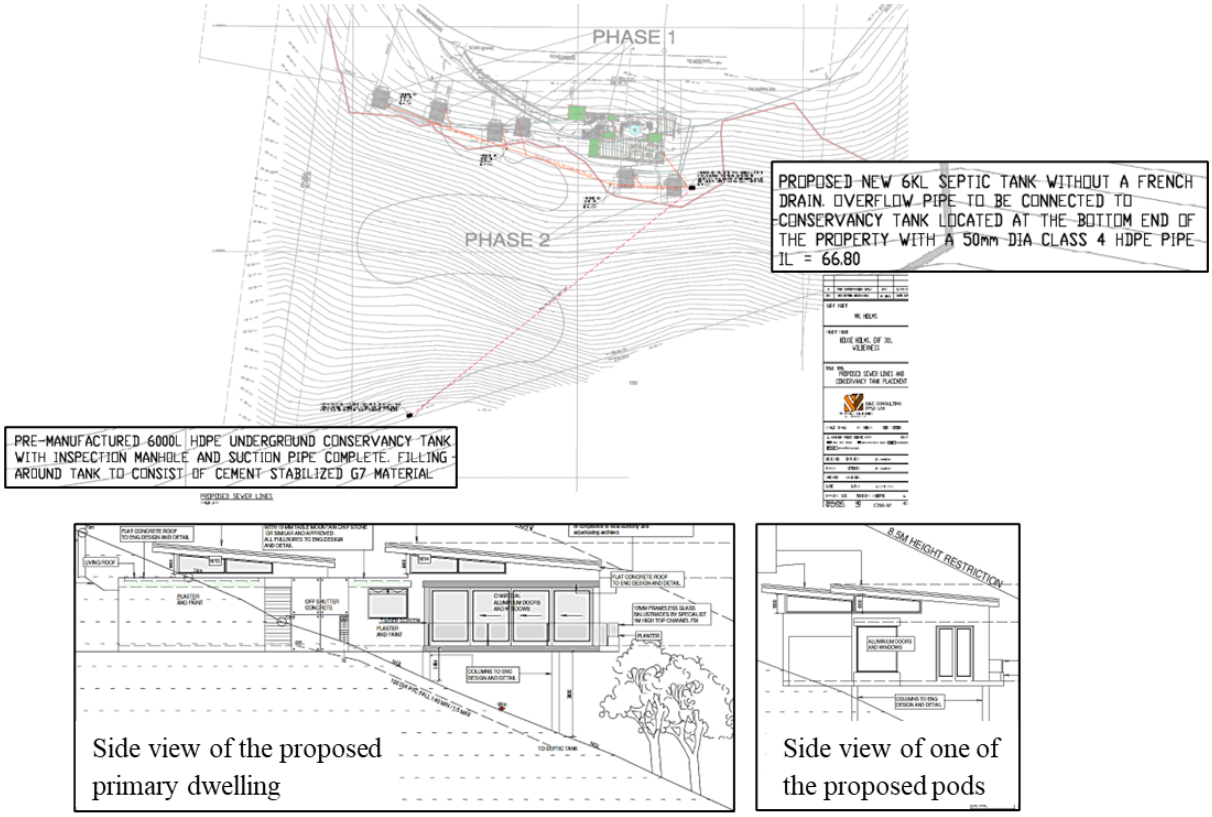

Figure 2: The site development plan (SDP) for Erf 301 as it was proposed prior to the completion of this report. The two eastern "Pods" on the site are going to be developed at a later stage as part of a second phase development on the site.

2. TERMS OF REFERENCE

This assessment provides information on Terrestrial and Botanical diversity and sensitivity, and an assessment of the impacts of the proposed development on the plant species and vegetation communities. 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 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 (30 October 2020).
    - 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 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 proposed development on Erf 301.

Table 1: Sources of BPA data for the Terrestrial Biodiversity Theme sensitivity (Stewart et al., 2021). Red rows indicate BPAs that have been triggered for Erf 301, and form the basis for the Very High sensitivity assigned by the screening tool.

Sensitivity layer	Data included and source
Critical Biodiversity Areas (CBAs)	Most recent terrestrial CBA spatial footprint for metros, provinces, or bioregional plans, combined to create a national data set.
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.
SAN Parks Buffer Areas	A buffer area for a National Park is defined in the February 2012 schedule on Biodiversity Policy and Strategy for South Africa's Strategy on Buffer Zones of 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". 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 05th of June 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 for the plants not listed in the report body is provided in Appendix 11.1. The likelihood that the majority of plant species have been found during the survey is discussed in the results section of the report, with a species accumulation curve for the duration of the site assessment is also presented in Appendix 11.1.

3.3 Assumptions & Limitations

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

- Only one survey took place during early winter on 05 June 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 thicket and forest on the Erf portion made it hard to gain access to some sections of the site. It is possible that the impenetrable nature of the vegetation 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 Erf 301 is described as warm and temperate. The rainfall pattern is aseasonal, although two peaks are reflected in rainfall (see Fig. 3). The mean annual run-off of water from this area is ca. 200 mm/annum (Cape Farm Mapper). The mean annual temperature (MAT) for this area is around 17 to 18˚C.

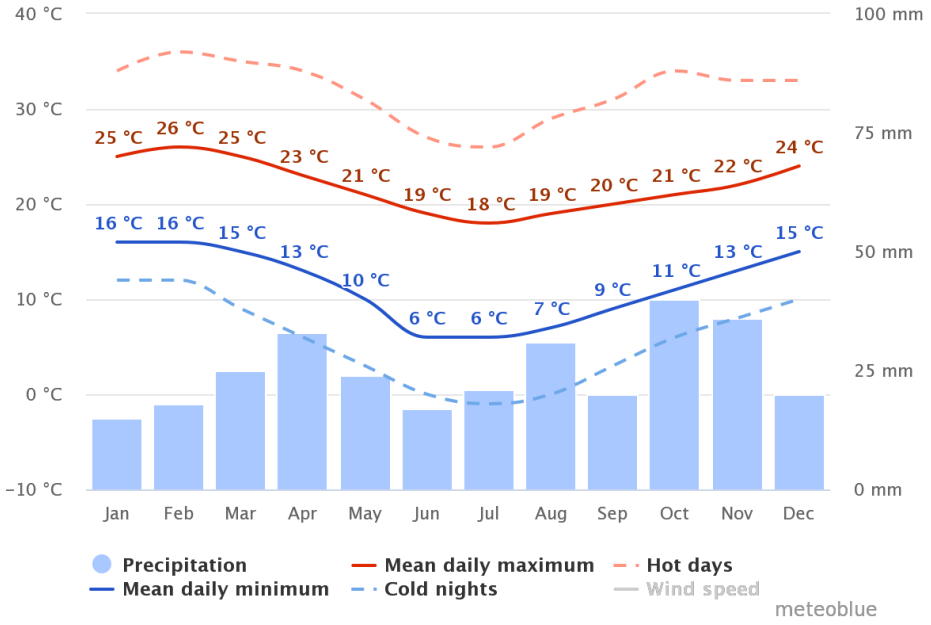

Figure 3: A summary graphic of the weather for the Hoekwil area.

4.1.2 Geology and Soil

The soil on the site is described as sandy, with a high erodibility factor (0.62 on Cape Farm Mapper). The geology of the site is likely part of the Cape Granite Suite (Browning & Macey, 2015). These granites are from the late Precambrian. The Maalgaten Granite, considered the main part of the George Pluton (i.e., a body if intrusive igneous rock), is likely present at the site and stretches from Wilderness in the East to the Klein Brak River in the West (Browning & Macey, 2015) as shown in Fig. 4. The rocky outcrop on Erf 301 might be part of this Maalgaten Granite, but it could also be Modderkloof Granodionite. A geologist would need to confirm the geology that is present on erf 301. Mike Rhea, a Geologist from the USA describes granodionite as:

> *"Granodiorite is an intrusive igneous rock composed primarily of feldspar, quartz, and smaller amounts of mafic minerals. It has a phaneritic texture, meaning its interlocking crystals can be seen with the naked eye. It usually displays mottled colours of off-white, gray, and black with no layering or banding."* ~ Granodiorite: Identification, Characteristics, Pictures & More – Rockhound Resource

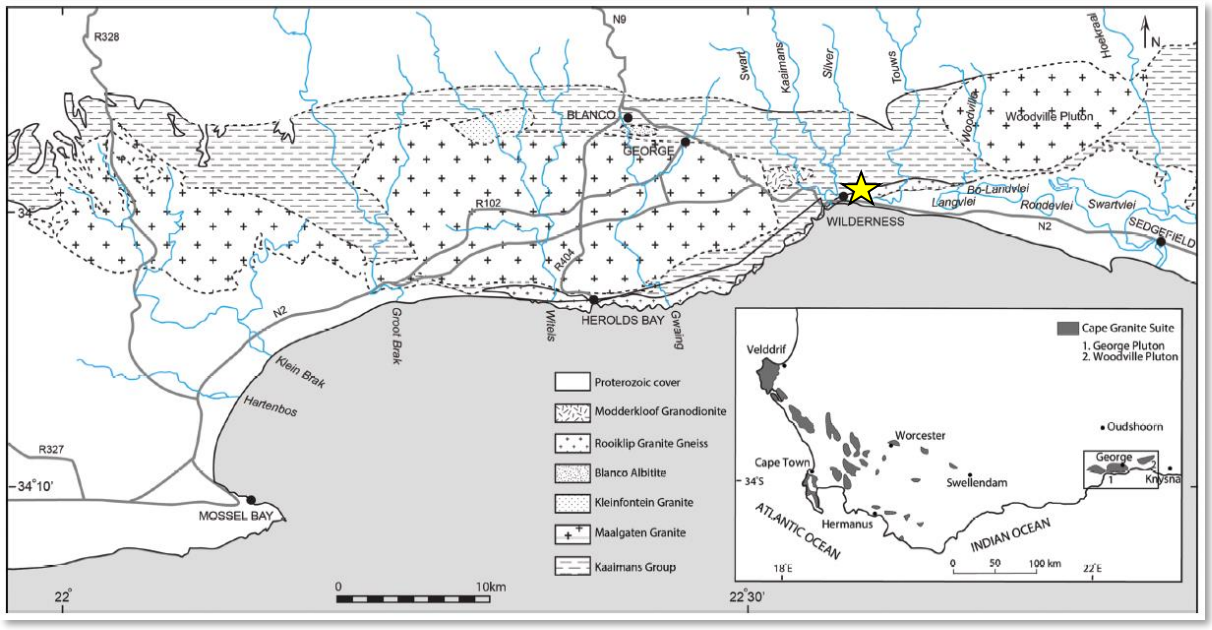

Figure 4: A map taken from the (Browning & Macey, 2015) paper showing the distribution of the George and Woodville Pluton granitoids. The inset illustrates additional areas where outcrops of the Cape Granite Suite occur. The location of Erf 301 is indicated with a star.

4.1.3 Vegetation Type(s)

The Environmental Comment document from the 16th of January 2023 for the "Permit application in terms of the Outeniqua Sensitive Coastal Area Extension (OSCAE) Regulations under Section 21 (1) of the Environmental Conservation Act (73 of 1989): Earthworks and clearing of vegetation on Erf 301 Whites Road, Wilderness" states that:

> "*Although in conservation planning the site is identified as a 'terrestrial CBA' and the vegetation on the site is described by Vlok as Wolwe River Fynbos / Forest the fynbos on the site has undergone a natural transition (due to a long absence of fires) to coastal thicket, with very little fynbos (and no conservation-worthy fynbos ecosystems) surviving. The site is however pristine with few if any alien invasive species being present.*"

The mapped vegetation for Erf 301 of Hoekwil is Garden Route Granite Fynbos and Goukamma Dune Thicket (in the south-west) according to the 2018 National Vegetation Map of South Africa (Fig. 5A; (Dayaram et al., 2019; Mucina & Rutherford, 2006). The Vlok vegetation map for the site does indeed map the site as "Wilderness Fynbos-Forest" (Fig. 5B). The Vlok vegetation map also indicates that hilltop areas and north-facing slopes to the north of Erf 301 are "Wilderness Grassy Fynbos" (Fig. 5B).

Garden Route Granite Fynbos is found only in the Western Cape Province in three main sections (Fig 4). The largest section of the vegetation type is mapped from Groot Brak River to Woodfield. Like shale fynbos, it is associated with undulating hills on coastal forelands. Garden Route Granite Fynbos is typified by dense proteoid and/or ericoid shrubby grassy fynbos depending on the slope and aspect of the landscape. This vegetation type is listed as critically endangered as over 70% of its original extent has been transformed to agriculture or forestry land uses (Fig. 6). Remaining patches of this vegetation type are confined mostly to highly fragmented pockets on steeper slopes. Furthermore, even though it is thought that this vegetation type was once dominated by proteoid fynbos, it seems to be easily converted to graminoid fynbos with more frequent fires and / or augmentation with pasture grasses (Mucina & Rutherford, 2006). Some of the typical plants that are associated with Garden Route Granite Fynbos as described in (Mucina & Rutherford, 2006) include (green species were seen on the site; blue species indicate species from the same Genus were recorded on the site):

Tall Shrubs: *Passerina corymbosa*, *Cliffortia serpyllifolia*, *Protea coronata, P. lanceolata, P. neriifolia*.

Low Shrubs: *Erica discolor var speciosa*, *E. peltata*, *Phylica confusa*, *Syncarpha paniculata, Agathosma ovata*, *Anthospermum prostratum, Aspalathus asparagoides, Cliffortia falcata*, *Cullumia bisulca, Erica canaliculata, E. diaphana, E. formosa, Eriocephalus africanus, Hermannia angularis, Leucadendron salignum, Lobelia tomentosa, Metalasia pungens*, *Mimetes cucullatus, Pelargonium fruticosum, Relhania calycina*.

Succulent Shrub: *Lampranthus sociorum*.

Semiparasitic Shrubs: *Osyris compressa, Thesium virgatum*.

Semiparasitic Epiphytic Shrub: *Viscum capense*.

Geophytic Herb: *Schizaea pectinata*.

Graminoids: *Tetraria cuspidata, Brachiaria serrata, Eragrostis capensis, Ficinia nigrescens, Heteropogon contortus, Pentaschistis eriostoma, Restio triticeus, Themeda triandra*

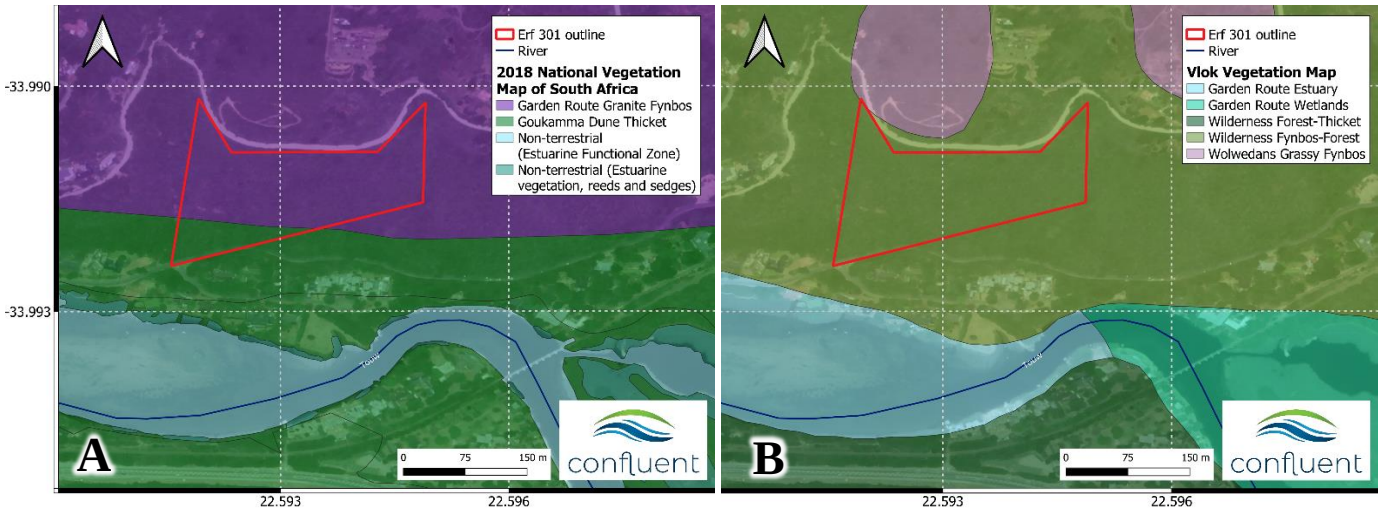

Figure 5: A) The mapped vegetation types according to the 2018 National Vegetation Map of South Africa (Dayaram et al., 2019; Mucina & Rutherford, 2006). B) The Vlok vegetation map categories for Erf 301 and the surrounding area.

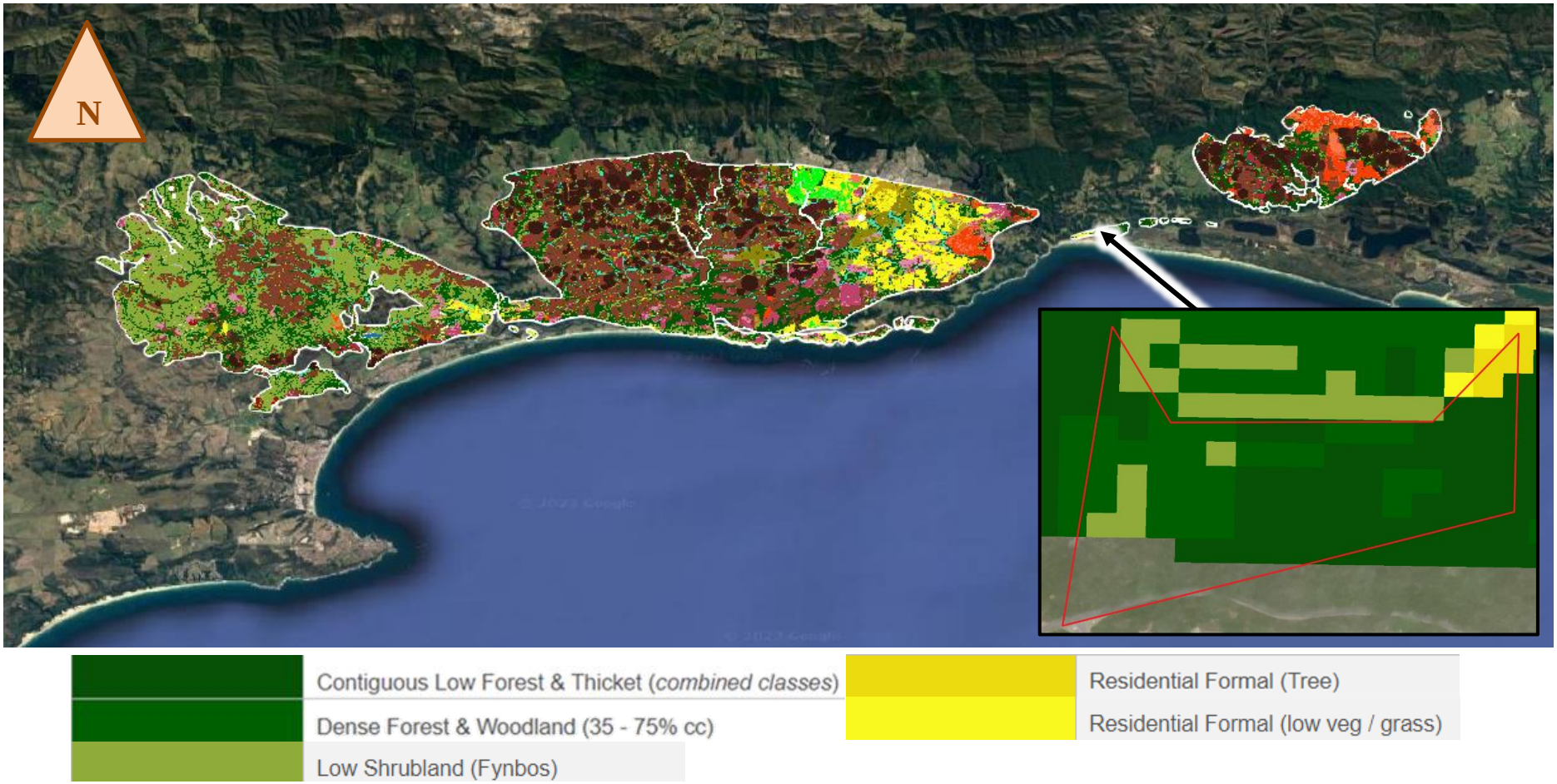

Figure 6: The 2020 land-use-land-cover (LULC) categories mapped for the full extent of Garden Route Granite Fynbos, with the proposed development site as an inset map. The legend provided below the map is only for the inset map. Generally dark brown and brown areas on the map represent agricultural areas, orange areas are planted forests, and yellow areas are residential as described in the remaining legend, available here: South African National Land-Cover (SANLC)

4.1.4 Western Cape Biodiversity Spatial Plan

The Biodiversity Spatial Plan for the Western Cape (WC BSP) contains several conservation planning layers that are used to set priority areas for conserving biodiversity (the definition and objectives of the different WC BSP layers are given in BOX 1). The majority of Erf 301 is mapped as a CBA 1 (i.e., natural Critical Biodiversity Area), with a small section in the south-west mapped as an ESA 2 (Ecological Support Area that is currently degraded) and the site is near the Touws Protected Area (Fig. 7). The majority of Erf 301 will be zoned as a conservation area, which is in accordance with the objectives of a CBA (see BOX 1). The development is unlikely to affect the objectives on the CBA mapped on the site (see Appendix 11.2 for recommended land-uses), given that the reasons for its assignment in this area is:

- 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.
- **Coastal resource protection**. The owner of Erf 301 is preserving the majority of the site for conservation purposes. The development will not undermine the objectives of coastal resource protection.
- **Eastern fynbos renosterveld granite fynbos floodplain wetland**. This does not apply to the proposed development on Erf 301.
- **FEPA River corridor, water source protection – Touws, Watercourse protection – South-eastern Coastal Belt**. Erf 301 is flanked on the east and western boundaries by non-perennial drainage lines. These are not going to be affected by the proposed development.
- **Wilderness core estuary**. This is not on Erf 301; the estuary is further south of the property and is already part of a Protected Area (Fig. 7).
- **Critically endangered Garden Route Granite Fynbos / Wolwedans Grassy Fynbos**. The development on the south facing steep slope of Erf 301 will not affect these vegetation types, even though they are mapped on the site.

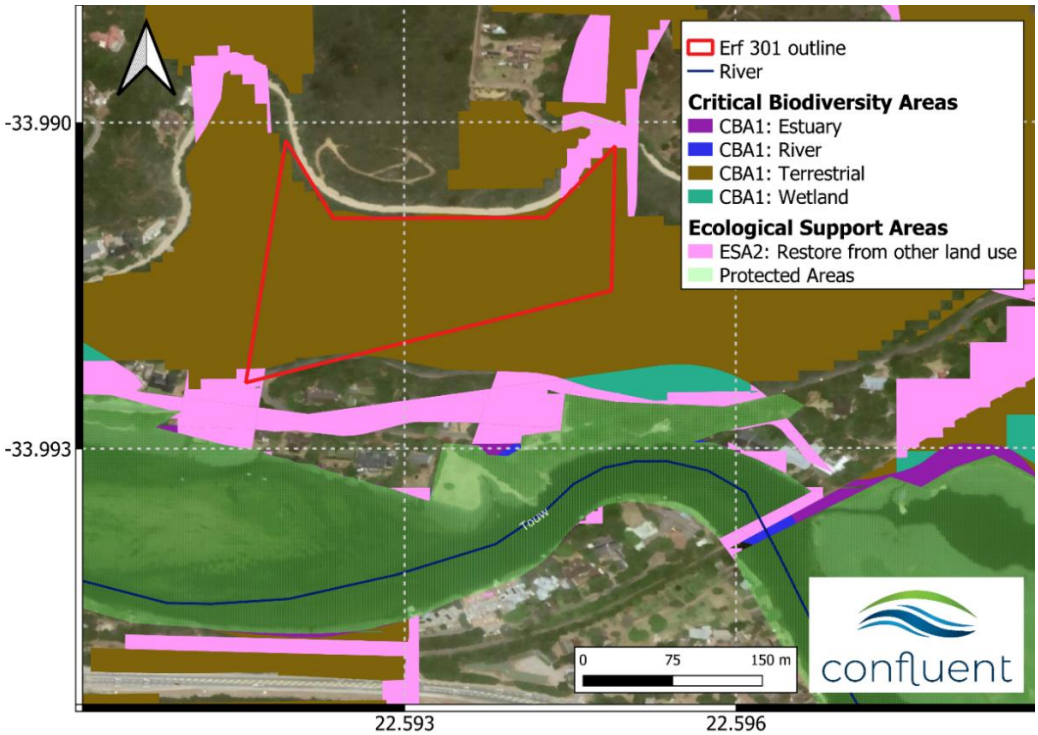

Figure 7: The mapped Western Cape Biodiversity Spatial Plan (WC BSP) categories that have been mapped for the site and surrounding landscape.

BOX 1: The Biodiversity Spatial Plan

Critical Biodiversity Area 1

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

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

Critical Biodiversity Area 2

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

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

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.

Protected Areas

Definition: Areas that are proclaimed as protected areas under national (National Environment Management: Protected Areas Act, Act 57 of 2003) or provincial (Mountain Catchment Areas Act, Act no 63 of 1970) legislation.

Objective: Keep in a natural state, with a management plan focused on maintaining or improving biodiversity. A benchmark for biodiversity conservation.

4.1.5 National Protected Area Expansion Strategy

Erf 301 is a private property, which makes it impractical to include as part of a protected area expansion strategy, as the land will need to be purchased to set it aside for that purpose. However, the owner is going to protect the majority of the site anyway for conservation, and therefore he is actually honouring this "protected area expansion strategy". The proposed development will be done in accordance with the conservation zonation Open Space that is planned for the Erf.

4.1.6 SAN Parks Buffer area

SAN Parks buffer areas are areas around National Parks that have been made to mitigate and reduce activities with negative ecological impacts taking place in close proximity to Parks, and to integrate National Parks into them into the landscape a little better. This concept has been widely recommended, including in the operational guidelines of UNESCO's World Heritage Convention 1. The purpose of these buffer zones are to:

- Protect the purpose and values of the national park, which is to be explicitly defined in the management plan submitted in terms of section 39(2) of the Act;
- Protect important areas of high value for biodiversity and/or to society where these extend beyond the boundary of the Protected Area;

- Assist adjacent and affected communities to secure appropriate and sustainable benefits from the national park and buffer zone area itself by promoting a conservation economy, ecotourism and its supporting infrastructure and services, and sustainability through properly planned harvesting.

According to the screening tool, the buffer that the proposed development site falls within is for Garden Route National Park (Fig. 8). This is because the buffer is very wide, having been defined in a 10 km radius around the National Park. However, the Garden Route National Park is ca. 5 km away from the proposed development site, and the proposed development site is separated from the Garden Route National Park mainly by agricultural areas. Even though the screening tool identified the buffer area as the reason for the site sensitivity, the proposed development is highly unlikely to negatively affect the buffer area for the Garden Route National Park.

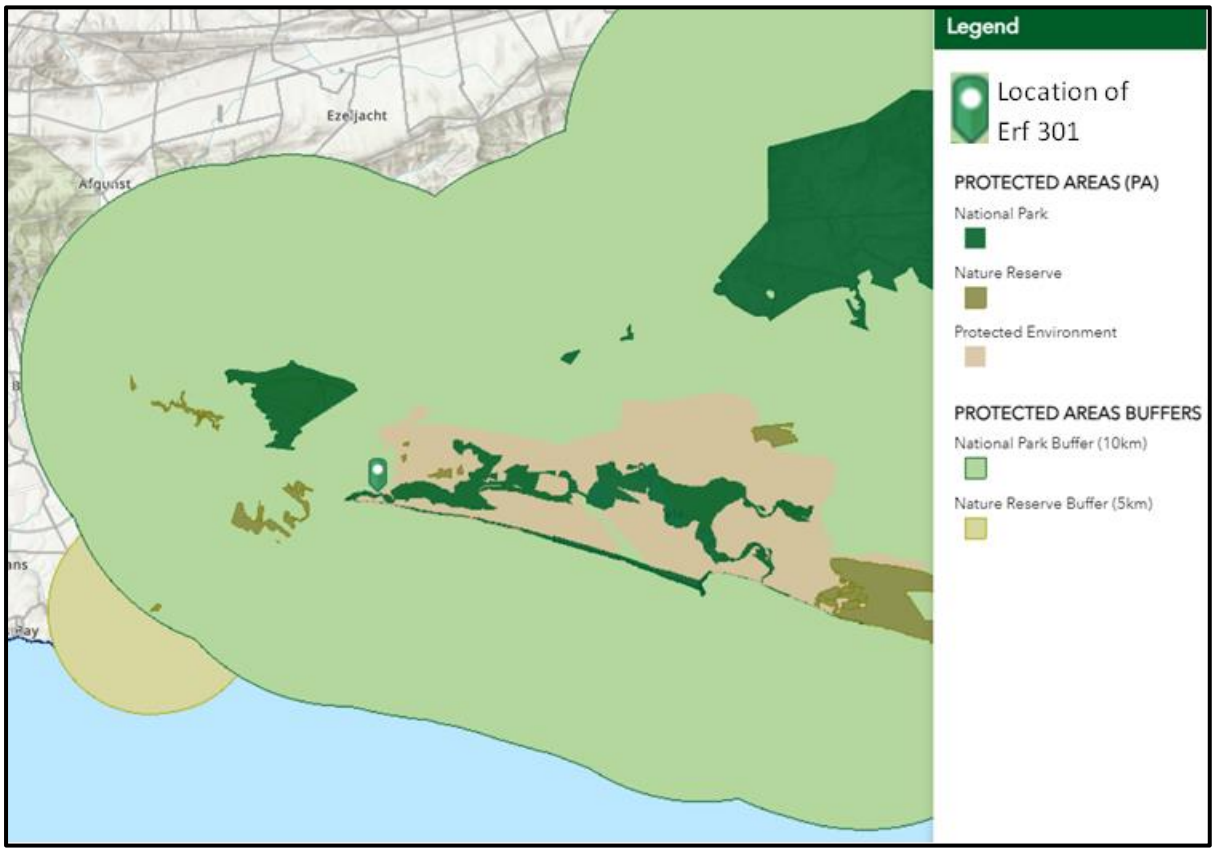

Figure 8: A map generated by the DFFE protected and conservation areas online map portal, which can be accessed here: Protected Areas Register (PAR) (environment.gov.za). The Garden Route National Park (dark green) has a 10 km buffer area (light green), as defined by the Listing Notice 3 of 4 December 2014.

4.1.7 FEPA Sub-Catchment and SWSA-sw

National Freshwater Ecosystem Priority Areas (NFEPAs) represent freshwater ecosystems that are required to meet the national biodiversity goals of freshwater ecosystems for South Africa. As already discussed, Erf 301 is flanked on the east and western boundaries by non-perennial drainage lines that are not going to be affected by the proposed development. In fact, the sections of these drainage lines on Erf 301 will be protected by the Open Space zonation of the majority of the Erf.

The site also forms part of the Outeniqua Strategic Water Source Area for surface water (SWSA-sw) runoff. Please refer to an aquatic specialist for more comments on the mapped SWSA for the site. From

a desktop level, and from a terrestrial biodiversity point of view, the development will occur on a site with soil that is prone to erosion. Conscious effort should be made on the site to avoid exposed soil during the construction phase. The developers of this property should keep in mind that the objective and philosophy of a SWSA is:

> "*Water is life. Clean water and sanitation underpin healthy lives and communities. Water drives job creation and economic growth. We need partnerships for living landscapes to achieve more clean water from our land. Partnerships that unlock benefits for people, water, and ecosystems and that recognise the connections between healthy ecosystems, healthy lives, economic growth, and job creation, between catchments and cities, between catchment management and maintenance of built infrastructure, and between our land and water. Healthy ecosystems in SWSAs including rivers, wetlands and land, help assure the quantity and quality of water flowing into our dams. Investing in maintaining and restoring SWSAs is a low risk and high return strategy for climate change adaptation. It is a form of ecosystem-based adaptation to climate change.*" ~ the South African Department of Forestry, Fisheries, and the Environment (DFFE) Biodiversity Sector Investment Portal

4.1.8 Historical Aerial Imagery

High resolution historical imagery (Fig. 9) can be sourced upon request from the CD: NGI Geospatial portal, or from their offices in Mowbray, Cape Town. Google Earth is also a repository of more recent historical images. The earliest historical image for the site is from December of 1936. While Erf 301 seems to have escaped agricultural transformation, there is evidence of agricultural fields north-east of the site in 1936. There seems to be some disturbance to the woody cover of the site in the northern section on the site (where the dwelling is proposed for Erf 301), however it is hard to see what this is without first obtaining a higher resolution photo scan for the site (which is a process that takes approximately one month after a request is sent to the CD:NGI offices in Cape Town). The 1957 image reveals that the agricultural fields north of the site persisted for 21 years (i.e., since 1936), and that additional sections of land have been cleared in some places. In 1973, more vegetation clearing north of Erf 301 is observed, with a small section of woody vegetation that was cleared in 1957 that has recovered. However, even though the small section recovered, the trend indicates an overall increase, not decrease, in cleared fields north of the site.

The slightly more zoomed in image from 2005 shows that the vegetation north of Erf 301 is still anthropogenically modified, with no disturbance aerially visible on Erf 301. More disturbance north of Erf 301 is observed in 2015, and again no disturbance on Erf 301 itself. The most recent image from 2022 still indicates minimal to no visible disturbance on Erf 301 with ongoing disturbance on the properties to the north. It is possible that the long-term and ongoing disturbances north of the property has had some indirect spillover effects on Erf 301, e.g., the establishment of invasive alien species (black wattles), fire suppression, and altered vegetation / ecosystem edge structure.

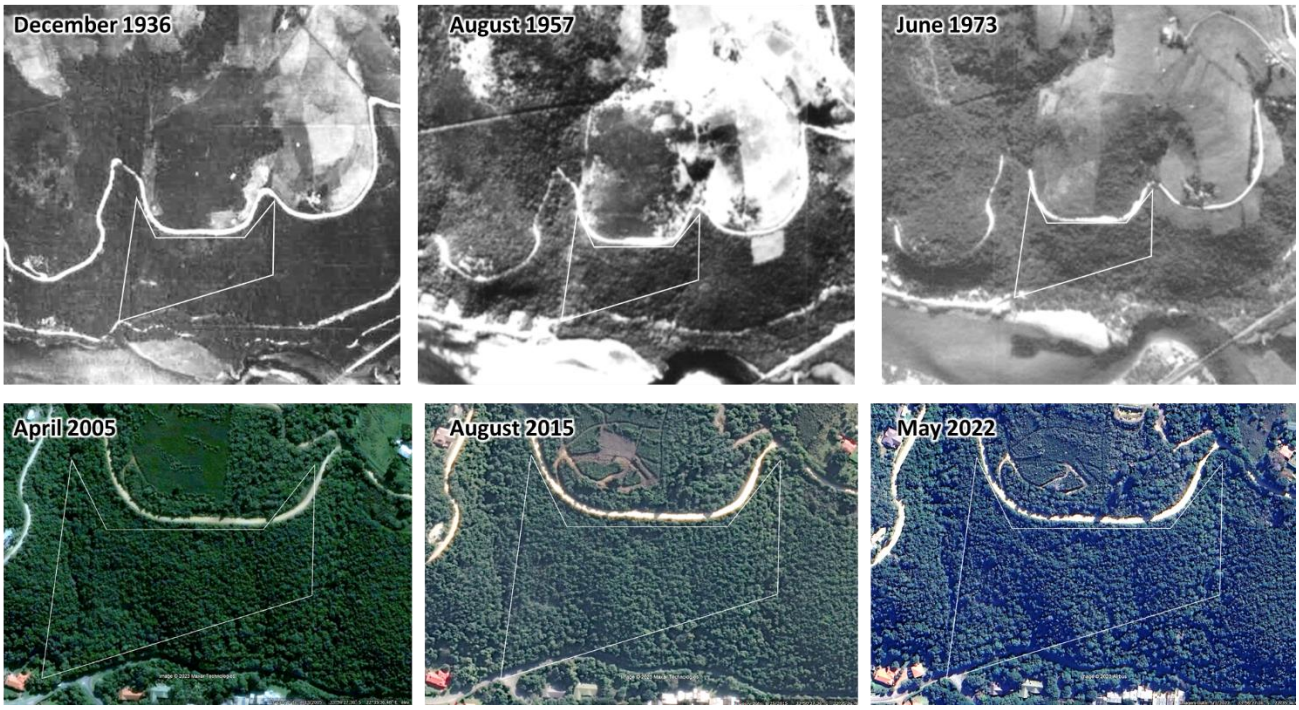

Figure 9: A series of historical imagery sourced from the CD: NGI geospatial portal (top row) and Google Earth (bottom row). The white polygons highlight the position of Erf 301.

4.2 Plant Species

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

4.2.1 Species of Conservation Concern (SCC)

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

- *Agathosma muirii*
- *Cotula myriophylloides*
- *Diosma passerinoides*
- *Erica chloroloma*
- *Erica glandulosa subsp. fourcadei*
- *Erica glumiflora*
- *Hermannia lavandulifolia*
- *Lampranthus fergusoniae*
- *Lampranthus pauciflorus*
- *Lebeckia gracilis*
- *Leucospermum glabrum*
- *Muraltia knysnaensis*
- *Nanobubon hypogaeum*
- *Selago burchellii*
- *Selago villicaulis*
- *Wahlenbergia polyantha*
- *Zostera capensis*
- Sensitive species 419
- Sensitive species 500
- Sensitive species 657
- Sensitive species 763
- Sensitive species 800
- Sensitive species 1024
- Sensitive species 1032
- Sensitive species 1081

4.2.2 SCC Identified Nearby.

On POSA no nearby SCC are recorded. The area that was searched on iNaturalist can be accessed from this link: Observations · iNaturalist. SCC that have been observed nearby on iNaturalist are

- *Disa arida* (Kleinkaroo Disa).
- *Disa schlechteriana* (Spur Disa), and
- *Disa spathulata* (Begging-hand Orchid),

5. RESULTS: FIELD ASSESSMENT

5.1 Refined Vegetation Map and Trajectory

The revised vegetation map, as made after the site assessment had been completed, is illustrated in Fig. 10. The two drainage lines that flank the Erf are included in the forest habitat on the site (Fig. 11 shows the eastern drainage line). The south-facing slope means that the substrate on the site was rather moist, and the air rather cool. The northern section of the site is mapped as a thicket because canopy cover was not continuous, and pioneer thicket species were visible in open canopy sections (e.g., *Tarchonanthus littoralis*, the coastal camphor bush, and common thicket edge species like *Gymnosporia buxifolia*, *Myrsine africana*, *Grewia occidentalis*, and a lot of *Pterocelastrus tricuspidatus*) with senescent fynbos elements in between (Fig. 12). It could be that fire suppression for over a century in this area has resulted in the thicket and forest observed on the site, but it is far more likely that the south facing slope and aspect of the site means that the habitat was never perfectly suited for fynbos vegetation. Furthermore, although two *Erica* species were recorded, no members of the Proteaceae, nor Restionaceae (typical fynbos plant families) were identified within the development footprint.

There is one section on the site that should be considered as Fynbos (Fig. 10), even though it is also isolated in a forest/thicket matrix on the site. This section of fynbos stood out on the site, as it covered a relatively large area or contiguous area that seemed to coincide with a flatter rocky outcrop on the property (possibly granite, although confirmation is needed for this). Although this fynbos is not likely to burn, it may be that the substrate in this section of the site makes it impossible for forest species to successfully colonise and establish.

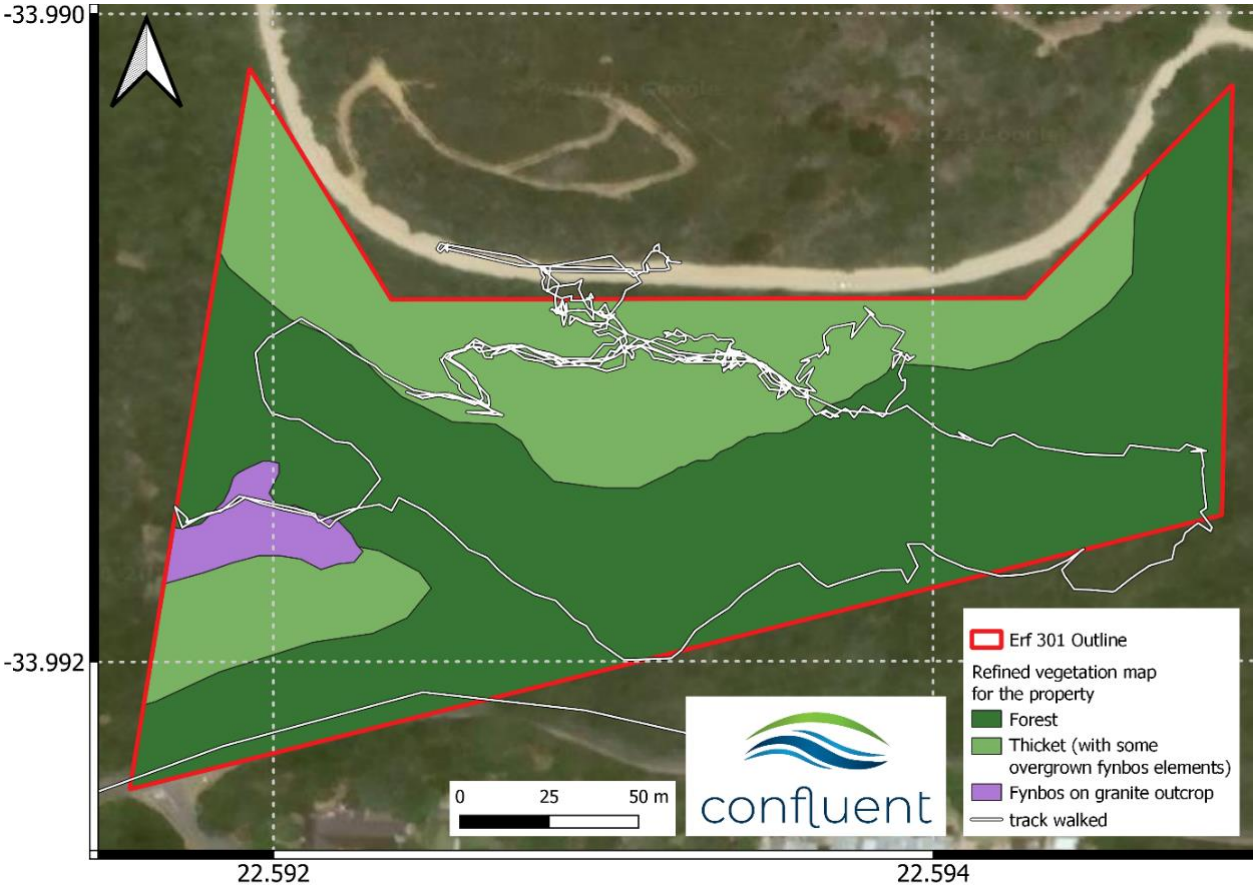

Figure 10: A revised vegetation map for Erf 301 in Hoekwil.

Figure 11: Photos (kindly taken by the owner) showing one of the two drainage lines of Erf 301. The images in this figure are from the eastern drainage line. The direction faced is indicated on the images with a North arrow.

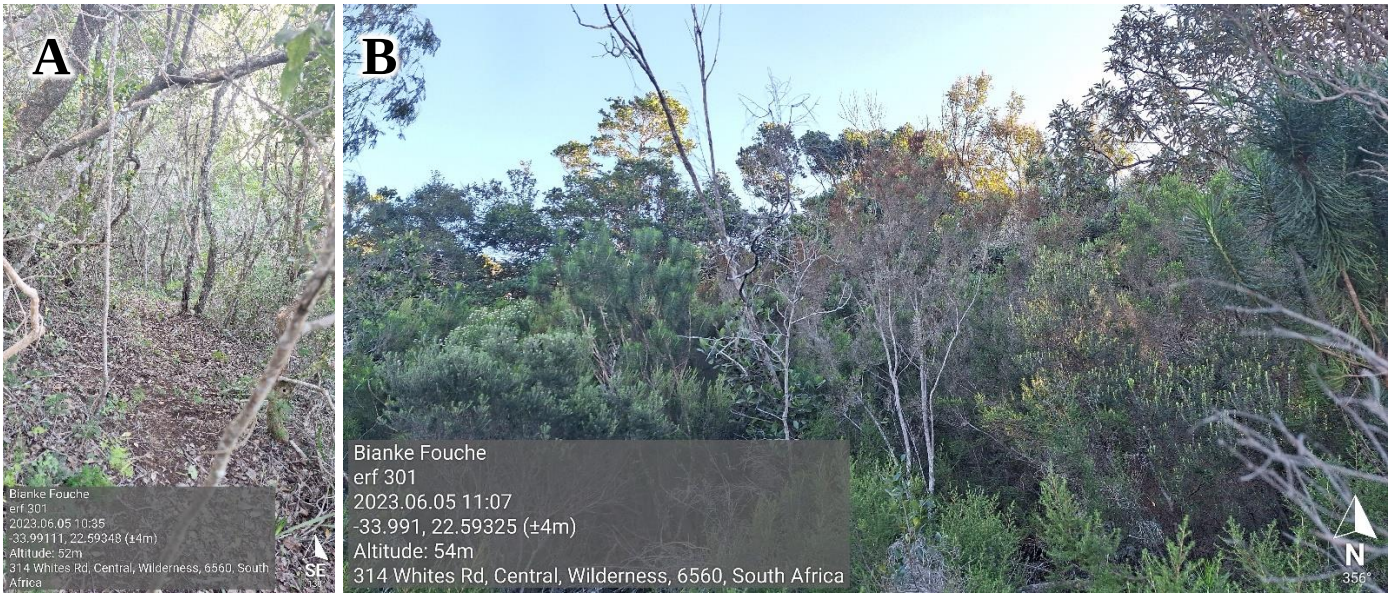

Figure 12: Photos showing A) the thicket/forest transition areas, and B) the open canopy pioneer thicket with fynbos elements in the northern section of the south facing slope of Erf 301.

5.2 Plant Species of Conservation Concern and Invasive Species

The following findings refer only to the proposed development area. One SCC was observed on the site in the forest area of the site east of where the easternmost "pod" is proposed. However, the proposed pod falls outside of the 30m buffer made for the sensitive species. The SCC observed is a sensitive species and will not be named in this report (see Fig. 13 & Table 2). Nationally protected Cheesewood trees (*Pittosporum viridiflorum*) were also observed on the site within the Thicket vegetation that falls within the development footprint (Fig. 13 & Table 2). This means that the owner of the site will need to obtain the relevant forestry licence to disturb, cut, or remove these trees. A yellowwood tree was also observed on the property near the western drainage line in the forest, but since this is far outside of the proposed development area, this species is not a concern for the proposed development, unless seedlings are found in the development footprint for the site.

Table 2: A list of the protected species of conservation concern that were found on the site.

Species	Common name	Family	Growth form	Status
Sensitive species (unknown number)	NA	NA	NA	Vulnerable A2cd
Pittosporum viridiflorum	Cheesewood	Pittosporaceae	Tree	Least Concern; Protected tree 139

Figure 13: Photo of the protected Cheesewood tree species (*Pittosporum viridiflorum*). The other sensitive species found on the site is not identified in this report due to the nature of its vulnerability.

Only one black wattle (*Acacia mearnsii*) tree was seen on the site (Fig 14). This invasive species is an aggressive invader of watercourses and is listed as a category two invasive species on both National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA) and Conservation of Agricultural Resources Act 43 of 1983 (CARA) invasive species regulations (see BOX 2 for what the NEMBA category means; CARA refers to agricultural areas, and therefore it is more important to understand the NEMBA invasive category).

The position of the black wattle, SCC and protected trees that are of concern for the proposed development footprint are illustrated in Fig. 15. The easternmost proposed pod is nearby a potentially sensitive species, and the updated plan has shifted this pod to outside the 30m buffer that was made for this species. Three Least Concern (LC) orchid species were recorded on the site in the thicket and forest habitats during the site assessment, and these are illustrated on the cover page of this report. The position of these three species over the proposed development footprint is illustrated in Fig. 15. Although these are not sensitive because of their LC status, they are a great feature of the site, and are delightfully boastful when they are in flower.

Figure 14: The rather large black wattle (*Acacia mearnsii*) tree that was observed on Erf 301.

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

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.

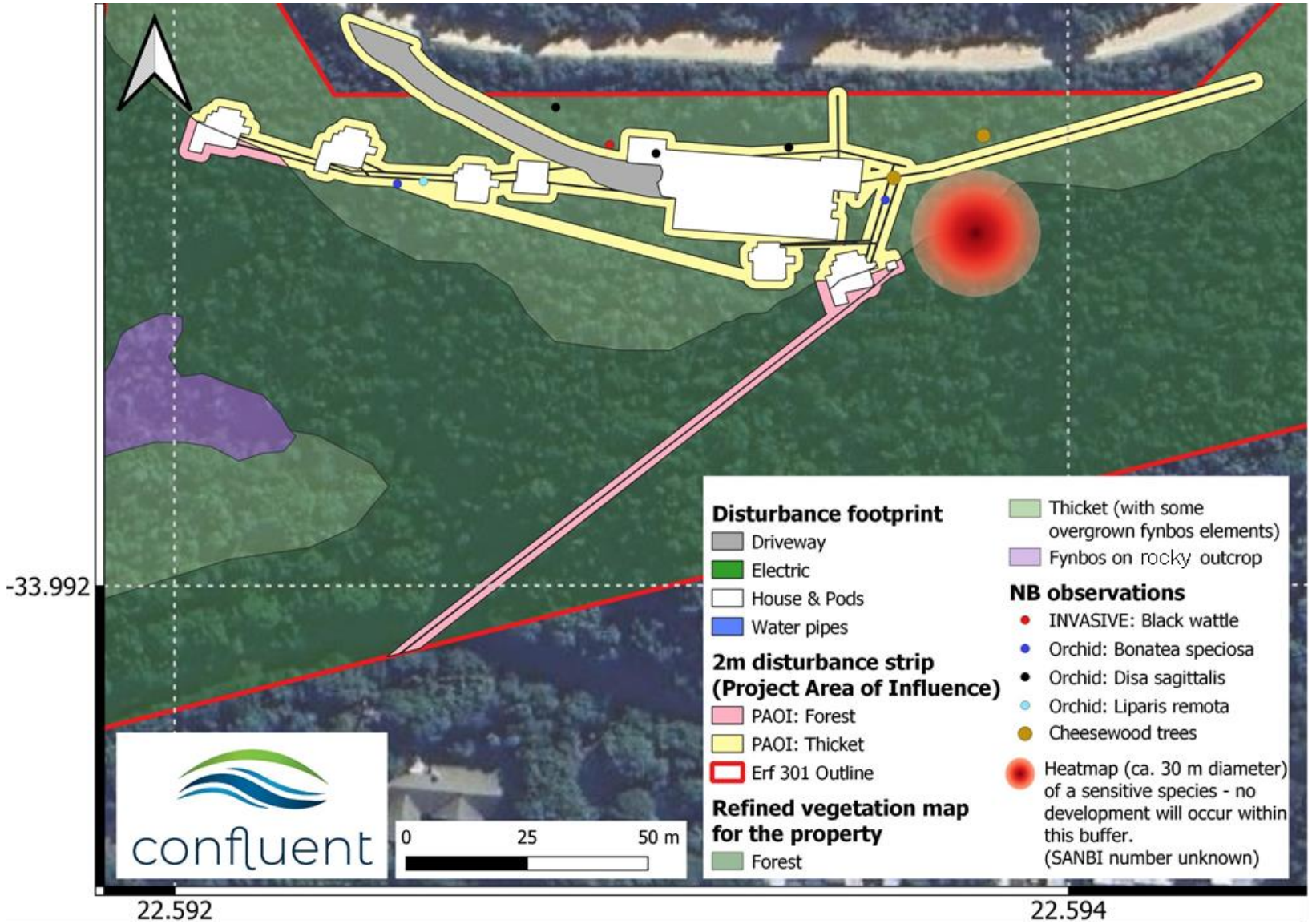

Figure 15: The footprint of the proposed development is illustrated by using a 2m disturbance buffer around the proposed features for the site. The area covered by this disturbance strip is defined as the project area of influence for this project, and it includes areas of permanent, and non-permanent anticipated disturbance on the site.

5.3 Additional SCC

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 Erf 301.

Species	Common name	Family	Growth form	Source	SANBI red list status	Probability of occurrence
Sensitive species (number unknown)	NA	NA	NA	Site assessment	Vulnerable A2cd	**Confirmed** This species was identified during the site assessment.
Nanobubon hypogaeum	Rubber-root fire-carrot	Apiaceae	Herbaceous Annual	DFFE Screening tool	Endangered B1ab(i,ii,iii,iv,v)	**High** This species is cryptic and easily overlooked. It is apparently more abundant in recently burnt veld, declining rapidly as the surrounding vegetation matures, making it difficult to predict its presence or absence on a site. The precautionary principle is followed, and it is assumed to have a high likelihood of occurrence.
Sensitive species 500	-	Orchidaceae	Tuberous geophyte	DFFE Screening tool	Endangered C2a(i)	**High** This species has a relatively wide range, occurring between the Cape Flats to Port Elizabeth. It is threatened by ongoing habitat loss to urban expansion and coastal development, competition from alien invasive plants (these are also affecting some subpopulations within protected areas), grazing, and some subpopulations in small fragments are potentially affected by a lack of fire. Inappropriate management and clearing of road verges are also threatening a number of small subpopulations. It was thought to be extremely rare, and at one stage was known from a single subpopulation near Mossel Bay, but recently, a number of previously unrecorded subpopulations have been discovered. There are currently between eight and 11 remaining subpopulations. Survey data for nine of these indicate that subpopulations are very small, the largest consisting of around 150 mature individuals. Following the precautionary principle, a high likelihood of occurrence is assigned.
Sensitive species 763	-	Orchidaceae	Rhizomatous geophyte	DFFE Screening tool	Vulnerable A2c	**High** This species is distributed along the coast between Riversdale to Port St Johns. It is found in a wide range of habitats, namely renosterveld, fynbos, thicket, and Afrotemperate Forests. This species habitat requirements are met by Erf 301.
Erica chloroloma	Greensepal heath	Ericaceae	Shrub	DFFE Screening tool	Vulnerable B1ab(ii,iii,iv,v)+2ab(ii,iii,iv,v)	**Medium**

Species	Common name	Family	Growth form	Source	SANBI red list status	Probability of occurrence
						This species is found between Wilderness and the Fish River Mouth in fynbos and thicket. It is conceivable that this species might be present on the site.
Erica glandulosa subsp. fourcadei	Ridges glandular heath	Ericaceae	Shrub	DFFE Screening tool	Vulnerable B1ab(ii,iii,iv,v)	**Medium** This species is found from Mossel Bay to Cape St Francis in strandveld, fynbos, and thicket habitats. It is conceivable this it may be present on the site.
Erica glumiflora	Gloomy heath	Ericaceae	Shrub	DFFE Screening tool	Vulnerable B1ab(i,ii,iii,iv,v)	**Medium** This species is found from Wilderness to East London, extending inland around Grahamstown. It is found in thornveld, strandveld, fynbos, savanna thicket, and coastal thicket habitats. It is conceivable that this species may be present on the site.
Hermannia lavandulifolia	Lavender-leaved dollrose	Malvaceae	Herbaceous perennial	DFFE Screening tool	Vulnerable A2c	**Medium** This species is widespread and actually very common and seems to like growing in disturbed vegetation. It is found from Worcester to the Overberg and extends along the southern Cape coastal lowlands as far east as Plettenberg Bay. This species may be present on the site, although it was not detected during the assessment.
Lampranthus fergusoniae	Limestone brightfig	Aizoaceae	Succulent	DFFE Screening tool	Rare	**Medium** This succulent is found from Pearly Beach to Knysna in strandveld, fynbos, and Goukamma Dune Thicket. This species might be on the site.
Lampranthus pauciflorus	Beach brightfig	Aizoaceae	Succulent	DFFE Screening tool	Endangered B1ab(ii,iii,iv,v)	**Medium** This succulent is found from Cape Infanta to Plettenberg Bay in strandveld and fynbos. It has been described as preferring rocky slopes and clayish soils. It is conceivable that this species might be in the site.
Lebeckia gracilis	Slender ganna	Fabaceae	Shrub	DFFE Screening tool	Endangered A2bc; B1ab(ii,iii,iv,v)	**Medium** Found from Bredasdorp to Gqeberha, this species occurs mainly in strandveld and coastal fynbos below 300 m elevation. It is conceivable that this species may be on the site.
Selago villicaulis	Dune bitterbush	Scrophulariaceae	Herbaceous perennial	DFFE Screening tool	Vulnerable B1ab(ii,iii,iv,v)	**Medium** This species occurs from Stilbaai to Knysna in strandveld and Goukamma Dune Thicket. It is conceivable that this species might be on the site.
Sensitive species 419	-	Dioscoraceae	Climbing tuberous geophyte	DFFE Screening tool	Vulnerable B1ab(iii,v)+2ab(iii,v)	**Medium**

Species	Common name	Family	Growth form	Source	SANBI red list status	Probability of occurrence
						This species is found from George to Humansdorp in fynbos habitats. It likes damp sandstone slopes in coastal fynbos. It is conceivable that this species might be on the site.
Sensitive species 657	-	Amarylidaceae	Geophyte	DFFE Screening tool	Endangered B2ab(iii,v)	**Medium** This species is found between Great-Brak and Port Elizabeth. Sub populations are severely fragmented, and are found in renosterveld, seashore vegetation, fynbos, and thicket. It is conceivable that this species could be present on the site.
Sensitive species 1032	-	Orchidaceae	Tuberous geophyte	DFFE Screening tool	Vulnerable C2a(i)	**Medium** This species occurs between Wilderness and Port Alfred in strandveld, thicket, and fynbos. It is conceivable that it may be present on the site.
Agathosma muirii	Heart buchu	Rutaceae	Shrub	DFFE Screening tool	Vulnerable A4abc	**Low** This species is found between Stilbaai and Mossel Bay in strandveld, fynbos, and Goukamma Dune Thicket. Erf 301 is a little outside of the natural range of this species.
Diosma passerinoides	Silcrete bitterbuchu	Rutaceae	Shrub	DFFE Screening tool	Vulnerable A2c; C2a(i)	**Low** This species is found from Robertson and Caledon to Bredasdorp, Albertinia and eastwards to the Baviaanskloof. It is mostly associated with renosterveld habitats but is also found in Garden Route Granite Fynbos.
Disa arida	Kleinkaroo Disa	Orchidaceae	Geophyte	iNaturalist	Endangered C2a(i)	**Low** This species is found in the Outeniqua, Rooiberg and Gamka mountains in fynbos. It is probably not on the site.
Muraltia knysnaensis	Garden Route purplegorse	Polygalaceae	Perennial	DFFE Screening tool	Endangered B1ab(ii,iii,iv,v)	**Low** This species is found in Coastal lowlands between Mossel Bay and the Keurbooms River in fynbos, strandveld, and Goukamma Dune Thicket habitats. It is usually associated with dry flats and hills, which is unlike the vegetation of Erf 301.
Selago burchellii	Garden Route Bitterbush	Scrophulariaceae	Herbaceous perennial	DFFE Screening tool	Vulnerable B1ab(ii,iii,iv,v)	**Low** This species is found between George and Plettenberg Bay in fynbos habitat. It is unlikely to be on the site as its habitat requirements on this south facing slope are not quite met.
Wahlenbergia polyantha	Cape-bells	Campanulaceae	Herbaceous perennial	DFFE Screening tool	Vulnerable B1ab(ii,iii,iv,v)	**Low** This species is distributed from Kleinmond to Knysna in strandveld, fynbos, and Goukamma Dune Thicket habitat in sandy flats. This species is not likely to be present on the site.

Species	Common name	Family	Growth form	Source	SANBI red list status	Probability of occurrence
Sensitive species 800	-	Iridaceae	Geophyte	DFFE Screening tool	Vulnerable B1ab(iii)	**Low** This species is found over a wide range from the Cape Peninsula to Knysna in renosterveld, fynbos, strandveld, and thicket habitat. It is rather unlikely to be present on the site
Sensitive species 1024	-	Orchidaceae	Tuberous geophyte	DFFE Screening tool	Endangered B1ab(iii,v)+2ab(iii,v) ; C2a(ii)	**Low** This species is found from Riversdale to Knysna and northern slopes of Langeberg Mountains in renosterveld and fynbos. As a result of extensive altering of natural ecosystems on the coastal forelands and primary habitat of *S. muticum*, it has since become very rare or extinct throughout much of its former distribution. Much of its known habitat is now replaced with urban expansion, agriculture, and forestry. It is unlikely to be present on the site.
Sensitive species 1081	-	Iridaceae	Geophyte	DFFE Screening tool	Endangered B1ab(i,ii,iii,iv,v)	**Low** This species is found from Uniondale to George and Knysna in renosterveld, fynbos, and Inland Shale Band Vegetation. It is often found near streams in fynbos. This species is unlikely to be found on the site as its habitat requirements are not entirely met.
Cotula myriophylloides	Watergras	Asteraceae	Hydrophyte	DFFE Screening tool	Critically Endangered B2ab(iii)	**Very Low** The aquatic habitat requirements of this species is not met by the site
Disa schlechteriana	Spur Disa	Orchidaceae	Geophyte	iNaturalist	Vulnerable D2	**Very Low** This species is found in the Langeberg between Riversdale and George. It is found on north-facing sandstone slopes from 300 to 100 m elevation. It is definitely not on this site.
Disa spathulata	Begging-hand Orchid	Orchidaceae	Geophyte	iNaturalist	Endangered C1+2a(i)	**Very Low** This species prefers lowland shale renosterveld, and transitional renosterveld-fynbos habitats. It is probably not on the site.
Leucospermum glabrum	Outeniqua pincushion	Proteaceae	Shrub	DFFE Screening tool	Endangered B1ab(iii,v)c(iv)+ 2ab(iii,v)c(iv); C2a(i)	**Very Low** This species is found in mountainous habitats in the Outeniqua and Tsitsikamma Mountains. It is not on the site.
Zostera capensis	Cape dwarf-eelgrass	Zosteraceae	Hydrophytic graminoid	DFFE Screening tool	Global IUCN: Vulnerable B2ab(ii,iii); SANBI regional listing: LC	**Very Low** The 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** for the "Forest" and "Fynbos on rocky outcrop" habitats on the site. The reasons for the assigned sensitivity are:

The forest on the site would form part of the National Forest Inventory for South Africa. Forests are protected in South Africa, and therefore the forest on the site is a viable CBA 1 area that will be protected by the owner. It has a high terrestrial biodiversity sensitivity. The fynbos on the rocky outcrop can be defined as an isolated section of Garden Route Granite Fynbos, and it therefore has a high sensitivity according to the terrestrial biodiversity protocol.

- **Low** for the "Thicket with some patches of overgrown fynbos" habitat on the site. The reasons for the assigned sensitivity are:

The thicket on the site is not part of a CR ecosystem, and it is not consistent with Garden Route Granite Fynbos for all the reasons mentioned in this report. The aspect of the thicket is on a south facing slope, and fire is unlikely to affect the vegetation here, making all the fynbos elements unviable for conservation efforts. Furthermore, the presence of fynbos nearby, on slope crests and north-facing slopes mean that fynbos seeds are present in the landscape. Fynbos will therefore start to colonise open canopy areas in thicket and forest but are unlikely to remain as thicket pioneer species start to outcompete them.

6.2 Botanical Diversity

The site sensitivity in terms of the terrestrial plant species theme is confirmed as:

- **High** for the "Forest" and "Fynbos on rocky outcrop" habitat on the site. The reasons for the assigned sensitivity are:

A species of conservation concern (a sensitive species) was found in the forest, and there are several SCC that are likely to occur in the forest on Erf 301. A proper survey of this area on the site was not undertaken on the rocky outcrop, as it is outside of the proposed development on Erf 301. The presence, or absence of SCC are not confirmed for this area, but some SCC could conceivable occur here.

- **Low** for the and "Thicket with some patches of overgrown fynbos". The reasons for the assigned sensitivity are:

No threatened or near threatened plant species were recorded in this vegetation type on the site. Only one protected LC tree species (*Pittosporum viridiflorum*, I.e., cheesewoods) was observed in this area, which means that the owner of Erf 301 will need to obtain the relevant forestry license to manage or trim these trees. The overgrown sections of fynbos are unlikely to support SCC.

7. SITE ECOLOGICAL IMPORTANCE

The site ecological importance (SEI) map (Fig. 16) is intended to provide a more refined overview of the sensitivity of the various habitats that have been identified on Erf 301. 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 VAST framework works as an aid for the SEI calculation, specifically adding a level of understanding about the receptor habitat condition, 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 VAST framework is summarised in Table 4 below. The VAST categories for the vegetation on Erf 301 are presented in Table 6 alongside the SEI component "receptor resilience". Although the receptor resilience is similar between all of the vegetation units mapped on the site, the VAST categories differ somewhat between different areas on the property.

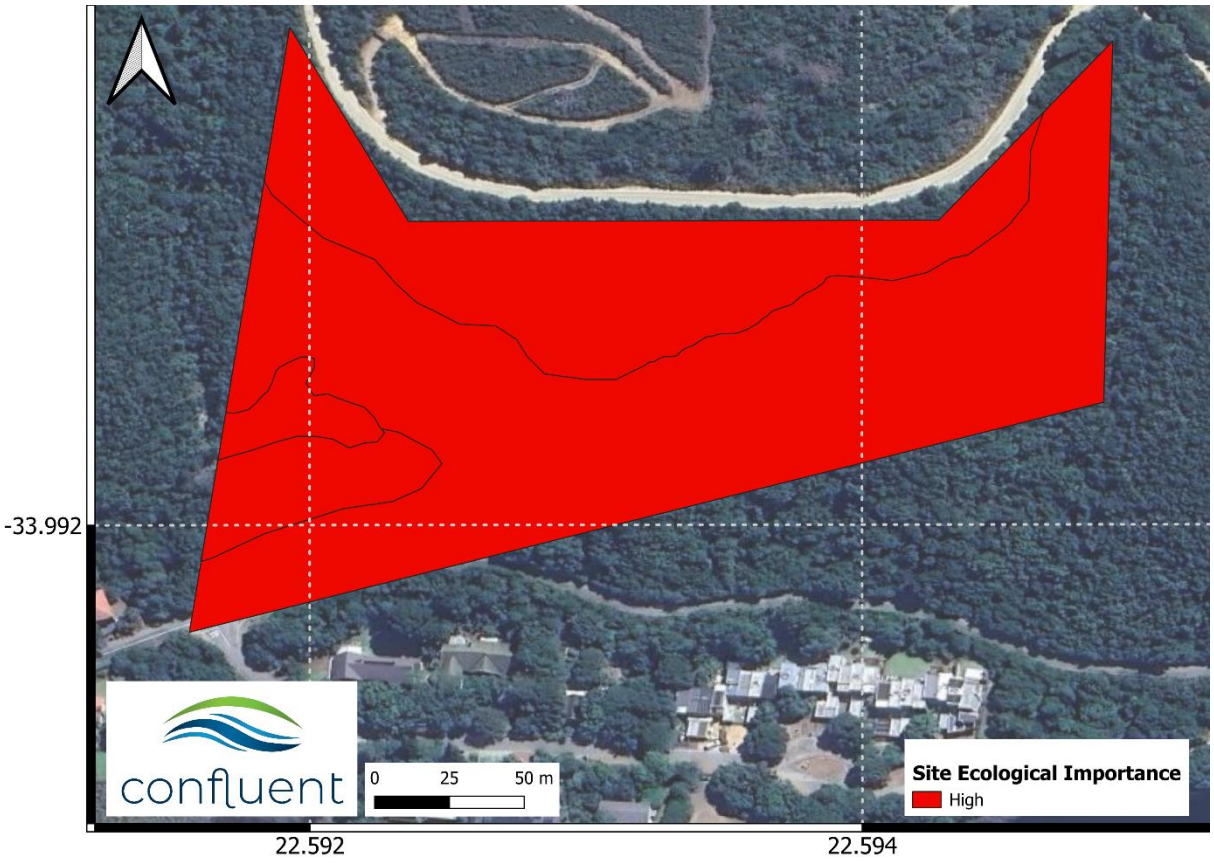

Figure 16: The SEI map for Erf 301, showing that all the vegetation on the site has a high Site Ecological Importance (SEI).

Table 4: Vegetation Assets, States, and Transitions (VAST) framework with columns representing states and shifts between them defined as transitions, as laid out in (Lesslie et al., 2010; Thackway & Lesslie, 2006).

Increasing modification

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

The site ecological importance of Erf 301 is High across the entire property. The SEI mitigation recommendations for the various ecological importance categories are in in Table 5, and SEI calculation reasons are given in Table 6. The method that was used to calculate the SEI map provided is given in Appendix 11.3. Although the vegetation across Erf 301 is not entirely uniform, the SEI calculation revealed that the forest and ecotonal vegetation on the site have a similar ecological importance, which can also be translated as the relative sensitivity of the site from an ecological perspective. A High SEI essentially means that avoidance is necessary wherever possible, however where development is unavoidable minimisation mitigation should be applied. In this case, the best area for minimisation mitigation on the site is the ecotonal vegetation along the northern section of Erf 301.

Consulting Table 6 reveals that the ecotonal vegetation has the lowest conservation value on the site due to the fact that this section of the site cannot be functionally maintained (the fire regime here will never be natural, as it is too small an area to form part of a manageable fire management plan). The vegetation here is already very overgrown, and the likelihood of SCC occurring in the ecotonal vegetation as it stands on Erf 301 is quite low. Even through ecotones are important for the ecology of the systems and are often unique areas, the ecotonal vegetation on Erf 301 is under an altered disturbance regime which has led to a compromise of its long-term ecological function.

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

Site Ecological Importance	Recommendation for activities based on the mitigation hierarchy
Very High	Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e. last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

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

Land use / Land cover	Conservation Importance (CI)	Functional Integrity (FI)	Receptor Resilience (RR)	Site Ecological Importance (SEI)
Forest	**Medium** Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals.	**High** Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches. Only minor current negative ecological impacts (e.g. few livestock utilising area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential.	**Low** VAST class I 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. Species that have a low likelihood of returning once a disturbance / impact has been removed.	**High** BI: Medium RR: Low
Thicket (with some overgrown fynbos elements)	**Low** No confirmed or highly likely populations of SCC.	**High** Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches. Only minor current negative ecological impacts (e.g. few livestock utilising area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential.	**Low** VAST class III 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. Species that have a low likelihood of returning once a disturbance / impact has been removed.	**High** BI: Medium RR: Low
Fynbos on rocky outcrop	**Medium** Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals.	**High** Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches. Only minor current negative ecological impacts (e.g. few livestock utilising area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential.	**Low** VAST class II 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. Species that have a low likelihood of returning once a disturbance / impact has been removed.	**High** BI: Medium RR: Low

8. IMPACT ASSESSMENT

The impact assessment for Erf 301 is based on the impacts associated with building a primary dwelling and six pods. Three alternative development options are considered in the impact assessment of this report, namely:

1. the **current preferred layout**, which is the result of engagement with the landowner following the site sensitivity verification report (SSVR). This is also the layout that was presented in Fig. 2 of this report.
2. The **original layout plan** which was made prior to the completion of the SSVR. Fig. 17 illustrates this layout compared to the current layout.
3. The **current preferred layout including only the primary dwelling** without the six pods.

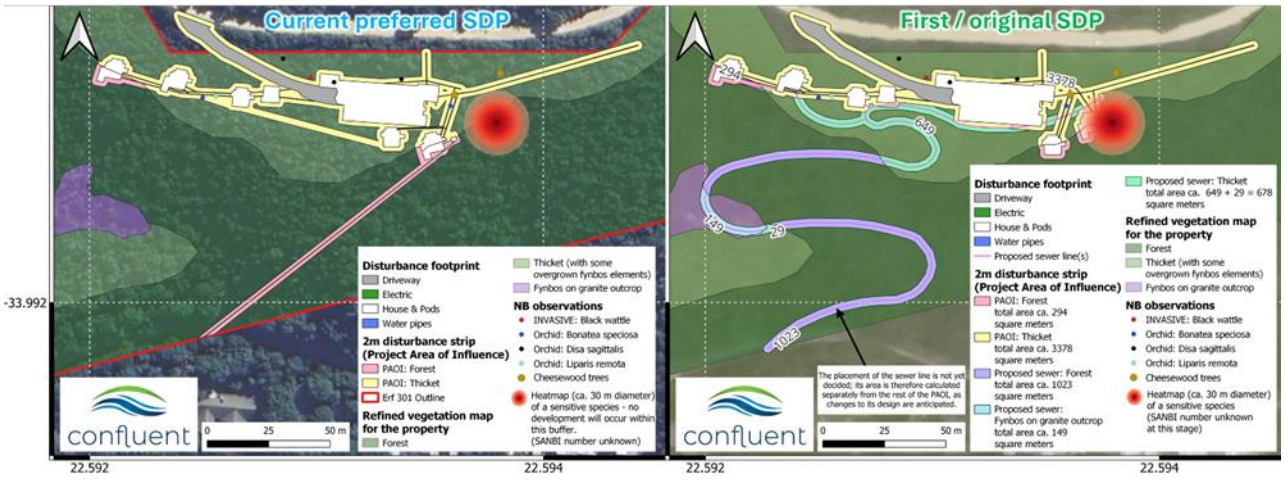

Figure 17: The current and old site development plans illustrated side by side for reference in the impact assessment tables presented.

For any impact assessment, the mitigation hierarchy must be kept in mind (Fig. 18; Ekstrom et al., 2015) in mind. If mitigation measures are likely to be ineffective at minimising large impacts, then avoidance mitigation must be implemented. If an impact cannot be prevented, then minimisation mitigation is preferred. The methods used for this impact assessment is provided in Appendix 11.4. The desired outcome of the mitigation hierarchy aims to ensure that (Brownlie et al., 2023):

1. There is no loss of irreplaceable biodiversity or irreplaceable ecological infrastructure and associated ecosystem services.
2. Negative impacts and risks of high significance to the environment, and on ecological infrastructure which provides important ecosystem services for people, are avoided.
3. Additional mitigation is applied to residual negative impacts of greater than ‘low’ significance, to reduce impact significance to ‘low’ or preferably ‘very low’.
4. Ecosystems, the habitat for species of plants and animals, and ecological infrastructure, when unavoidably impacted by the proposed development, are rehabilitated/restored as soon as practicable, and concurrently with the proposed development where feasible.
5. Biodiversity offsets are provided in cases where every effort has been made to avoid and minimise negative impacts, and rehabilitate/restore damage, but residual negative impacts of moderate/medium or high significance remain. Biodiversity offsets should ensure that

biodiversity is not incrementally eroded beyond acceptable limits, the ecological deficit is not exacerbated, and that people are left no worse off than before the proposed development.

6. Compensation is provided to ensure that people adversely affected by the proposed development are not left worse off, particularly in cases where:
    a. there is a time lag between negative impacts and providing remediative mitigation (i.e. rehabilitation/restoration and biodiversity offsets), in the form of substitutes for affected ecosystem services on which there is high dependence by affected people;
    b. the outcomes of rehabilitation/restoration and biodiversity offsets are not designed to/will not benefit the affected parties.
7. The cumulative impact of the authorised development, and land and resource use changes, does not:
    a. result in the loss of irreplaceable biodiversity, an inability to meet biodiversity targets or increase the risk of extinction for any species; and/or
    b. result in the loss of ecological infrastructure without substitute, causing an irreversible loss in ecosystem services.

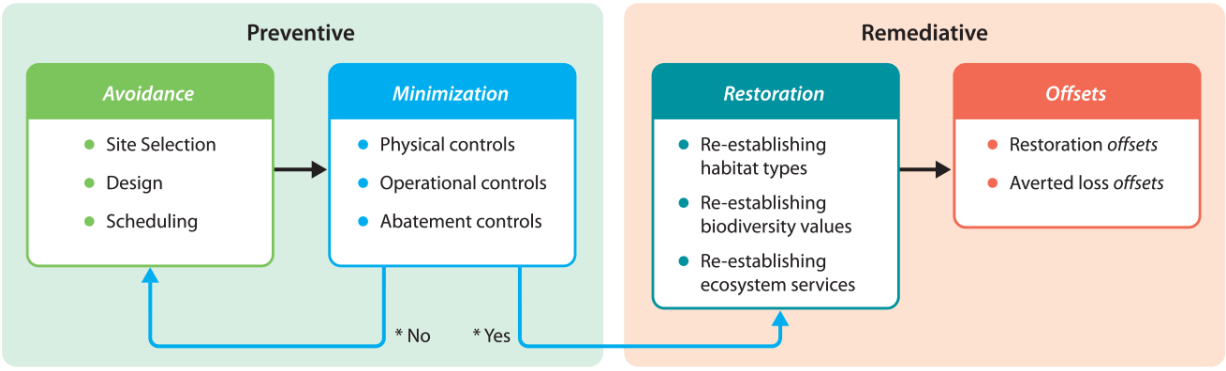

Figure 18: The iterative process of avoiding and minimising the predicted impacts on biodiversity and ecosystem services, as described in (Ekstrom et al., 2015).

8.1 Current Impacts

The current impacts on the site are minimal, and most of the vegetation & habitat on the property is in a relatively natural state. A summary of some of the current negative impacts on the site are:

- There is an existing path that meanders through the forest on Erf 301, however the impact of maintaining and using this path is very low on the site, and no noticeable edge effects were observed adjacent to the path.
- The clearings made on the site along the northern section of the property in the ecotone area may increase the susceptibility of this area to become more invaded, as there are established invaded landscapes nearby, such as the property directly north of Erf 301.
- Whites Road has effectively removed the connectivity between the ecotone along the north of Erf 301and the rest of the fynbos to the north. This isolated ecotone cannot be functionally managed as fynbos, as fire management is not possible. While fynbos sections can be cut periodically, the diversity of the isolated ecotone patch will remain compromised and at risk of invasion.

8.2 Layout and Design Phase

The current design of the dwellings proposed on Erf 301 has already considered the botanical sensitivities of the site following the initial site sensitivity verification report which was completed in 2023. The initial SDP has already been updated following consultation and engagement during 2023, and the design of the project at present is a result of that engagement. The current layout will incorporate and be considerate of native tree species where they occur within the development footprint and respects existing vegetation and species of conservation concern (SCC) that have been observed. No SCC will be affected in the current layout of the site. There are therefore no current recommendations in this impact assessment regarding the layout and design of the project from a botanical and terrestrial biodiversity perspective as the existing plans already reflect a comprehensive and well-considered approach to the site's botanical resources. Given the landowner and botanical specialists' satisfaction with the existing plans, further updates are unnecessary for the themes presented in this report as they would result in redundant efforts and unnecessary costs without adding significant value to the project.

The following description of the current preferred layout is provided in the animal impact assessment report by Monica Leitner:

> "*The impact assessment considers the construction of a driveway, one dwelling and six pods on the property.*
>
> - *The driveway to access the primary dwelling is estimated to cover 416 m2.*
> - *The primary dwelling will cover a total of 446 m2 with the front half raised off the ground (on pylons/stilts) effectively reducing the permanent footprint to ca. 200 m2.*
> - *The six pods (38 m2 each) will also make use of a raised footprint on stilts/pylons, ultimately resulting in a total permanent footprint of 9.5 m2 x 6 pods = 57 m2.*
>
> *The total footprint of development (without the use of stilts/pylons) is estimated to be 1090 m2, which has effectively been reduced by raising some sections off the ground with the use of stilts/pylons to 673 m2. This reduces the habitat transformation from approx. 3% to 2% of the property size*."

8.3 Construction Phase

The construction phase will have the highest immediate impacts on the site. An Environmental Control Officer (ECO) should be appointed and involved on a weekly basis during the construction phase of the project.

8.3.1 A direct loss of patches of habitat due to earthworks and other construction related activities for the proposed development of a dwelling and pods on Erf 301.

Description: The proposed development will result in the permanent loss of thicket ecotonal vegetation, and small patches of forest south of Whites Road. The impact on the loss of vegetation and habitat is most severe and noticeable during the construction phase of the project due to the fact that structures placed on the site are permanent features. The proposed development of a primary dwelling with six pods amounts to ca. 2% of the total area of Erf 301 if the current preferred SDP is followed. The impact is assessed in Table 7.

Consequences that may occur due to this impact:

1. The further loss and fragmentation of an already fragmented habitat, and a loss of ecotonal vegetation.
2. A shift towards a negative change in the conservation status of the forest / thicket habitat on the site.

Mitigation measures:

1. Prior to construction, the disturbance footprint of proposed developments should be clearly defined and demarcated to prevent unnecessary damage to the surrounding environment. This mitigation measure is described in the animal species report and must be followed according to the specifications in that report.
    a. For once off deliveries, clear indications on the nearby roads should be put up to guide truck drivers to the construction site, thus avoiding divers getting lost and causing unnecessary disturbance.
2. Prior & during construction: Weather reports must be checked daily to avoid heavy machinery and activities on the site during rainy weather. Following a rainfall event (excluding short periods of gentle, light rain), all construction on the site must cease temporarily.
3. During construction: Erosion control measures. Refer to the animal specialist report for additional detail on this mitigation measure.
    a. Make use of silt fences and sediment barriers on the site.
        i. Silt fences should only be implemented where necessary on the site if during the construction phase erosion becomes a noteworthy problem.
        ii. Straw bales and sandbags are temporary barriers that can be used on the site from the start of the construction phase to avoid and control sediment movement in areas with higher potential for runoff.

b. Temporary vegetation cover in areas of permanent disturbance

    i. A hydroseed mixture of native grasses and groundcovers can be used on exposed soil surfaces to provide immediate soil stabilization. Species such as *Eragrostis capensis* and *Stenotaphrun secondatum* can be used for rapid coverage. *Vicia sativa* (common vetch) is a leguminous plant that can be used in areas where construction activities have temporarily ceased in order to protect the soil.

c. Erosion control blankets and mats that are biodegradable (e.g., coir made from coconut fibres) can be used with native seed mixes to enhance the stabilisation of soil. These are an option in the disturbance envelope of 2m around permanent disturbance footprints on the site.

4. <u>During construction</u>: Protection and re-use of topsoil.

    a. The topsoil will be vital for the success of rehabilitation of vegetation following construction process and must therefore be treated with care.

    b. Topsoil from vegetation on the site (excluding topsoil under invasive plants) in new excavation areas must be stripped to a depth of ca. 30cm and kept in designated piles. Topsoil piles must be suitably covered with to prevent any additional invasive species seeds from falling in and establishing in the soil.

    c. 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.

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

5. <u>Prior planning & during construction</u>: Minimise the disturbance area.

    a. Dust suppression mechanisms e.g., materials and regular site maintenance (e.g., cleaning surfaces and "rounding off" a workday) is essential to reduce dust, and general pollution.

    b. Implement phased construction to limit the extent of exposed soil at any given time. This approach reduces the area vulnerable to erosion and allows for stabilization measures to be applied progressively.

Table 7: Construction phase impact 1 – A direct loss of patches of habitat due to earthworks and other construction related activities for the proposed development of a dwelling and pods on Erf 301.

CONSTRUCTION	Preferred (updated) SDP		First SDP		Preferred SDP with only primary dwelling, and no pods		No-go scenario	
Impact	Unmitigated	Mitigated	Unmitigated	Mitigated	Unmitigated	Mitigated	Unmitigated	Mitigated
Duration	Permanent	Permanent	Permanent	Permanent	Permanent	Permanent	NA	NA
Extent	Limited	Very Limited	Limited	Very Limited	Limited	Very Limited	NA	NA
Intensity	Low	Very Low	Moderate	Low	Low	Very Low	Negligible	Negligible
Probability	Certain	Certain	Certain	Certain	Certain	Certain	Highly unlikely	Highly unlikely
SCORE	Moderate negative Score: -84	Minor negative Score: -70	Moderate negative Score: 91	Moderate negative Score: 77	Moderate negative Score: 84	Minor negative Score: -70	Negligible negative Score: 0	Negligible negative: Score: 0
Confidence	High	High	High	High	High	High	High	High
Reversibility	Low	Low	Low	Low	Low	Low	High	High
Resource irreplaceability	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate

8.3.2 A direct loss of patches of species of conservation concern (SCC) and protected trees due to earthworks and other construction related activities for the proposed development of a dwelling and pods on Erf 301.

Description: The site assessment revealed Erf 301 is home to SCC and protected trees (namely milkwood and cheesewood trees). The local loss of threatened and protected plant species can have potentially far-reaching impacts on the environment. The impact is assessed in Table 8.

The following consequences may occur due to this impact:

1. Fragmentation of SCC sub-populations.
2. A shift towards a negative change in the conservation status of the SCC and a reduction in the extent of occurrence (EOO) of SCC and protected trees.
3. A general loss of suitable habitat for SCC.
4. A loss of genetic variation within remaining SCC stands.
5. An increased risk of re-invasion of the site, mainly by wattles, hakeas, and pines.

Mitigation measures:

1. Prior planning & during construction: The proposed development must have a maximum disturbance envelope of 2m around the proposed development.
    a. Prior to the commencement of construction and earth movement on the site, a plant search and rescue must be conducted of all fynbos taxa on the site (preferably with a botanist or suitably informed ECO on the site to supervise the search and rescue and provide guidance on best practice).
    b. The rescued plants must be kept in a nursery that should preferably be set up on Erf 301. Alternatively, arrangements for a suitable nursery site should be made to keep and care for removed plants during the construction phase of the project.
    c. The rescued plants must be planted back with the aid of the ECO or horticultural specialists within the 2m disturbance footprint around the permanent disturbance footprints. This will promote the regeneration of natural vegetation around the developments and reduce the possibility of negative edge effects on the site.
    d. Additional plants that are observed during construction within a development footprint must be rescued and added to the rescued plants in the indigenous nursery.
2. The development may not have any additional gardening, especially lawn areas, in order to prevent negative edge effects and long-term habitat degradation. The only additional landscaping / gardening on the site should be limited to potted plants and potted beds.
    a. Only natural fynbos and forest plant species rescued from the site must regrow around the dwelling and pods, with regular invasive plant management (checks and removal).
        b. No kikuyu grass is allowed anywhere on Erf 301 (Fig. 19).

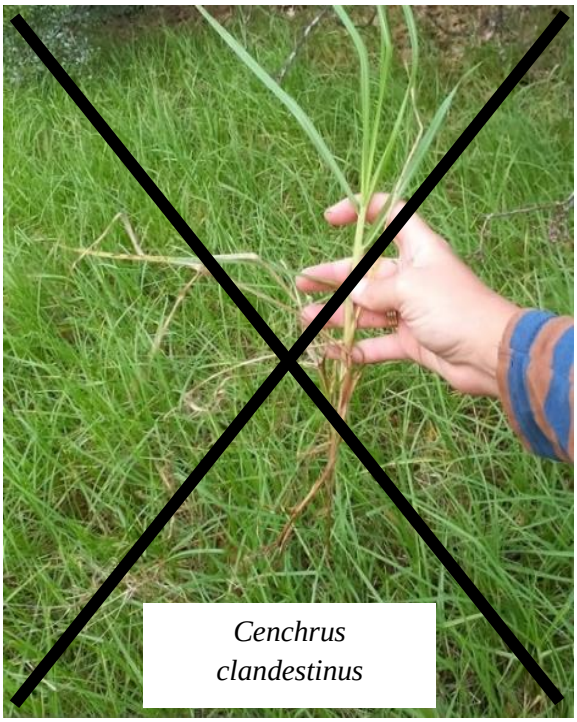

Figure 19: An image of the invasive kikuyu grass (*Cenchrus clandestinus*) that may not be planted anywhere.

c. The owner must be wary of so-called "indigenous" gardening, as this kind of advertising is not always accurate.

d. Plaques celebrating some of the naturally occurring flora on the property could potentially be made on Erf 301, however this is not a requirement.

3. Materials used during construction must be sourced and transported responsibly to minimise the risk of further introductions of new invasive plants and contamination of the site.

    a. Install vehicle wash stations at site exits to remove soil and prevent it from being transported off-site and contributing to erosion elsewhere.

    b. Staff must check their clothes when they enter and leave to ensure no invasive plants have been introduced or poached from the natural surrounding environment. 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. However, some LC and Near Threatened species, especially geophytes (several on Erf 301), can also be targeted by plant poachers despite not being listed as sensitive species.

4. Driveways and parking spaces for non-heavy machinery could make use of open pavers (Fig. 20) that are planted with non-invasive grasses, like *Cynodon dactylon* (the Cape Royal variety; Fig. 21), or as an alternative *Stenotaphrum secundatum* (Buffalo grass; Fig. 21).

Figure 20: A local example of the use of open pavers for car parking in George.

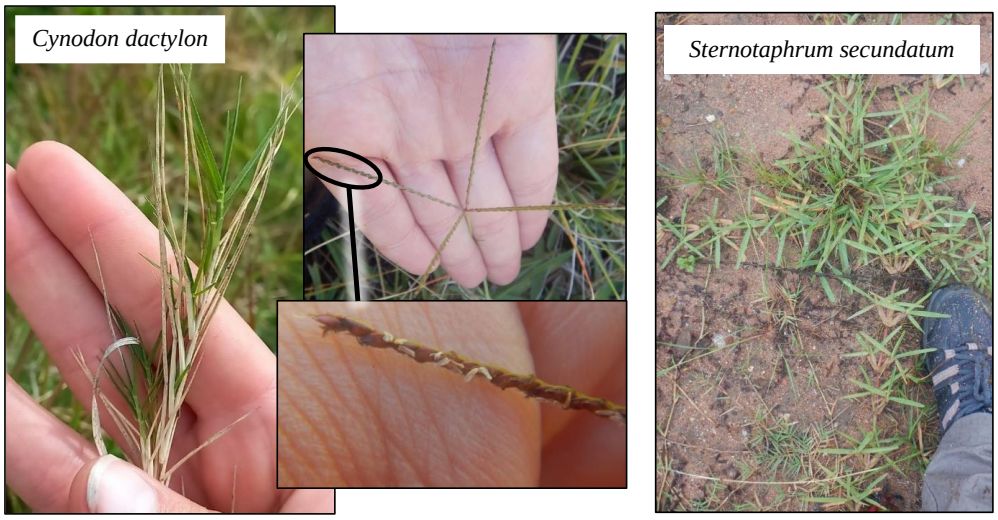

Figure 21: Images of *Cynodon dactylon* and *Stenotaphrum secundatum*.

Table 8: Construction phase impact 2 – A direct loss of patches of species of conservation concern (SCC) due to earthworks and other construction related activities for the proposed development of a dwelling and pods on Erf 301.

Construction	Preferred (updated) SDP		First SDP		Preferred SDP with only primary dwelling, and no pods		No-go scenario	
Impact: Cabins	Unmitigated	Mitigated	Unmitigated	Mitigated	Unmitigated	Mitigated	Unmitigated	Mitigated
Duration	Ongoing	Medium term	Ongoing	Medium term	Ongoing	Medium term	NA	NA
Extent	Limited	Very Limited	Limited	Very Limited	Limited	Very Limited	NA	NA
Intensity	Low	Very Low	Moderate	Low	Low	Very Low	Negligible	Negligible
Probability	Almost certain	Likely	Almost certain	Likely	Likely	Unlikely	Highly Unlikely	Highly Unlikely
SCORE	Minor negative Score: -66	Negligible negative Score: -35	Minor negative Score: -72	Minor negative Score: -40	Minor negative Score: -55	Negligible negative Score: -21	Negligible negative Score: 0	Negligible negative Score: 0
Confidence	High	High	High	High	High	High	High	High
Reversibility	Low	Low	Low	Low	Low	Low	High	High
Resource irreplaceability	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate

8.3.3 An indirect impact resulting in habitat degradation, and SCC loss due to construction site management on Erf 301.

Description: In addition to the large and obvious construction impacts, the management of materials and staff on the site is also an important impact on the site. If managed properly, many accidents and unanticipated negative losses to the expense of the environment, as well as staff can be avoided. This impact is assessed in Table 10.

The following consequences may occur due to this impact:

1. Unanticipated losses of vegetation outside of designated areas.
2. Increased duration of negative construction impacts.
3. Increased vulnerability to impacts within remaining habitat portions.
4. Potential health and safety hazards on the site and in the surrounding environment.
5. The creation of novel habitat that indigenous species cannot survive in, but where exotics and invasive plants thrive in.

Mitigation measures:

1. During construction: All new staff must be briefed about the layout of the construction site and must be made aware of the no-go areas and fact that the surrounding environment is sensitive and must not be disturbed.
2. During construction: 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 and other problems must not be allowed to operate on the site until they have been repaired.
3. During construction: Ongoing monitoring and clearing of invasive plants should occur. A detailed plan is not required for Erf 301, as the invasive plants on the site are minimal, and can easily be cleared. This is a requirement by law. The black wattles observed on the site must be controlled as described in Table 9. Pine trees can be cut down as close to the ground as possible without application of herbicide.
4. During construction: Adequate ablution must be provided and no waste dumping or burning is to be allowed. See the animal specialist report for more detail.
5. During construction: Concrete, cement, plastering, and painting must be conducted with care. See the animal specialist report for more detail.
6. During construction: Stockpiles of materials must be managed responsibly. See the animal specialist report for more detail.

Table 9: A table illustrating the different control measures that are appropriate for black wattles (*Acacia mearnsii*). The adult trees on Erf 301 could be bark stripped, cut and then the stump treated, or treated via bark frilling as specified below.

Size class	Treatment method	Herbicide	Trade name	Recommended product	Dosage (mℓ / g)	Wetter/ Dye	a.i. (L/ kg)	Mix (l)	% mix	Estimated product (L/ha or kg/ha)	Volume of mix	Cautions
Seedling	Hand pull	No herbicide needed										
Seedling	Foliar spray	Clopyralid 90 + Triclopyr (as amine salt) 270 g/L SL	Confront 360 SL, Astra 360 SL	Clopyralid 90 + Triclopyr (as amine salt) 270 g/L SL	30		0.03	10	0.3	0.9	300	
		Fluroxypyr 200 g/L EC	Cardinal 200 EC, FriXon, Solstar, Starane 200 EC, Terminal 200 EC, Tomahawk 200 EC, Voloxypyr 200 EC		12.5	0.50%	0.0125	10	0.125	0.375	300	
		Glyphosate (as isopropylamine salt) 480 g/L SL	Seismic		110	0.10%	0.11	10	1.1	3.3	300	
		Glyphosate (as sodium salt) 500g/kg WG	Kilo		100		0.1	10	1	2	200	
		Triclopyr (as triethyl ammonium) 120 g/L + Aminopyralid 12 g/L	Confront super 132		50	0.50%	0.05	10	0.5	1.5	300	
		Triclopyr (as butoxy ethyl ester) 480 g/L EC	Garlon 4, Garlon 480 EC, Nuvagon 480 EC, Tribel 480 EC, Triclon, Trimax E, Tripyr 480 EC, Viroaxe, Vulture 480 EC		75	0.50%	0.075	10	0.75	2.25	300	
		Triclopyr (as butoxy ethyl ester) 240 g/L + Aminopyralid 30 g/L	Garlon Max 270 EW		25	0.50%	0.025	10	0.25	0.75	300	
		Fluroxypyr 80 + Picloram 80 g/L ME	Plenum 160 ME, Gladiator 160 ME, Mafia 160 ME, Quorum 160 ME		12.5	0.50%	0.0125	10	0.125	0.375	300	To not contaminate water used for domestic or irrigation purposes
		Triclopyr 600g/kg WG	Triclomax 600 SG		60	0.50%	0.06	10	0.6	1.8	300	
		Fluroxypyr (pyridyloxy compound) 320g/L + Triclopyr (Pyridyloxy compound) 160g/L	Impala 480 EC		33		0.033	10	0.33	0.99	300	
Young	Lopping / Pruning	Fluroxypyr 80 + Picloram 80 g/L ME	Plenum	Triclopyr (as amine salt) 360 g/L SL	200	0.50%	0.2	10	2	4	200	
		Imazapyr 100 g/L SL	Chopper, Hatchet		1000		1	10	10	20	200	
		Picloram (as potassium salt) 240g/L SL	Access, Browser		150	0.50%	0.15	10	1.5	3	200	
		Triclopyr (as amine salt) 360 g/L SL	Lumberjack, Timbrel		300	0.50%	0.3	10	3	6	200	
		Triclopyr (as triethyl ammonium) 120 g/L + Aminopyralid 12 g/L	Confront super		200	0.50%	0.2	10	2	4	200	
Adult	Bark strip	No herbicide needed										
	Cut stump	Picloram (Pyridine compound) 80g/L + Fluroxypyr (Pyridine compound) 80g/L ME	Plenum 160 ME, Gladiator 160 ME, Mafia 160 ME, Quorum 160 ME	Picloram (as potassium salt) 50g/kg + Triclopyr (as triethylamine salt) 50g/kg	200	0.50%	0.2	10	2	4	200	
		Imazapyr 100 g/L SL	Eco-Imazapyr, Hatchet		1000		1	10	10	20	200	
		Picloram (as potassium salt) 240g/L SL	Access 240 SL, Adequate 240 SL, Browser, Picloram, Radiate, Scrubber 240 SL		150	0.50%	0.15	10	1.5	3	200	
		Triclopyr (as amine salt) 360 g/L SL	Lumberjack, Timbrel		300	0.05%	0.3	10	3	6	200	
		Picloram (as potassium salt) 50g/kg + Triclopyr (as triethylamine salt) 50g/kg	Kaput 100 gel		1-2mm layer to entire exposed surface area						200	Kaput gel recommended
		Triclopyr (as pyridine compound) 270g/L + Clopyralid (as pyridine compound) 90g/L	Confront 360 SL, Astra 360 SL		200	0.50%	0.2	10	2	4	200	
		Triclopyr (as triethyl ammonium) 120 g/L + Aminopyralid 12 g/L	Confront super132		200		0.2	10	2	4	200	Stumpout registered
		Cylindrobasidium laeve	Stumpout		1 sachet / 400ml sunflower oil = 100 stumps					200		
	Frill	Picloram (as potassium salt) 240g/L SL	Access 240 SL, Browser, Picloram 240 SL, Radiate, Scrubber 240 SL	Picloram (as potassium salt) 240g/L SL	600	2.00%	0.6	10	6	12	200	
		Triclopyr (as amine salt) 360 g/L SL	Timbrel 360 SL		400	0.50%	0.4	10	4	8	200	
All	Biological control	Dasineura rubiformis	Dasineura rubiformis	Both								
		Melanterius maculatus	Melanterius maculatus									

Table 10: Construction phase impact 2 - An indirect impact resulting in habitat degradation, and SCC loss due to construction site management on Erf 301.

Construction	**Preferred (updated) SDP**		**First SDP**		**Preferred SDP with only primary dwelling, and no pods**		**No-go scenario**	
Impact	Unmitigated	Mitigated	Unmitigated	Mitigated	Unmitigated	Mitigated	Unmitigated	Mitigated
Duration	Long term	Immediate	Long term	Immediate	Long term	Immediate	Immediate	Immediate
Extent	Limited	Very limited	Limited	Very limited	Limited	Very limited	Very limited	Very limited
Intensity	Moderate	Very low	High	Low	Moderate	Very low	Negligible	Negligible
Probability	Likely	Rare	Likely	Rare	Likely	Rare	Highly unlikely	Highly unlikely
SCORE	Minor negative Score: -55	Negligible negative Score: -8	Minor negative Score: -60	Negligible negative Score: -10	Minor negative Score: -55	Negligible negative Score: -8	Negligible negative Score: -3	Negligible negative Score: -3
Confidence	High	High	High	High	High	High	High	High
Reversibility	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	High	High
Resource irreplaceability	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate

8.4 The Conclusion of the Construction Phase

The conclusion of any project is an essential, but often overlooked aspect of projects. This relates primarily to the cleaning up of the site once construction has concluded. All of the mitigation measures proposed above are only meaningful if construction is properly concluded.

1. 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.
2. Revegetation of bare soil following construction is an essential part of concluding the construction phase of the project.
3. 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 project area of influence (PAOI) for the proposed development.

8.5 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.

8.5.1 Habitat and SCC on Erf 301 negatively affected by the management activities of Erf 301, like vegetation trimming, path and road maintenance, fire regime changes, ongoing management of invasive plants, etc.

Description: The proposed dwelling developments will be in close proximity to Red Listed and protected plant species that are vulnerable to habitat loss and fragmentation. The primary dwelling and pods will alter the disturbance regime in the northern section of Erf 301. If the management of Erf 301 is done in an ecologically friendly way in the long-term, impacts of management in the area can prevent and reduce cumulative negative impacts. Without the appropriate consideration for the environment, management activities will impact the flora and habitat they grow in negatively. The impact is assessed in Table 11.

The following consequences may occur due to this impact:

1. A general long-term loss of habitat for plants, pollinators, and other important taxa.
2. Altered soil characteristics which causes unnecessary harm to forest vegetation dynamics.
3. Pollution of the environment.
4. The creation of a landscape of fear where some animals and insects that are able to access the site do not do so because of excessive and potentially destructive anthropogenic activity.
5. Loss of habitat to invasive plants species and increasingly species poor senescent fynbos in ecotonal areas on the site.

Mitigation measures:

1. It is a requirement of the law that alien clearing and monitoring be followed on Erf 301.
2. Emergency & cleaning supplies for incidents of waste spillage, or fires accidentally spreading should be kept nearby for each development proposed (e.g., keep lime, spades, first aid etc. handy). Fire extinguishers etc. must be kept as per fire safety regulations.
3. Owners and guests must be aware of activities that are not allowed on the site.

a. No disposal of grey water in the environment.

b. No walking where a path is not clearly indicated / present.

c. Instructions for the proper use of chemical toilets must be provided and must be clearly visible in all restrooms.

4. No plants may be brought to the site from elsewhere, unless planted in pots or artificial beds. All species must be from the plant search and rescue operation, or must be species that occur there naturally.

    a. No planting of trees or other plants outside of the development disturbance footprint.

    b. Locally indigenous species may be sourced from elsewhere for the rehabilitation of the 2m disturbance strip.

5. Light pollution must be considered during the operational phase of the project. Full-spectrum bulbs mimic natural sunlight, providing a balanced spectrum of light suitable for plant growth. They are suitable for areas with low natural light. See the animal specialist report for more detail on this mitigation measure.

6. Due to the forest environment over the majority of the site, and Whites Road along the northern boundary, no fire breaks may be made on Erf 301.

7. Fencing around the perimeter of Erf 301 should be avoided if possible to ensure the site remains connected to the habitat to the east and west.

Table 11: Operational phase impact 1 – Habitat and SCC on Erf 301 negatively affected by the management activities of Erf 301, like vegetation trimming, path and road maintenance, fire regime changes, ongoing management of invasive plants, etc.

Operational	**Preferred (updated) SDP**		**First SDP**		**Preferred SDP with only primary dwelling, and no pods**		**No-go scenario**	
Impact	Unmitigated	Mitigated	Unmitigated	Mitigated	Unmitigated	Mitigated	Unmitigated	Mitigated
Duration	Permanent	Permanent	Permanent	Permanent	Permanent	Permanent	Medium term	Medium term
Extent	Limited	Very limited	Limited	Very limited	Limited	Very limited	Limited	Very limited
Intensity	Moderate	Low	High	Moderate	Moderate	Low	Very low	Negligible
Probability	Almost certain	Almost certain	Almost certain	Almost certain	Almost certain	Almost certain	Unlikely	Rare
SCORE	Moderate negative Score: -78	Minor negative Score: -66	Moderate negative Score: -84	Minor negative Score: -72	Moderate negative Score: -78	Minor negative Score: -66	Negligible negative Score: -24	Negligible negative Score: -12
Confidence	High	High	High	High	High	High	High	High
Reversibility	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Resource irreplaceability	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate

8.5.2 Habitat and SCC are negatively affected in the long-term by landscaping resulting in water attenuation problems, genetic pollution, and potential long-term biodiversity loss from the cultivation of species that are not indigenous to the area.

Description:

Most landowners plant gardens with plants that are not native and indigenous to the area where they live. Pseudo-natural gardening also results in the creation of Frankenflora. This means that genetic pollution could result in cryptic hybridisation and eventual species loss. By allowing the planting of gardens in sensitive natural habitat (even with species advertised as being locally sourced), a loss of SCC will take place from increased edge effects habitat that is already somewhat fragmented. Some gardening / landscaping (a form of soft landscaping) may be required within the development footprint, and here "hard landscaping" must be avoided where possible (Box 4). Some sustainable and ecologically friendly principles for gardens are presented in Fig. 22. The impact is assessed in Table 12

BOX 4: 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 at different levels. Soft landscapes support biodiversity if local indigenous species are planted, or better yet, of 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 vegetation allows groundwater attenuation and minimisation of erosion risk, so that the consequences of groundwater and rainfall risks are far more manageable and are less likely to have far reaching and / or catastrophic impacts. Soft landscaping is especially important on Erf 301 where the proposed development will be constructed near the crest of a south facing slope, where water will flow towards the valley below.

Hard landscaping

Hard landscaping refers to spaces around constructed buildings that have been transformed into impermeable surfaces, such as pavements, and concrete driveways. Hard landscapes have negative impacts on the natural environment and are less ideal than soft landscaping. 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 which means that water disposal systems need to be adequate to prevent erosion. No plants can really grow on these surfaces making groundwater attenuation problematic.

The following consequences may occur due to this impact:

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 introduction & establishment of invasive plants in natural fynbos vegetation
3. A general loss of habitat, not only for plants, but important pollinator species too.
4. Eventual loss of any remaining 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; 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 fire regimes.

Mitigation measures:

1. Additional gardening should be avoided and may only take place in pots and potted beds on the site.
2. Ongoing effort to remove all invasive plants species is a requirement by law.
3. As mentioned before, no planting of kikuyu grass will be allowed. Lawns may not be planted.
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 in gardens, and when used it must be done with caution and may not become routine practice.
6. If gardens need to be considered within the 2m disturbance areas around permanent disturbance footprints, 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 (Fig. 22). All these tips from Fynbos Life form part of the mitigation on the impact of landscaping.

Figure 22: A illustration that can help guide future gardening decision making, as provided by the https://www.fynboslife.com/life-garden/ website.

Table 12: Operational phase impact 2 – Habitat and SCC are negatively affected in the long-term by landscaping resulting in water attenuation problems, genetic pollution, and potential long-term biodiversity loss from the cultivation of species that are not indigenous to the area.

Operational	**Preferred (updated) SDP**		**First SDP**		**Preferred SDP with only primary dwelling, and no pods**		**No-go scenario**	
Impact	Unmitigated	Mitigated	Unmitigated	Mitigated	Unmitigated	Mitigated	Unmitigated	Mitigated
Duration	Permanent	Brief	Permanent	Brief	Permanent	Brief	Immediate	Immediate
Extent	Limited	Very limited	Limited	Very limited	Limited	Very limited	Limited	Very limited
Intensity	High	Low	High	Low	Moderate	Very low	Low	Very low
Probability	Certain	Likely	Certain	Likely	Certain	Likely	Highly unlikely	Highly unlikely
SCORE	Moderate negative Score: -98	Negligible negative Score: -30	Moderate negative Score: -98	Negligible negative Score: -30	Moderate negative Score: -91	Negligible negative Score: -25	Negligible negative Score: -6	Negligible negative Score: -4
Confidence	High	High	High	High	High	High	High	High
Reversibility	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Resource irreplaceability	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate

9. CONCLUSION

Erf 301 is mapped as Garden Route Granite Fynbos; however, the vegetation map of South Africa does not take ecotonal vegetation into account, making its classification harder to defend. The valleys and south facing slopes here contain forest vegetation, and then the plateaus and north facing slopes are fynbos. Between these vegetation types there is a relatively narrow transitional ecotone. The transitional vegetation on Erf 301 plays an important functional role between forest and fynbos. Erf 301 also didn't have a marked invasive presence. Only one large black wattle was found. Some black wattles were also seen outside of the development footprint in the valleys flanking the east and west, but it was not a big invasion and still very manageable. Should the mitigation measures proposed in this report be followed, the preferred current layout is acceptable. The owner also wants to declare the remaining section of Erf 301 as a conservation area (>90% of the erf), which is a very positive outcome for a development in the Wilderness and Hoekwil area.

10. REFERENCES

Browning, C., & Macey, R. H. (2015). Lithostratigraphy of the George pluton units (Cape Granite Suite), South Africa. *South African Journal of Geology*, *118*(3), 323–330. https://doi.org/10.2113/gssajg.118.3.323

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*. https://www.capenature.co.za/wp-content/uploads/2019/10/A-Summary-Overview-of-the-Biodiversity-Spatial-Plan_web.pdf

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). https://doi.org/10.1111/j.1523-1739.2009.01342.x

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. https://doi.org/10.4102/ABC.V49I1.2452

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.

Ekstrom, J., Bennun, L., & Mitchell, R. (2015). *A cross-sector guide for implementing the Mitigation Hierarchy*.

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. https://doi.org/10.1111/J.1442-9993.2008.01869.X

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.

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. https://doi.org/10.1111/1365-2745.14110

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. https://doi.org/10.4102/abc.v31i1.509

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*. https://doi.org/10.1111/j1442-8903.2006.00292.x

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. http://opus.sanbi.org:80/jspui/handle/20.500.12143/6922

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. https://doi.org/10.1111/J.1472-4642.2011.00874.X

11. APPENDIX

11.1 Provisional Plant Species List

All species that have not yet been mentioned that were observed during the site visit are in Table 13. A species accumulation curve for all the species recorded on the site during the assessment are presented in Fig. 23.

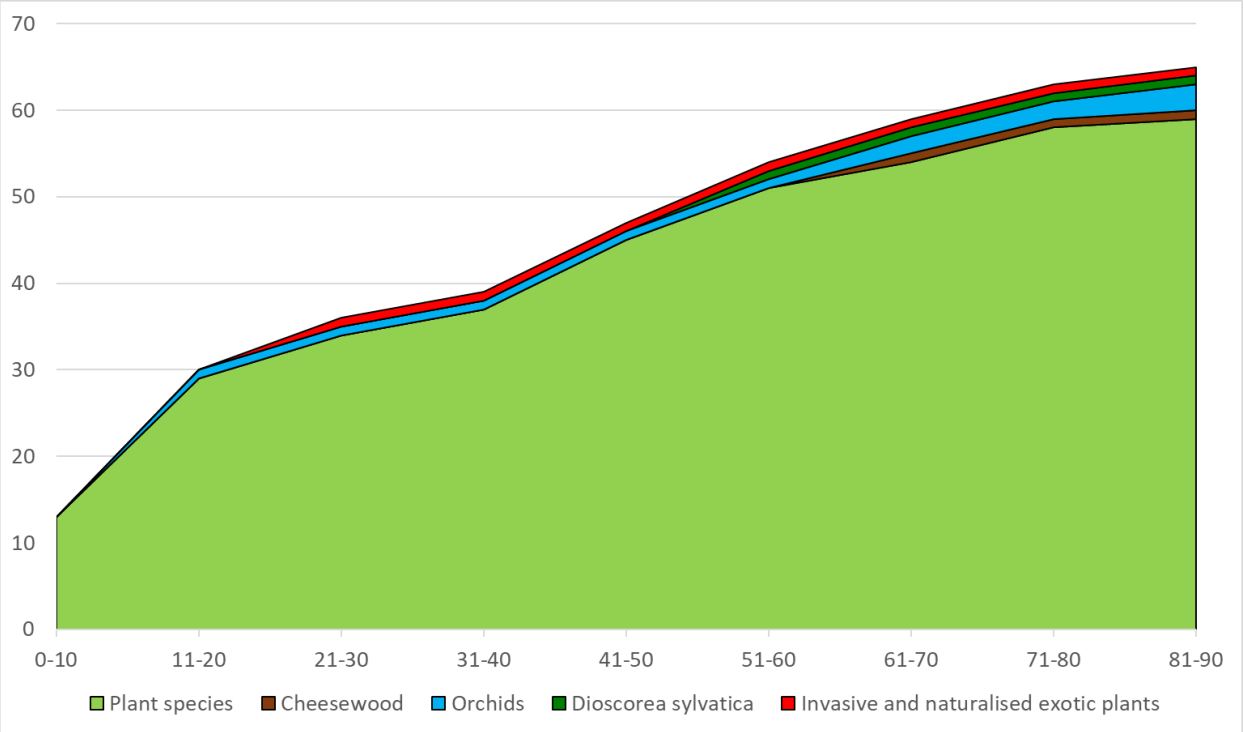

Figure 23: A plant species accumulation curve for the site assessment.

Table 13: A provisional species list for the proposed development footprint on the site. The colour codes are as follows: The three LC orchids on the site are highlighted in light blue. Species associated with fynbos are highlighted in pink. Invasive black wattle (*Acacia mearnsii*) is in red, protected trees are in brown, and the threatened SCC is in green.

Family	Species	Common name
Class Polypodiopsida (Ferns)		
ASPLENIACEAE	*Asplenium rutifolium*	Buchu Spleenwort
PTERIDACEAE	*Cheilanthes viridis*	Green Cliff Brake
Class Liliopsida (Monocot flowering plants)		
ASPARAGACEAE	*Asparagus aethiopicus*	African Asparagus
ASPARAGACEAE	*Asparagus setaceus*	Common Asparagus Fern
CYPERACEAE	*Carex sp.*	true sedges
IRIDACEAE	*Dietes iridioides*	Small Fortnight Lily
IRIDACEAE	*Tritoniopsis caffra*	Mountain Reedpipe
ORCHIDACEAE	*Bonatea speciosa*	Green Woodorchid
ORCHIDACEAE	*Disa sagittalis*	X Disa
ORCHIDACEAE	*Liparis remota*	Forest Fly Orchid
POACEAE	*Ehrharta erecta*	panic veldtgrass
Class Magnoliopsida (Dicot flowering plants)		
AIZOACEAE	*Carpobrotus deliciosus*	Delicious Sourfig
ANACARDIACEAE	*Searsia lucida*	Glossy Currantrhus
APOCYNACEAE	*Acokanthera oppositifolia*	bushmans poison
APOCYNACEAE	*Carissa bispinosa*	num-num
APOCYNACEAE	*Gonioma kamassi*	Knysna Boxwood
APOCYNACEAE	*Secamone alpini*	Monkey Rope
ASTERACEAE	*Delairea odorata*	Cape-ivy
ASTERACEAE	*Gerbera cordata*	Forest Gerbera
ASTERACEAE	*Helichrysum felinum*	Strawberry Everlasting
ASTERACEAE	*Metalasia muricata*	White bristle bush
ASTERACEAE	*Senecio sp.*	groundsels
ASTERACEAE	*Senecio linifolius*	Thread Ragwort
ASTERACEAE	*Tarchonanthus littoralis*	Coastal Camphorbush
CELASTRACEAE	*Cassine peragua*	Cape Saffron
CELASTRACEAE	*Elaeodendron croceum*	Forest Saffron
CELASTRACEAE	*Gymnosporia buxifolia*	Common Spikethorn
CELASTRACEAE	*Lauridia tetragona*	Climbing Saffron
CELASTRACEAE	*Maytenus acuminata*	Silky Bark
CELASTRACEAE	*Maytenus acuminata acuminata*	Silkybark
CELASTRACEAE	*Mystroxylon aethiopicum aethiopicum*	Cape Koobooberry
CELASTRACEAE	*Pterocelastrus tricuspidatus*	Candlewood
CELASTRACEAE	*Putterlickia pyracantha*	Bastard Spikethorn
CRASSULACEAE	*Crassula multicava*	Fairy Stonecrop
CRASSULACEAE	*Crassula orbicularis*	Rock Stonecrop
NA	Sensitive species (number unknown)	NA
EBENACEAE	*Diospyros dichrophylla*	Poison Starapple

Family	Species	Common name
ERICACEAE	*Erica discolor speciosa*	Garden Route Discolorous Heath
ERICACEAE	*Erica peltata*	Shield Heath
FABACEAE	*Acacia mearnsii*	black wattle
FABACEAE	*Dipogon lignosus*	Okie bean
FABACEAE	*Virgilia divaricata*	Gardenroute Keurboom
GESNERIACEAE	*Streptocarpus rexii*	Wild Gloxinia
LAMIACEAE	*Stachys aethiopica*	African Stachys
LAURACEAE	*Cassytha ciliolata*	devil's tresses
MALVACEAE	*Grewia occidentalis*	Crossberry
MENISPERMACEAE	*Cissampelos capensis*	Cape Moonseed Vine
METTENIUSACEAE	*Apodytes dimidiata*	White Pear
OCHNACEAE	*Ochna serrulata*	Small-leaved plane
OLEACEAE	*Olea capensis*	Black Ironwood
OXALIDACEAE	*Oxalis imbricata*	Tile Sorrel
PITTOSPORACEAE	*Pittosporum viridiflorum*	Cape Cheesewood
POLYGALACEAE	*Polygala myrtifolia*	Sweet Pea Shrub
PRIMULACEAE	*Myrsine africana*	African Boxwood
RHAMNACEAE	*Phylica axillaris*	Axil Hardleaf
RHAMNACEAE	*Rhamnus prinoides*	Shiny-leaf
ROSACEAE	*Cliffortia sp.*	Caperoses
RUBIACEAE	*Canthium inerme*	Turkeyberry
RUTACEAE	*Agathosma ovata*	False Buchu
SALICACEAE	*Dovyalis rhamnoides*	Cape Cranberry
SANTALACEAE	*Colpoon compressum*	Cape Sumach
THYMELAEACEAE	*Passerina corymbosa*	Common Gonna
THYMELAEACEAE	*Passerina falcifolia*	Weeping Gonna
VITACEAE	*Rhoicissus digitata*	Baboon Grape

11.2 Land Use Recommendations According to the WC BSP

Table 14: The land-use planning proposed by the Western Cape Biodiversity Spatial Plan

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

11.3 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 15 below.

Table 15: 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 16. 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 16: 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

11.4 Impact Assessment Methods

Individual impacts for the construction and operational phase were identified and rated according to criteria which include their intensity, duration, and extent. The 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 17.

Table 17: 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 18.

Table 18: 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 19).

Table 19: 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