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Appendix G3: Terrestrial Biodiversity and Flora Assessment

Specialist Impact Assessment for Erf 2074 in Keurbooms, Bietou Local Municipality.

Terrestrial Biodiversity & Terrestrial Plant Species Report

Erica discolor on a sandstone outcrop

Prepared For:	EcoRoute Environmental
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SACNASP:	Cand. Sci. Nat. (Botanical Science) – 141757
Reviewer:	Dr. Jackie Dabrowski (Pr.Sci.Nat 115166)
Date:	05 August 2024
Version:	Final draft

DECLARATION OF SPECIALIST INDEPENDENCE

- 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 study and compiling this report I did not have any interest, hidden or otherwise, in the proposed development that this study has reference to, except for financial compensation for work done in a professional capacity;
- Work pfarmormed for this study was done in an objective manner. Even if this study 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 pfarmorming 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.

Bianke Fouche (MSc)

August 2024

BIANKE FOUCHE ABRIDGED CV

Qualifications

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

SACNASP Registration No: 141757 (Candidate Botanical Scientist)

Skills and Core Competencies

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

References

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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
EMP	Ecological Management Plan
ESA	Ecological Support Area
NEM:BA	National Environmental Management: Biodiversity Act
ONA	Other Natural Areas
PAOI	Project Area of Influence
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
SDP	Site Development Plan

1. INTRODUCTION

1.1 Background

Confluent Environmental was contracted by Eco Route to undertake a specialist assessment for botanical and terrestrial sensitivity of Erf 2074, in Plettenberg Bay. The size of the Erf is ca. 6.25 ha. According to the Department of Forestry, Fisheries, and the Environment (DFFE) Screening Tool, this SSVR is required because the terrestrial plant species theme has been highlighted as having a **Medium & Low** sensitivity, and the terrestrial biodiversity has a **Very High** sensitivity. Erf 2074 is located south of the N2 highway, and can be accessed from Marine Way (Fig. 1). The site is located in an established urban residential area, with open space associated with the valley bordering the property's southern edge. The Piesang River also flows in the valley south of Erf 2074.

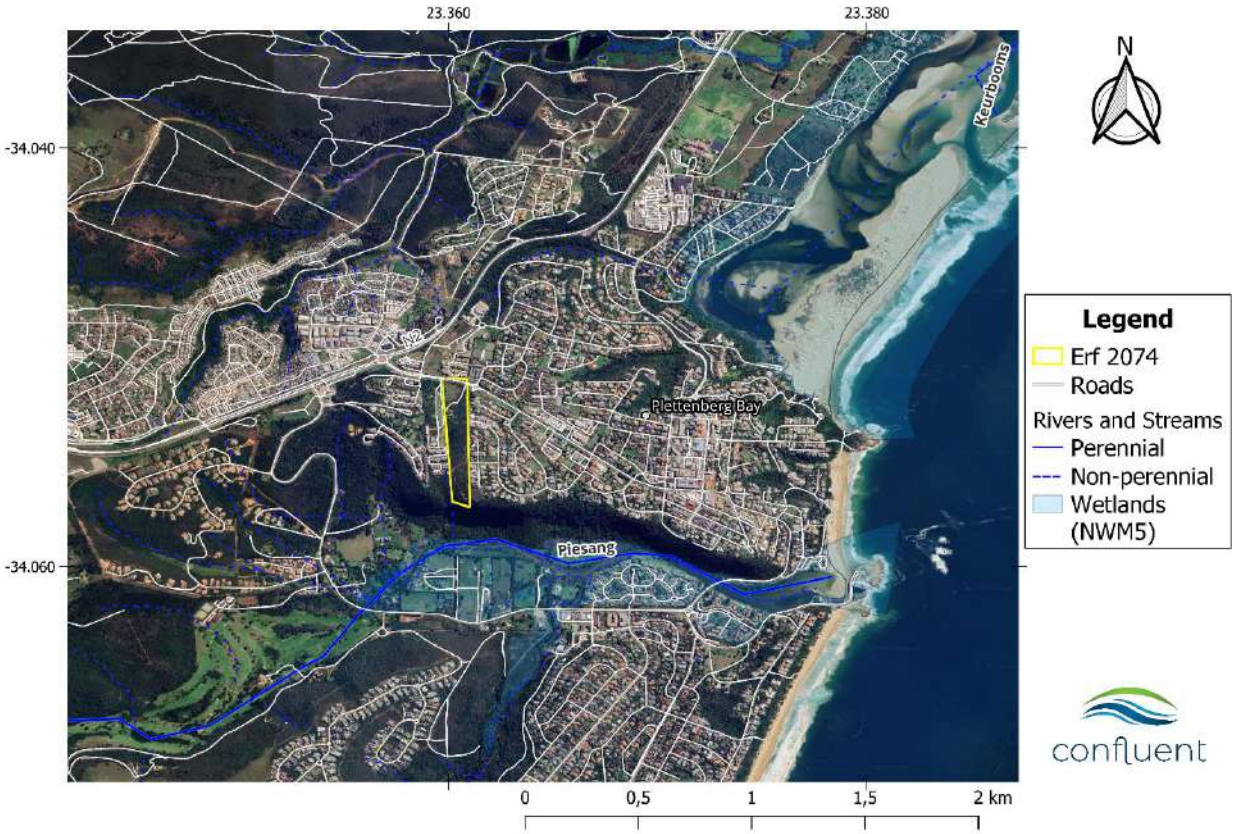

Figure 1: The general location of Erf 2074 in Plettenberg Bay. Dotted blue lines illustrate non-perennial drainage lines, and the solid blue line is the Piesang River.

1.2 Site Development Plan

The current site development plan (SDP), as well as an alternative SDP was made available during July 2024. The internal sewer pipes will be the property of the development and will not be taken over by Bitou Municipality. Refer to the aquatic compliance statement for more detail on the sewage systems being proposed. The plans, indicated in Fig. 2 indicates that the alternative option contains more housing units and parking bays than the second Preferred option. The Alternative option one will have 375 parking bays for 100 two-bedroom units and

150 three-bedroom units. The Preferred will have 63 two-bedroom units and 165 three-bedroom units.

Existing structures on the site (Fig. 2) are the Olive grove, planted tree rows in the northern half of the site adjacent to the dirt roads, store/garage, out building, the existing house, other residential dwellings, chicken coop, shed, shade structure, old non-functional protea plantation, reservoir, and telephone line.

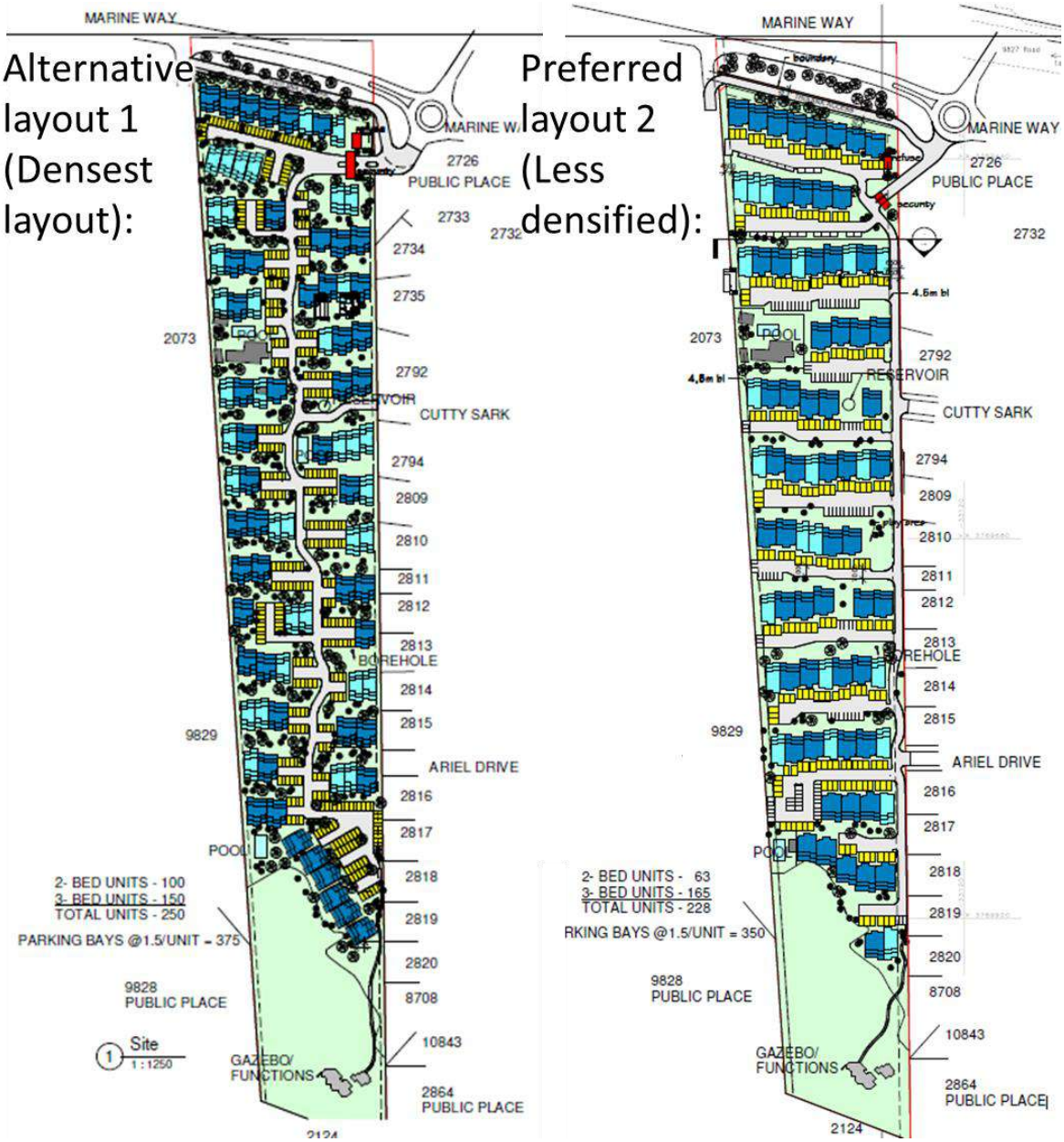

Figure 2: The current layout plans for Erf 2074 in July 2024.

2. TERMS OF REFERENCE

This site sensitivity verification report provides information on Terrestrial and Botanical diversity and sensitivity of the site. The results presented are based on a desktop and field assessment, which includes a consideration of historical photographic records of the site. The assessment presented in this report follows the Protocol for the Specialist Assessment and

Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity, and Terrestrial Plant Species themes.

This site sensitivity assessment follows the requirements of:

- The Environmental Impact Assessment Regulations, as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998), which includes:
    - The protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial plant species (28 July 2023).
    - The protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial biodiversity (20 March 2020). Additional guidelines for the terrestrial biodiversity theme:
    - Ecosystem Guidelines for Environmental Assessment in the Western Cape (de Villiers et al., 2016).
    - The Western Cape Biodiversity Spatial Plan Handbook and summary booklet (CapeNature, 2017; Pool-Sandvliet et al., 2017).
    - The Subtropical Thicket Ecosystem Programme Handbook: Integrating the natural environment into land-use decisions at the municipal level: towards sustainable development (Pierce & Mader, 2006).
- Additional guidelines for the terrestrial plant species theme:
    - Species Environmental Assessment Guideline: Guidelines for the implementation of the Terrestrial Flora (3c) & Terrestrial Fauna (3d) Species Protocols for environmental impact assessments in South Africa (Verburgt et al., 2020).

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

2.1 Online Screening Tool

The Department of Forestry, Fisheries, and the Environment (DFFE) screening tool report for the development footprint has identified the **terrestrial plant species theme as having a Low & Medium sensitivity**, and the **terrestrial biodiversity theme as having a Very High sensitivity** (Fig. 3). Note that the Screening Tool plant species theme does not take Near Threatened plant populations into account.

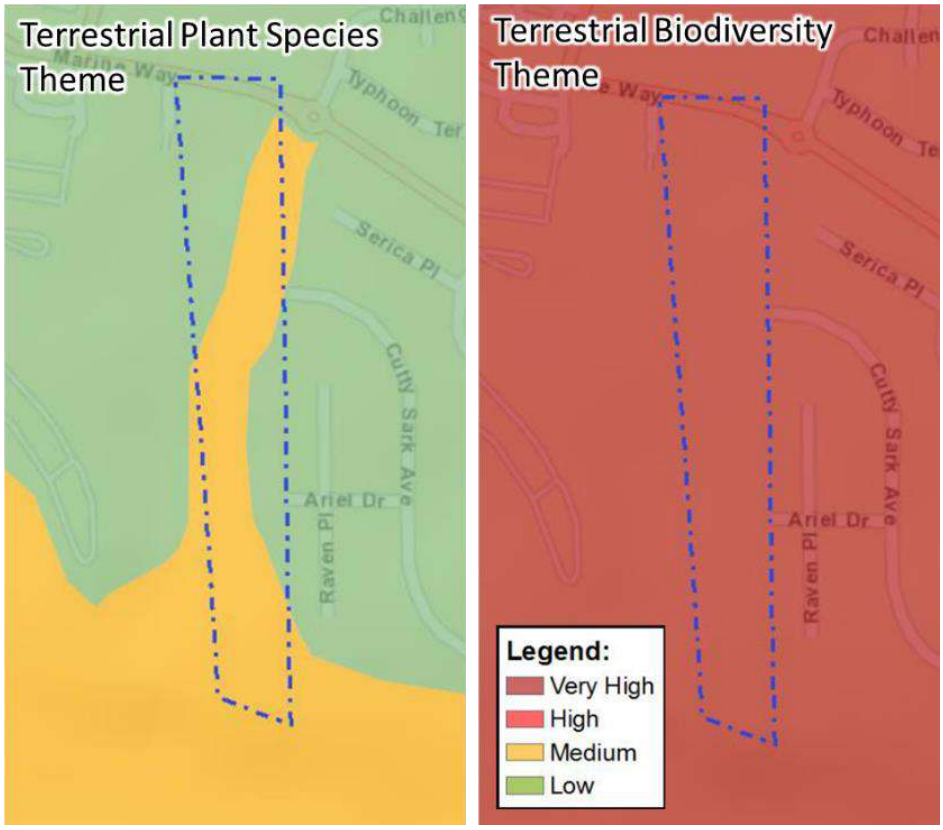

Figure 3: The screening tool generated site sensitivities for the two themes included in this report.

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. The highlighted rows of Table 1 were triggered for the proposed development on Erf 2074.

Table 1: Sources of BPA data for the Terrestrial Biodiversity Theme sensitivity (Stewart et al., 2021). Only BPAs that have been triggered for Erf 2074 by the screening tool are listed.

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.
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. The buffer applicable here is the 10km wide buffer for the Garden Route National Park.
Freshwater Ecosystem Catchments (terrestrial)	Freshwater ecosystem catchments, determined through the National Freshwater Ecosystem Priority Area (NFEPA) process.

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.

3.2 Field Assessment

Field work was undertaken on the 16th & 17th of January 2024. 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 found more easily 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 a Nikon Coolpix camera. A provisional species list and plant species accumulation curve is provided in Appendix 12.1.

3.3 Assumptions & Limitations

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

- Only one survey took place during the summer over two days on the 16th & 17th of January 2024. The species list is therefore limited to the findings of the one field assessment, as well as past records on iNaturalist and the Plants of Southern Africa (POSA) database for the proposed development site and its surrounding areas.
- The species list and SCC reported are not exhaustive, and more species will be added to the list should more sampling effort, and sampling in different seasons occur (Perret et al., 2023).
- Many plant species flower seasonally and are therefore difficult / not likely to be identified outside of their flowering season.
- Some rare and threatened plant species are difficult to locate and easily overlooked in the field (e.g., geophytes, small succulents, small shrubs, and cryptic spp.). Furthermore, some species may not have been visible at all during the time of the site assessment (e.g., some geophytes, annuals, and parasitic plants).
- Environmental factors such as the prevailing fire regime, successional stage of the vegetation present, previous cultivation of the land, and the level of alien infestation at the site affects the species visible at the time of assessment (Cowling et al., 2010; Privett et al., 2001).
- The dense invaded sections on the site (mostly blackwood wattles, *Acacia melanoxylon*) and in the surrounding environment made it hard to gain access to some sections of the site. It is possible that focus on “bundu bashing” and getting access to some parts of the site may have caused a lapse in concentration so that an SCC could have been missed on the site.
- Effort was made to geotag all protected trees on the site, however it is very likely that some have been missed, especially in densely vegetated areas away from the walked track on the site.

4. RESULTS: DESKTOP ASSESSMENT

4.1 Terrestrial Biodiversity

4.1.1 Climate, Geology, and Soil

The climate of Plettenberg Bay is described as warm and temperate. The rainfall pattern is aseasonal, with rain typically occurring even in the driest months of the year (Fig 4). Two seasonal rainfall peaks during the spring and winter. The mean annual temperature (MAT) for this area is around 18˚C.

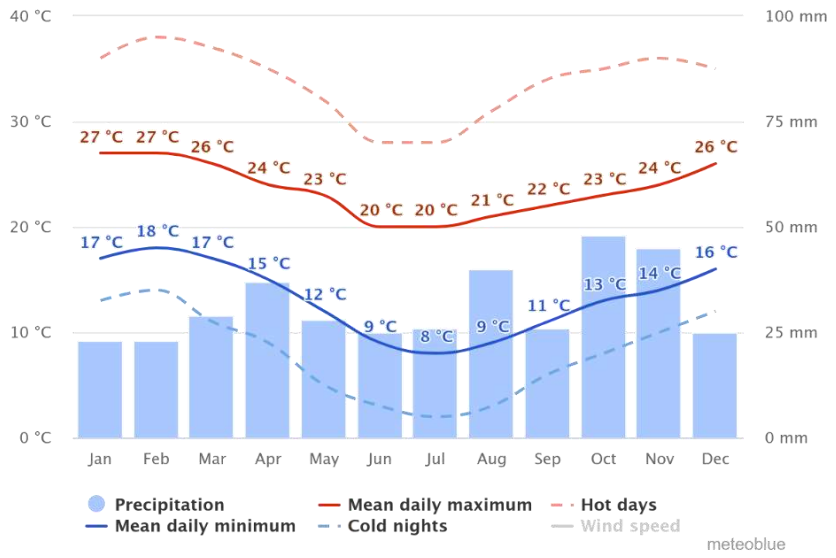

Figure 4: Summary of the climate data for Plettenberg Bay. The graph was sourced from meteoblue.

The geology of the site was mostly sandstone with relatively nutrient poor sandy soil (Fig. 5). The origin of the geology and soil in this area is from aeolian (i.e., windblown) origin that is from the Quaternary (Paton, 2023). The topsoil on the site had a sandy texture, and clay content in the soil is likely very low throughout the soil profile.

Figure 5: Images of the geology and substrate on Erf 2074.

4.1.2 Vegetation Type(s)

The mapped vegetation type on Erf 2074 is the least threatened (LT; Government gazette no. 2747, NEMBA Act no 10 of 2004, updated 18 November 2022) South Outeniqua Sandstone Fynbos (FFs 19; Fig. 6). This vegetation type occurs along the southern slopes of the Outeniqua mountains from Cloetesburg to the Keurbooms River. It includes sandstone outcrops on the lowlands near Knysna and Natures Valley (Dayaram et al., 2019; Mucina & Rutherford, 2006). Usually, landscapes with South Outeniqua Sandstone Fynbos have moderately undulating slopes, and the fynbos vegetation can be quite tall and dense, with a relatively open understorey.

Important and endemic taxa to this vegetation type can be found in the vegetation type description of Mucina & Rutherford (2006), and the 2012 updated list is provided in Appendix 12.2. According to the 2021 updated ecosystem details, about 67% of the original area (historically ca. 157 123 ha) of the vegetation type is still intact, with 32.2% formally conserved. The Vlok vegetation map includes two vegetation variants on the site, splitting Erf 2074 approximately in half. The southern half is mapped as Piesang River Fynbos-Forest, and the northern half is mapped as Roodefontein Grassy Fynbos (Fig. 6).

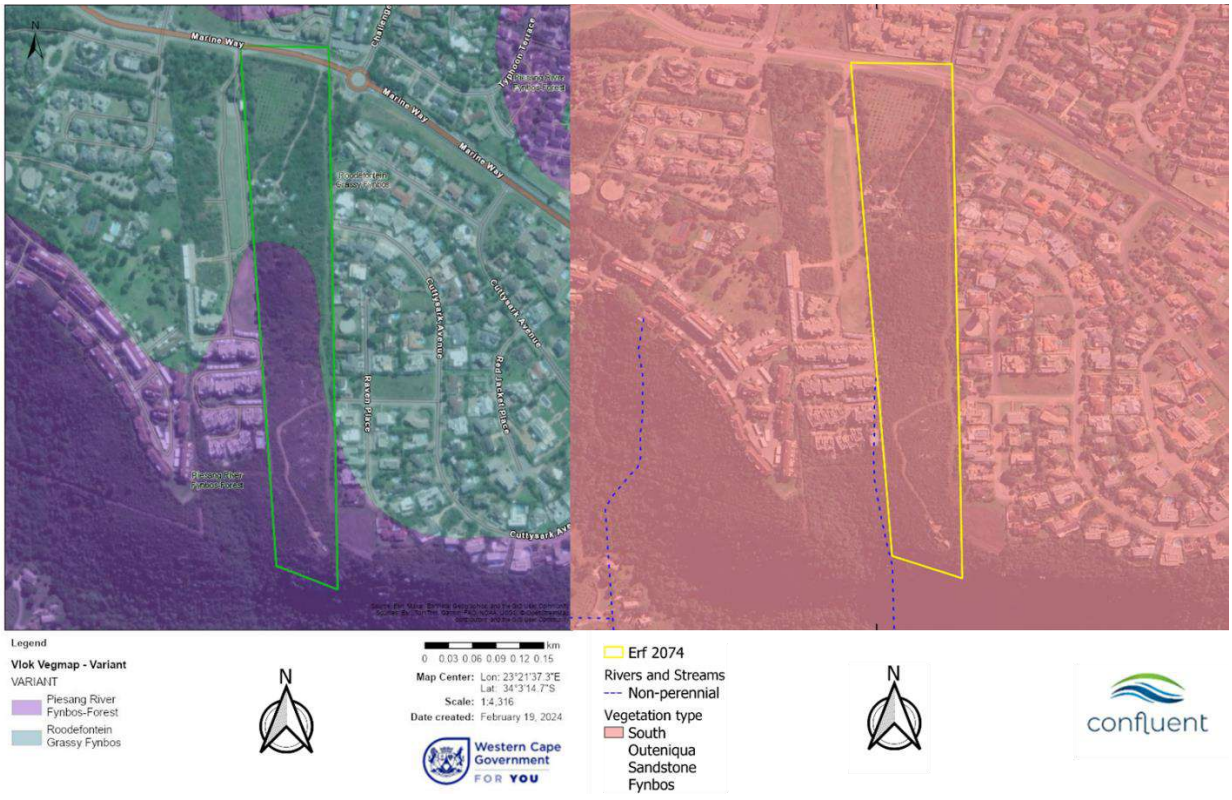

Figure 6: The mapped vegetation type according to the Vlok vegetation map (left) and the 2018 National Vegetation Map of South Africa (right; Dayaram et al., 2019; Mucina & Ruthfarmord, 2006) for Erf 2074.

4.1.3 Western Cape Biodiversity Spatial Plan

The Biodiversity Spatial Plan for the Western Cape (WC BSP) excludes the majority of Erf 2074 from the conservation planning areas (Fig. 7). Only the southernmost section of the site, i.e., the valley and a section of the fynbos habitat on the site, is mapped as a terrestrial critical biodiversity area (CBA1). ESA 1 & 2 areas are mapped along the south-western boundary of

Erf 2074. Explanations of the BSP categories on the site are in Box 1. The reasons for the BSP layers mapped here are (grey entries either do not apply to the site or are outside of the scope of this report to provide comment on):

- **FEPA (Freshwater Ecosystem Priority Areas) River Corridor** – The valley below Erf 2074, which includes the Piesang River, could be considered a FEPA. However, Erf 2074 itself falls outside of this area. Refer to the aquatic compliance statement for the site.
- **Piesang (Core) Estuary** – Erf 2074 is not within an estuary.
- **South Eastern Coastal Belt Permanent Lower Foothill River** – This is likely referring to the Piesang River south of Erf 2074. Refer to the aquatic compliance statement for the site.
- **Watercourse protection- South Eastern Coastal Belt** - Refer to the aquatic compliance statement for the site.
- **South Outeniqua Sandstone Fynbos (VU)** – According to the 2022 updated list of threatened ecosystems, South Outeniqua Sandstone Fynbos is now considered least threatened (LT), and is no longer vulnerable (VU).

Figure 7: The mapped Western Cape Biodiversity Spatial Plan (WC BSP) categories that have been mapped for Erf 2074.

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.

Ecological Support Area 1

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

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

Ecological Support Area 2

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

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

4.1.4 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 buffer is 10km wide. However, the Garden Route National Park is ca. 9 km away from the proposed development site, and the proposed development site is separated from the Garden Route National Park mainly by existing disturbed areas and privately owned erven in Plettenberg Bay. Even though the screening tool identified the buffer area as one of the reasons for the site sensitivity, the proposed development is highly unlikely to negatively affect corridor connectivity and the buffer area for the Garden Route National Park.

Figure 8: The Protected Areas Register (PAR) map around Erf 2074 (indicated by the yellow flag). This interactive map can be accessed from the DFFE PAR website.

4.1.5 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 descriptions below are also presented in the animal species theme report for Erf 2074 (Leitner, 2024).

1938: The majority of the property and surrounding areas were in a natural state with limited development. Only one building was present in the northern half of the Erf. Modified vegetation was visible in the north-western corner on the site, likely for agricultural use. An access road extended to the building from the north-eastern corner of Erf 2074. Two small structures are visible at the start of this access road.

1960: A lot of vegetation clearing / habitat modification had occurred in the north-western section of Erf 2074. The neighbouring property west of Erf 2074 was also highly modified by this time. A new tree row is also visible on the north-western boundary of Erf 2074. The access road from 1938 had been altered, so that two roads split soon after entering the property; one still extended to the existing building, and another road extended further south to a patch of cleared vegetation along the western boundary of Erf 2074. For more detail on the section where the road ended in the 1960s, higher resolution imagery will need to be requested for the site from the Department of Agriculture, Land Reform, & Rural Development in Cape Town.

1974: More road networks crossed Erf 2074; however, the roads were limited to the northern half of the Erf. The field in the north-east was actively maintained for agricultural purposes. Apart from the modified section in the north-western section of Erf 2074, the majority of the vegetation was undisturbed, and did not seem to represent thicket / forest. However, in order to verify this observation of a lack of thicket and forest, higher resolution imagery will need to be requested for the site.

1990: The previously well-maintained north-western section of Erf 2074 was not being maintained by 1990, with invasive and secondary vegetation visible growing here in an

adventive manner. The woody trees likely spread from the previously neat tree rows that were planted on the site and surrounding erven. The residential development east of Erf 2074 had started.

2004: Many trees in the north of the property have been cleared, including the older planted tree row (windbreak) along the north-western boundary. Invasive trees were present in the middle of the site. The southern portion of the property appears to be fynbos. All roads across the south of the site linking the neighbouring properties have been revegetated. Vegetation clearing was visible west of Erf 2074. This clearing was mainly for new roads and residential developments. The residential development east of Erf 2074 was already well established in 2004.

2010: A densification of woody vegetation occurred along the access road in the northeast of the site and around the houses. The agricultural area in the north-west had been cleared and was again being actively maintained. Woody vegetation surrounded the field by 2010. Overall, tree density in the middle of the site increased. The fynbos in the southern half of Erf 2074 seems to be split into two parts: a more open section with exposed sandstone transitioning abruptly into an older, denser section near the valley in the southern section of the site. The housing developments on both western and eastern neighbouring properties were well established.

2013: The agricultural field in the north-east had been converted to an Olive tree (*Olea europaea europaea*) orchard and was still surrounded by dense vegetation/trees. Vegetation densification was also occurring along the access road and around the buildings on site. Many of the trees in the middle of the property had been cleared. A dirt road was visible along the entire eastern boundary of Erf 2074.

2016: Invasive woody vegetation returned to previously invaded areas relatively rapidly (within 3 years), notably around the access road, agricultural land, and houses in the north. The northern and middle sections of Erf 2074 are full of adventive vegetation, which has essentially led to the modification and transformation of vegetation there. The southern half of the site is still fynbos and seems to be relatively uninvaded. A new road was made off from the eastern boundary road, leading to a small clearing and new structure that had been constructed before the rocky steep area in the south-eastern section of the site.

2021: Increased vegetation cover across the whole site, with the sandstone outcrops in the southern half also obscured by the increased growth. The only roads are the access roads to the houses, the eastern boundary clearing/road, and the road to the structure on the southern boundary. No progress has occurred with the development/structure in the south of the property, with no change in size or shape of the structure since 2016. This is also the current state of the vegetation and land cover of Erf 2074.

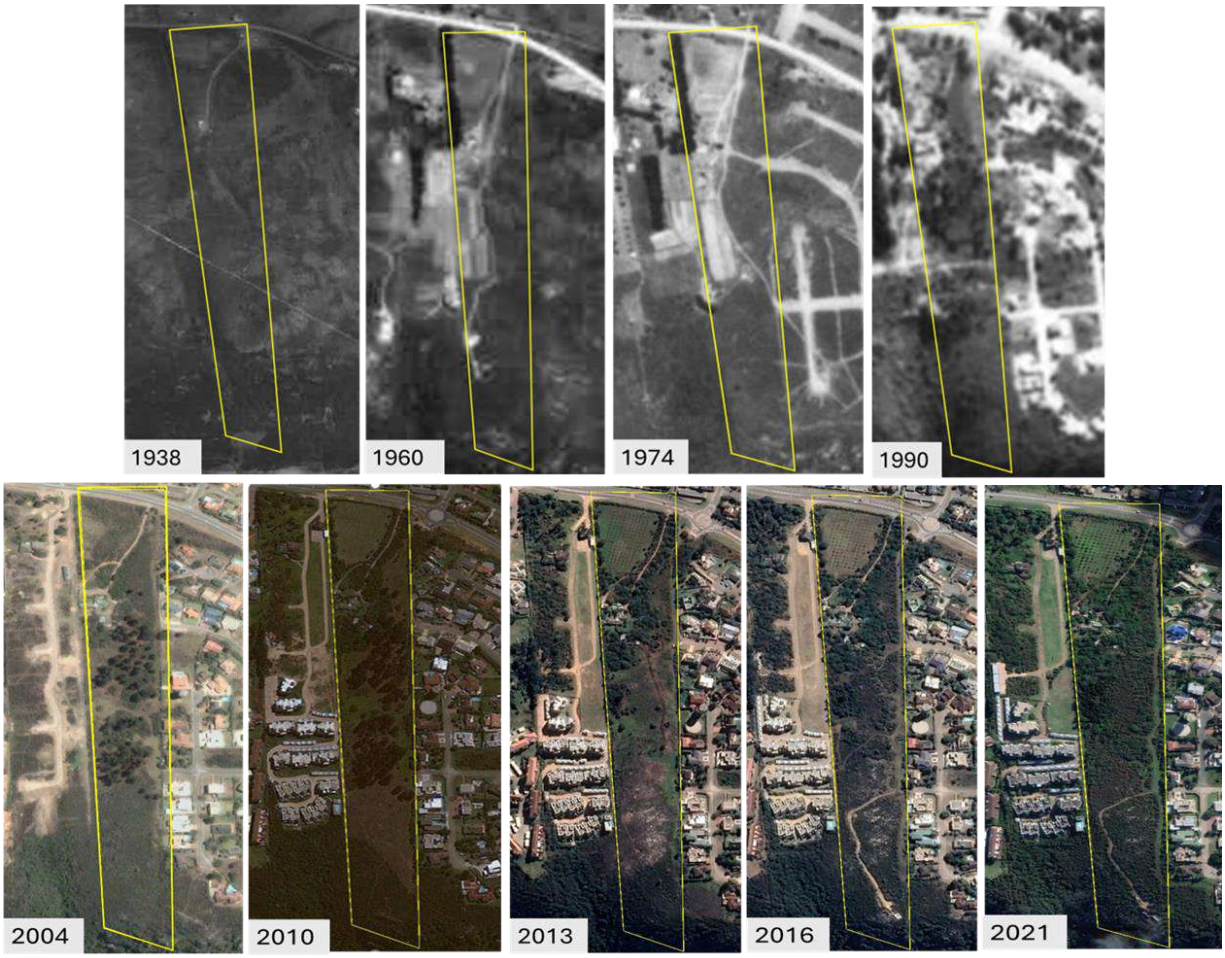

Figure 9: A series of historical imagery sourced from the CD: NGI geospatial portal (top two rows) and Google Earth (bottom two rows).

4.2 Plant Species

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

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

Several SCC have the potential to occur on the site and include the following:

- *Acmadenia alternifolia*
- *Acrolophia lunata*
- *Erica glandulosa fourcadei*
- *Erica glumiflora*
- *Felicia westae*
- *Leucospermum glabrum*
- *Mimetes pauciflorus*
- *Muraltia knysnaensis*
- *Osteospermum pterigoideum*
- *Pterygodium cleistogamum*
- *Pterygodium newdigiteae*
- Sensitive species 131

4.2.2 Additional SCC that have been observed nearby on iNaturalist

- *Bartholina etheliae*
- *Brunsvigia josephinae*
- *Erica onusta*
- *Ficinia fastigiata*
- *Freesia leichtlinii*
- *Glia decidua*
- *Gnidia chrusophylla*
- *Hyobanche robusta*
- *Lampranthus pauciflorus*
- *Moraea australis*
- *Ocotea bullata*
- *Oxalis pendulifolia*
- *Protea obtusifolia*
- *Psoralea venberkelae*
- *Ruschia duthiae*
- *Selago burchellii*
- *Selago villicaulis*
- Sensitive species (unknown number #01)
- Sensitive species (unknown number #02)
- Sensitive species 1032
- Sensitive species 419
- Sensitive species 500
- Sensitive species 800

5. RESULTS: FIELD ASSESSMENT

5.1 Refined Vegetation Map & Species Observed

The current state of the vegetation on Erf 2074 is somewhat complex, with some sections being heavily invaded, while other sections are near pristine fynbos (Fig. 10 & 11). Historically it seems that the entire site was likely an open-canopy vegetation type – which is consistent with the South Outeniqua Sandstone Fynbos that is mapped here. The north-western section of the site has been in a transformed state for decades, and does not represent sensitive vegetation, nor are any SCCs likely to be found in highly invaded areas, like the mapped "Dwellings & non-natural gardens" and "Invasion – mainly *Acacia melanoxylon*" (Fig. 11). Some of the senescent fynbos on the site contained thicket elements and was also somewhat invaded by wattles (*Acacia cyclops*, *A. mearnsii*, *A. melanoxylon*, *A. saligna*), pines (*Pinus radiata*), cotoneaster (*Cotoneaster glaucophyllus*), and purpletop vervains (*Verbena bonariensis*).

Figure 10: Images of the vegetation / ecosystems observed on the site.

Three species of protected trees were found on the site, and it is very likely that all three species have been planted on Erf 2074 by humans in the past (Figs. 11 & 12). The protected trees are:

- *Afrocarpus falcatus* (The Outeniqua yellowwood tree; protected tree no. 16)
- *Podocarpus latifolius* (The real yellowwood tree; protected tree no. 18)
- *Sideroxylon inerme inerme* (Milkwood tree ; protected tree no. 579)

None of the protected trees are also on the SANBI National Red List, i.e., they are all least concern (LC). One possible SCC was observed on the steep rocky outcrops along the south of the site, extending into the valley, namely the endangered (EN) *Lampranthus* cf. *pauciflorus* (Fig. 12). Two, likely planted, *Protea* bushes were found on the site, namely the king protea (*Protea cynaroides*) and a possible hybrid / cultivar of the grey-leaf protea (*P*. cf. *laurifolia*). The location of all of these plants are illustrated in Fig. 11, while images of them are in Fig. 12. Numerous invasive plant species were also observed on the site, and these are listed in the species list on Appendix 12.1. The different NEMBA categories of invasive plant species are summarised in Box 2

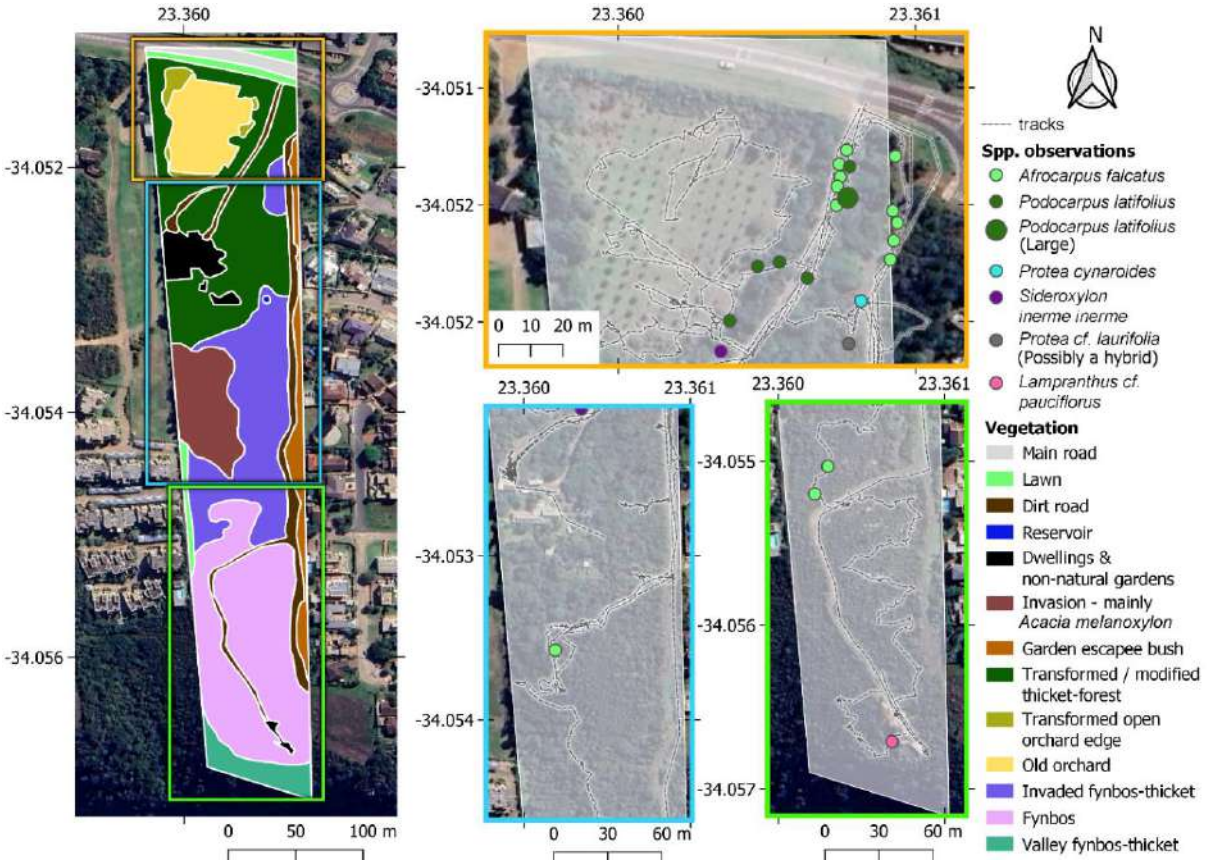

Figure 11: A revised vegetation map for Erf 2074, with the track walked and the protected trees, SCC, and planted proteas observed indicated as dots.

Figure 12: An image illustrating the three protected trees found on the site, the King protea (P. cynaroides), a grey-leaf protea (P. cf. laurifolia, likely planted), Garden Route keurboom (*Virgilia divaricata*), and possible SCC *Lampranthus* cf. *pauciflorus* on the site. The photo of *A. falcatus* was not taken on the site.

BOX 2: NEMBA categories for listed invasive alien plants.

Category 1a

Species which must be combatted or eradicated.

- Immediate steps must be taken to eradicate and combat or eradicate.
- Authorised officials must be permitted to enter properties to monitor, assist with or implement the combatting or eradication.
- If an Invasive Species Management Programme has been developed, a person must combat or eradicate the listed invasive species in accordance with such programme.

Category 1b

Species which must be controlled.

- Property owners and organs of state must control the listed invasive species within their properties.
- If an Invasive Species Management Programme has been developed, a person must control the listed invasive species in accordance with such programme.
- Authorised officials must be permitted to enter properties to monitor, assist with or implement the control of listed species.
- Any Category 2 listed species (where permits are applicable) which fall outside of containment and control, revert to Category 1b and must be controlled.
- Any Category 3 listed species which occur within a Protected Area or Riparian (wetland) revert to Category 1b and must be controlled.
- The Minister may require any person to develop a Category 1b Control Plan for one or more Category 1b species occurring on a property.

Category 2

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

- A permit is required to carry out any restricted activity.
- No person may carry out a restricted activity in respect of a Category 2 listed invasive species without a permit.
- A person in control of a Category 2 listed species must take all necessary measures to ensure that specimens of the species do not spread outside of the land or area, such as an aviary) specified in the permit.

Category 3

Category 3 listed invasive species are subject to certain exemptions in terms of section 70(1)(a) of the NEMBA Act, which applies to the listing of alien invasive species.

- Any category 3 listed plant species that occurs in riparian areas must be considered as category 1b and the appropriate control measures instituted.

5.2 Additional SCC That May be Found

All SCC that may be present on the site have been identified using the screening tool report for the site, iNaturalist nearby observations, and the POSA database (Table 2).

Table 2: All plant SCC and protected species flagged for the site and nearby surroundings, and their probability of occurrence on the site.

Species	Common name	Family	Growth form	Source	Status	Probability of occurrence
Afrocarpus falcatus	Outeniqua yellowwood	Podocarpaceae	Tree	Specialist inclusion	Protected tree no. 16	**Confirmed** This species was on the site. Most trees were likely planted.
Podocarpus latifolius	Broad-leaved yellowwood	Podocarpaceae	Tree	Specialist inclusion	Protected tree no. 18	**Confirmed** This species was on the site. Most trees were likely planted.
Sideroxylon inerme inerme	Milkwood tree	Sapotaceae	Tree	Specialist inclusion	Protected tree no. 579	**Confirmed** This species was on the site. Most trees were likely planted.
Lampranthus pauciflorus	Beach brightfig	Aizoaceae	Succulent	iNaturalist	Endangered B1ab(ii,iii,iv, v)	**Likely confirmed** One of the *Lampranthus* species was provisionally identified as *L. pauciflorus* on the site.
Acmadenia alternifolia	Harkerville porcelainflower	Rutaceae	Dwarf shrub	DFFE Screening tool	Vulnerable B1ab(ii,iii,iv) +2ab(ii,iii,iv)"	**High** This species occurs in South Outeniqua Sandstone Fynbos and could likely be on the site.
Acrolophia lunata	Pale Cinderella Orchid	Orchidaceae	Geophyte	DFFE Screening tool	Endangered B1ab(ii,iii,v); D	**High** This species occurs in South Outeniqua Sandstone Fynbos and could likely be on the site.
Erica glandulosa subsp. fourcadei	Ridges glandular heath	Ericaceae	Shrub	DFFE Screening tool	Vulnerable B1ab(ii,iii,iv, v)	**High** This species occurs in South Outeniqua Sandstone Fynbos and could likely be on the site.
Erica glumiflora	Gloomy heath	Ericaceae	Shrub	DFFE Screening tool	Vulnerable B1ab(i,ii,iii,iv ,v)	**High** This species occurs in South Outeniqua Sandstone Fynbos and could likely be on the site.
Freesia leichtlinii	Dune kammetjie	Iridaceae	Geophyte	iNaturalist	Near Threatened B1ab(ii,iii,iv, v)	**High** This species is common in coastal sand and limestone fynbos, preferring rocky areas. Rocky outcrops were abundant on the site.
Gnidia chrysophylla	Gold capesaffron	Thymelaceae	Perennial	iNaturalist	Near Threatened B1ab(i,ii,iii,iv ,v)	**High** Found in coastal flats in fynbos. It is possible that this species could occur in the fynbos on Erf 2074
Muraltia knysnaensis	Garden Route purplegorse	Polygalaceae	Perennial	DFFE Screening tool	Endangered B1ab(ii,iii,iv, v)	**High** This species occurs in South Outeniqua Sandstone Fynbos and could likely be on the site.
Osteospermum pterigoideum	Boneseed daisies	Asteraceae	Shrub	DFFE Screening tool	Endangered B1ab(ii,iii,v) +2ab(ii,iii,v)	**High** This species occurs in South Outeniqua Sandstone Fynbos and could likely be on the site.
Oxalis pendulifolia	Hangleaf sorrel	Oxalidaceae	Herbaceous perennial	iNaturalist	Near Threatened B1ab(ii,iii,iv,	**High**

					v)+2ab(ii,iii,iv,v)	This species could be present in the fynbos sections of Erf 2074
Protea obtusifolia	Limestone Sugarbush	Proteaceae	Shrub	iNaturalist	Near Threatened A2c+3c+4c	**High** Limestone pavements and outcrops on coastal forelands, 0-200 m. This species could be present on the site.
Psoralea venberkelae	Nicky's Fountainbush	Fabaceae	Large shrub	iNaturalist	Vulnerable D2	**High** This species is restricted to a narrow strip of sandstone fynbos remaining above coastal cliffs. It could be present in the southern fynbos on Erf 2074.
Pterygodium cleistogamum	Blind bonnet	Orchidaceae	Geophyte	DFFE Screening tool	Vulnerable B1ab(ii,iii)	**High** This species occurs in South Outeniqua Sandstone Fynbos and could likely be on the site.
Bartholina etheliae	Club spider orchid	Orchidaceae	Geophytic ground orchid	iNaturalist	Global IUCN: Vulnerable D2; SANBI regional listing: LC	**Medium** Following the precautionary principle, it is conceivable that this species could occur in the fynbos in the southern half of the property.
Curtisia dentata	Assegai tree	Curtisiaceae	Tree	Specialist inclusion	Protected tree 570; Near Threatened A2d	**Medium** This species could be present in the forest / thicket vegetation on the site.
Erica onusta	Heath species	Ericaceae	Shrub	iNaturalist	Critically Endangered B1ab(iii,v)	**Medium** This species has a highly restricted range and is found between coastal fynbos and forest. Following the precautionary principle, it is conceivable that it may be on the site.
Hyobanche robusta	Garden Route Cat's Nails	Orobanchaceae	Root parasite	iNaturalist	Endangered B1ab(ii,iii,v)	**Medium** Found in deep coastal dune systems. Following the precautionary principle, it is conceivable that this species might be on the site.
Moraea australis	Southern glasstulp	Iridaceae	Geophytr	iNaturalist	Near Threatened B1b(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)	**Medium** Found in coastal dunes in fynbos. Following the precautionary principle, it is conceivable that this species might be on the site.
Ocotea bullata	Stinkwood	Lauraceae	Tree	DFFE Screening tool	Protected tree 118; Endangered A2bd	**Medium** It is conceivable that this tree species might be present in the thicket-forest sections of the site.
Pterygodium newdigiteae	Bonnet species	Orchidaceae	Geophyte	DFFE Screening tool	Critically Endangered (Possibly Extinct)	**Medium** Following the precautionary principle, this species could be present on the site.
Ruschia duthiae	Tentfigs	Aizoaceae	Succulent	iNaturalist	Vulnerable B1ab(ii,iii,iv,v)+2ab(ii,iii,iv,v)	**Medium** Gentle north-facing sandstone or shale slopes with grassy fynbos. Following the precautionary principle, it is conceivable that this species might be on the site.
Selago burchellii	Garden route bitterbush	Scrophulariaceae	Herbaceous perennial	DFFE Screening tool	Vulnerable B1ab(ii,iii,iv,v)	**Medium** Gentle north-facing sandstone or shale slopes with grassy fynbos. Following the precautionary principle, it

						is conceivable that this species might be on the site.
Selago villicaulis	Dune bitterbush	Scrophulariaceae	Herbaceous perennial	iNaturalist	Vulnerable B1ab(ii,iii,iv,v)	**Medium** This species is in coastal fynbos and thicket. Following the precautionary principle, it is conceivable that this species might be on the site.
Sensitive species (unknown number #01)	-	-	-	iNaturalist	Near Threatened B1ab(ii,iii,iv,v)	**Medium** Found in coastal & Afromontance forest. This species could be on the site.
Sensitive species (unknown number #02)	-	-	-	iNaturalist	Vulnerable A2cd	**Medium** Found in coastal & Afromontance forest. This species could be on the site.
Sensitive species 1032	-	-	-	iNaturalist	Vulnerable C2a(i)	**Medium** Found close to the shoreline. Following the precautionary principle, it is conceivable that this species might be on the site.
Sensitive species 131				DFFE Screening tool	Critically Endangered (Possibly Extinct)	**Medium** This species is found in South Outeniqua Sandstone Fynbos, but it is possibly extinct.
Sensitive species 419	-	-	-	iNaturalist	Vulnerable B1ab(iii,v)+2ab(iii,v)	**Medium** Found in coastal & Afromontance forest. This species could be on the site.
Sensitive species 500	-	-	-	DFFE Screening tool	Endangered C2a(i)	**Medium** Found in lowland sandy flats. Following the precautionary principle, it is conceivable that this species might be on the site.
Sensitive species 800	-	-	-	DFFE Screening tool	Vulnerable B1ab(iii)	**Medium** Following the precautionary principle, it is conceivable that this species might be on the site.
Felicia westae	River felicia	Asteraceae	Perennial	DFFE Screening tool	Endangered B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)	**Low** Found near streambanks near the coast
Sensitive species (unknown number #03)	Josephines Candelabra	Amaryllidaceae	Geophyte	iNaturalist	Vulnerable A2c; C2a(i)	**Low** This species is associated with renosterveld more than fynbos. The likelihood of its presence on Erf 2074 is relatively low.
Ficinia fastigiata	Vlei clubrush	Cyperaceae	Graminoid	iNaturalist	Vulnerable D2	**Very Low** Erf 2074 is far outside of the range for this species
Glia decidua	Swartland gli	Apiaceae	Perennial	iNaturalist	Near Threatened B1ab(i,ii,iii,iv,v)	**Very Low** Erf 2074 is far outside of the range for this species
Leucospermum glabrum	Outeniqua pincushion	Proteaceae	Shrub	DFFE Screening tool	Endangered B1ab(iii,v)c(iv)+2ab(iii,v)c(iv); C2a(i)	**Very Low** Usually found in the mountains
Mimetes pauciflorus	Treeflower pagoda	Proteaceae	Shrub	DFFE Screening tool	Vulnerable A2c+3c+4c	**Very Low** Usually found in the mountains

6. SITE SENSITIVITY VERIFICATION

6.1 Terrestrial Biodiversity

Table 3 summarises the reason for the sensitivity assigned to the site. The terrestrial biodiversity theme sensitivity is confirmed to be (Fig. 13):

- **Low** for the northern half of Erf 2074 (i.e., sections not classified as “fynbos” or “valley fynbos-thicket”), and
- **Very High** for the southern half (the sections classified as “fynbos” or “valley fynbos-thicket”).

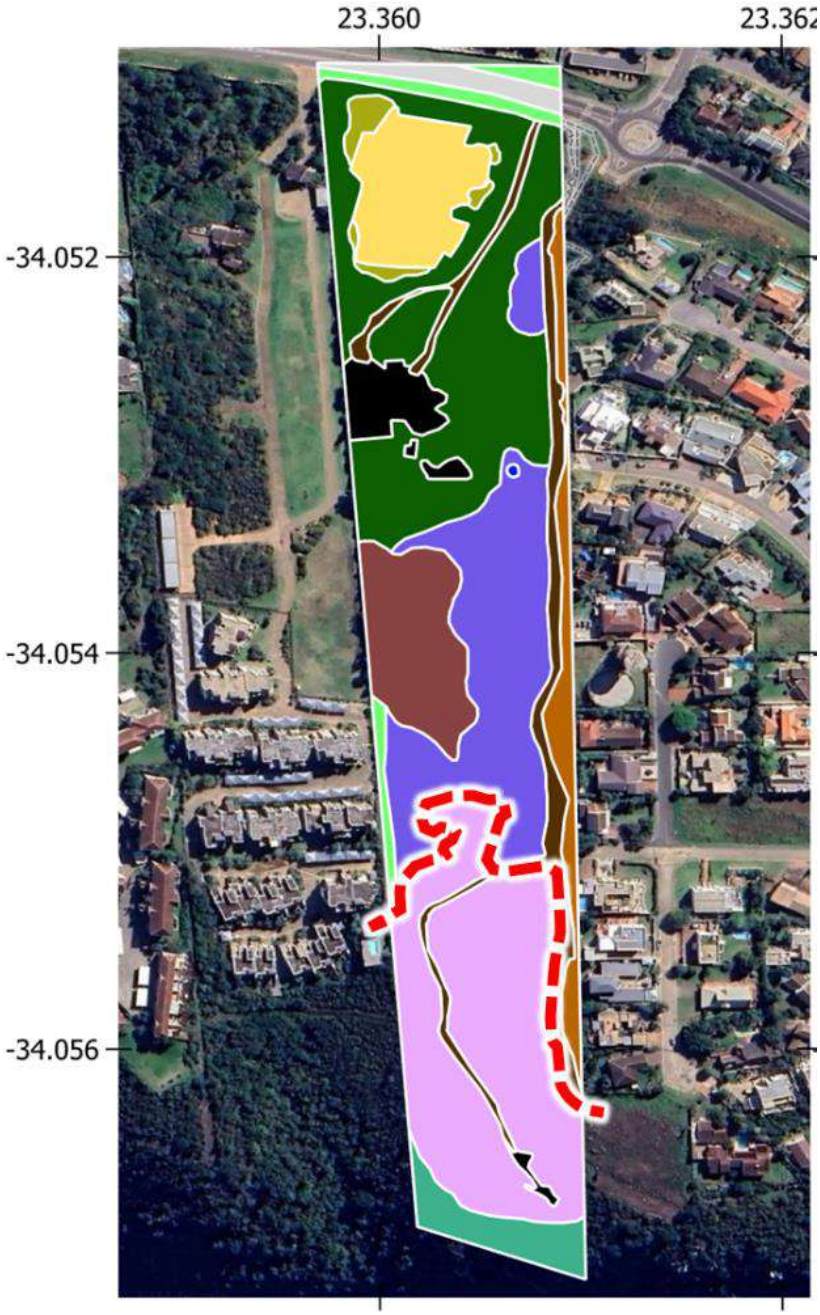

Figure 13: The site sensitivity is divided into a northern and southern half, which is divided based on the vegetation mapped on the site. The division of the site is illustrated here by the red dotted line.

Table 3: The original triggers for the terrestrial biodiversity theme sensitivity provided in the Screening tool report evaluated for the northern and southern halves of Erf 2074 respectively. Grey entries represent reasons that do not apply to the site, and green entries do apply to the site.

Sensitivity layer	Northern Half of Erf 2074	Southern half of Erf 2074
Critical Biodiversity Areas (CBAs)	None mapped	The southernmost section on fynbos and steep valley are past of a terrestrial CBA 1 area.
Ecological Support Areas (ESAs)	A thin section of ESA 1 & 2 is mapped along the western boundary of the site, but this is on a transformed lawn that borders an established, permanent, residential development.	A thin section of ESA 1 & 2 is mapped along the western boundary of the site, and this coincides with the valley below the residential development west of Erf 2074. The valley should remain protected and represents more sensitive habitat. The valley bottom has a confirmed drainage line in excellent condition identified and described in the compliance statement of the aquatic report.
SAN Parks Buffer Areas	The buffer is 10km wide, and the site is almost 10km away from the Garden Route National Park. The northern half of the site is highly modified and has limited connectivity to the surrounding landscape & habitats.	The buffer is 10km wide, and the site is almost 10km away from the Garden Route National Park. However, the southern half of the site is connected to the larger natural valley below, which is a functional ecological corridor.
Freshwater Ecosystem Catchments (terrestrial)	The only water resource here is the artificial reservoir. Erf 2074 does not have areas that directly add to FEPA. Refer to the aquatic compliance statement.	The Piesang River is south of Erf 2074 in the valley. Erf 2074 does not have areas that directly add to FEPA. Refer to the aquatic compliance statement.

6.2 Botanical Diversity

- No SCC were observed in the northern half of the site, nor are any highly likely to occur there, mainly due to the adventive nature of the vegetation growing there. The protected tree species observed here area all likely planted. The northern half (i.e., sections not classified as “fynbos” or “valley fynbos-thicket”) of the site has a **Low** botanical theme sensitivity, provided that the relevant forestry license is obtained to trim, remove, or alter these protected trees if necessary.
- One SCC is confirmed in the fynbos habitat on the site (i.e., *Lampranthus* cf. *pauciflorus*), and several other SCC have been evaluated to have a high likelihood of occurrence in the fynbos habitat. The southern half (i.e., sections classified as “fynbos” or “valley fynbos-thicket”) of the site is therefore confirmed to have a **High** plant species theme sensitivity.

7. SITE ECOLOGICAL IMPORTANCE

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

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

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

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

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

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

The criteria for defining RR, CI and FI are provided in the Species Environmental Assessment Guidelines of 2022. BI can be derived from a simple matrix of CI and FI, as illustrated in Table 4 below.

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

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

SEI can then be derived from a second matrix, as depicted in Table 5. SEI is specific to the proposed development and can therefore only be compared between alternative layouts for the same proposed development, but not between developments.

Table 5: The matrix that defines the site ecological importance (SEI) of a given habitat type, as identified from a desktop and field assessment.

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

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

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

The SEI map that was produced for Erf 2174 reflects the sensitivity of the site (Fig. 14). The mitigation associated with different SEI categories are in Table 6, and reasoning behind the map is provided in Table 7.

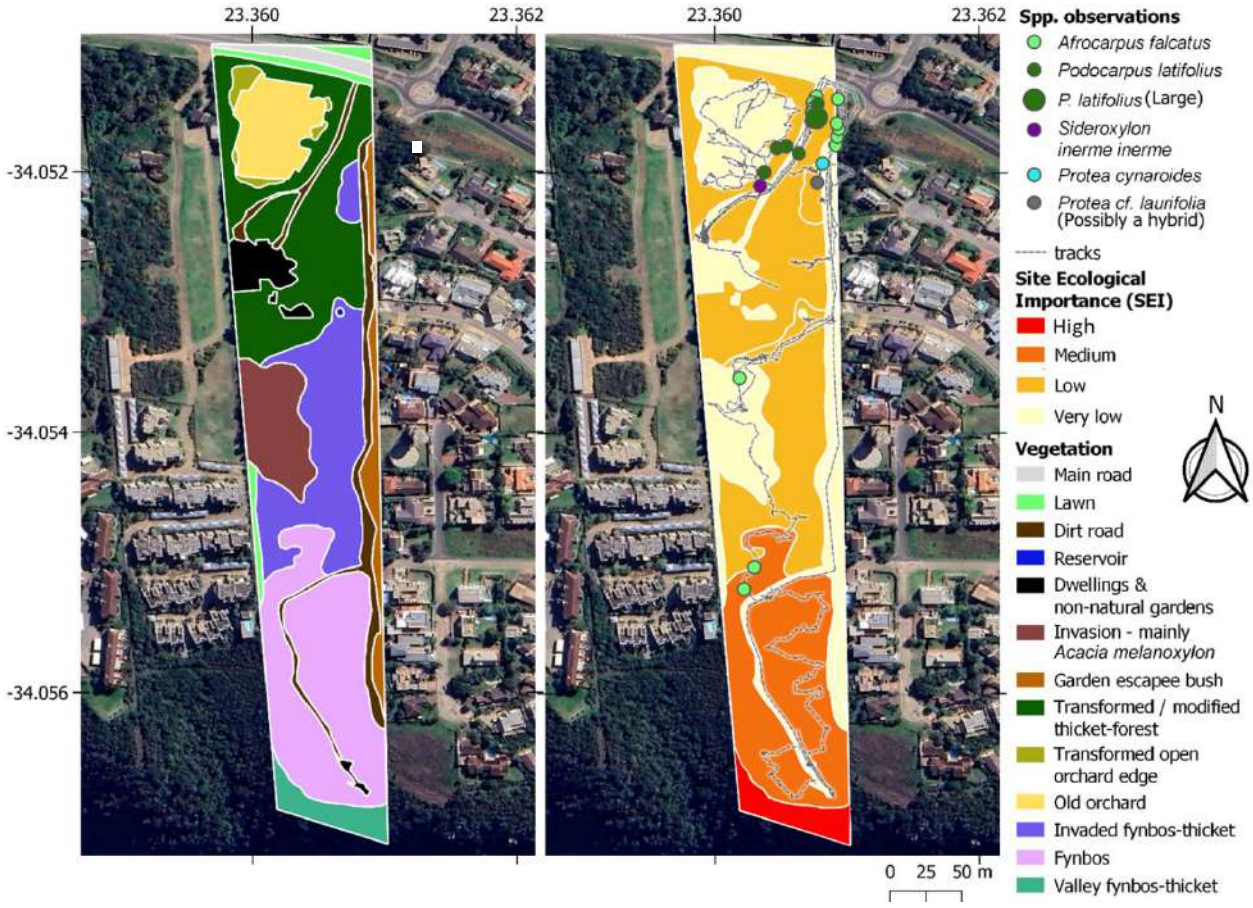

Figure 14: The Site Ecological Importance (SEI) shown alongside the vegetation mapped on Erf 2074.

Table 6: The vegetation observed and resulting SEI map for Erf 3877 in Mossel Bay.

Site Ecological Importance	Recommendation for activities based on the mitigation hierarchy
Very High	Avoidance mitigation – no destructive development activities should be considered. 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.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

Table 7: The different land cover classes for the site and their associated site ecological importance aspects and final category.

Land use / Land cover	Conservation Importance (CI)	Functional Integrity (FI)	Receptor Resilience (RR)	Site Ecological Importance (SEI)
Main Road	**Very low** No natural habitat remaining.	**Very low** A road is associated with several major negative ecological impacts.	**Very high** VAST class VI: Removed. The road will likely remain tarred and free of vegetation.	**Very Low** BI: Very low RR: Very high
Dirt Road	**Low** < 50% of receptor contains natural habitat, and no confirmed or highly likely SCC.	**Low** Several minor and major current negative ecological impacts.	**High** VAST class V & VI: Replaced – managed & some sections removed. If the dirt road is left to recover	**Very Low** BI: Low RR: High
Dwellings & gardens, Garden escapee bush, Lawns, & Reservoir	**Low** < 50% of receptor contains natural habitat, and no confirmed or highly likely SCC.	**Low** Several minor and major current negative ecological impacts.	**High** VAST class V: Replaced – managed. The exotic and invasive species here are likely going to remain on the site, and these areas will remain unnatural vegetation & habitats	**Very Low** BI: Low RR: High
Old orchard & Transformed open orchard edge	**Low** < 50% of receptor contains natural habitat, and no confirmed or highly likely SCC.	**Medium** Mostly minor current negative ecological impacts with some major impacts (e.g. established population of alien	**High** VAST class IV & V: Replaced with managed & adventive sections. The managed orchard sections will likely become similar to the helichrysum	**Very Low** BI: Low RR: High

		and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.	dominated unmanaged orchard edge if left alone.	
Invasion, mainly by Acacia melanoxylon	**Low** < 50% of receptor contains natural habitat with limited potential to support SCC.	**Medium** Mostly minor current negative ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.	**High** VAST class III: Transformed. The dense invasion will remain on the site unless significant long-term interventions are implemented.	**Very Low** BI: Low RR: High
Transformed / Modified forest-thicket	**Medium** > 50% of receptor contains natural habitat with potential to support SCC.	**Medium** Mostly minor current negative ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.	**High** VAST class III: Transformed. A lot of the trees present here seem to be planted or seem to have escaped from gardens. The vegetation here is transformed and will likely remain this way unless significant and ongoing active restoration & alien clearing takes place.	**Low** BI: Medium RR: High
Invaded fynbos-thicket	**Medium** > 50% of receptor contains natural habitat with potential to support SCC.	**Medium** Mostly minor current negative ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.	**High** VAST class II: Modified. The fynbos here is quite senescent and the vegetation is already modified and not in a fully natural state. With ongoing disturbance, generically speaking, the modified vegetation here is likely to remain, or become increasingly invaded.	**Low** BI: Medium RR: High
Fynbos	**Medium** > 50% of receptor contains natural habitat with potential to support SCC.	**High** Good habitat connectivity with potentially functional ecological corridors with limited past	**Medium** VAST class I & II: Residual, with some modified sections. While this vegetation is resilient, if more invasives, like pines &	**Medium** BI: Medium RR: Medium

		disturbance & minimal negative ecological impacts	wattles establish & densify here, some species will be lost from the landscape, perhaps permanently.	
Valley fynbos - thicket	**High** Sensitive protected forest habitat with the potential to support Red Listed plant species.	**High** Good habitat connectivity with potentially functional ecological corridors with limited past disturbance & minimal negative ecological impacts	**Medium** VAST class I & II: Residual, with some modified sections. While this vegetation is resilient, if more invasives, like pines & wattles establish & densify here, some species will be lost from the landscape, perhaps permanently.	**High** BI: High RR: Medium

8. PROJECT AREA OF INFLUENCE (PAOI)

The Project Area of Influence (PAOI) is defined according to ecosystem services and processes that are likely to be affected by the proposed development on Erf 2074. The PAOI is first calculated by the Environmental Assessment Practitioner (EAP), and then independently also worked out by the specialists that have been appointed. Specialist defined PAOIs are then consolidated by the EAP after these first two steps in the process of identifying its area. The PAOI is slightly larger than the site development plan (SDP), as the SDP only indicates the direct disturbance footprint of the proposed project while the PAOI considers the area where impacts on SCC and other important plant species are likely. The PAOIs presented is based on

1. The two development options presented earlier in this report,
2. as well as a third alternative option proposed by the author of this report (Fig. 15). The third alternative option is a densified version of alternative option two. The densification is assumed not to be too problematic, as the only difference between the first and second development options is the density of the housing proposed (with both option one and two having near identical PAOI's).

The total area of Erf 2074 is ca. 62457 sqm, or ca. 6.25 ha. PAOI calculations for the property are in Table 8 below. Under all of the scenarios, at least three quarters (75%) of the Erf will be transformed, means the area that will remain natural space is just over one hectare for all the development scenarios. None of the alternative options will have any effect on the High SEI area.

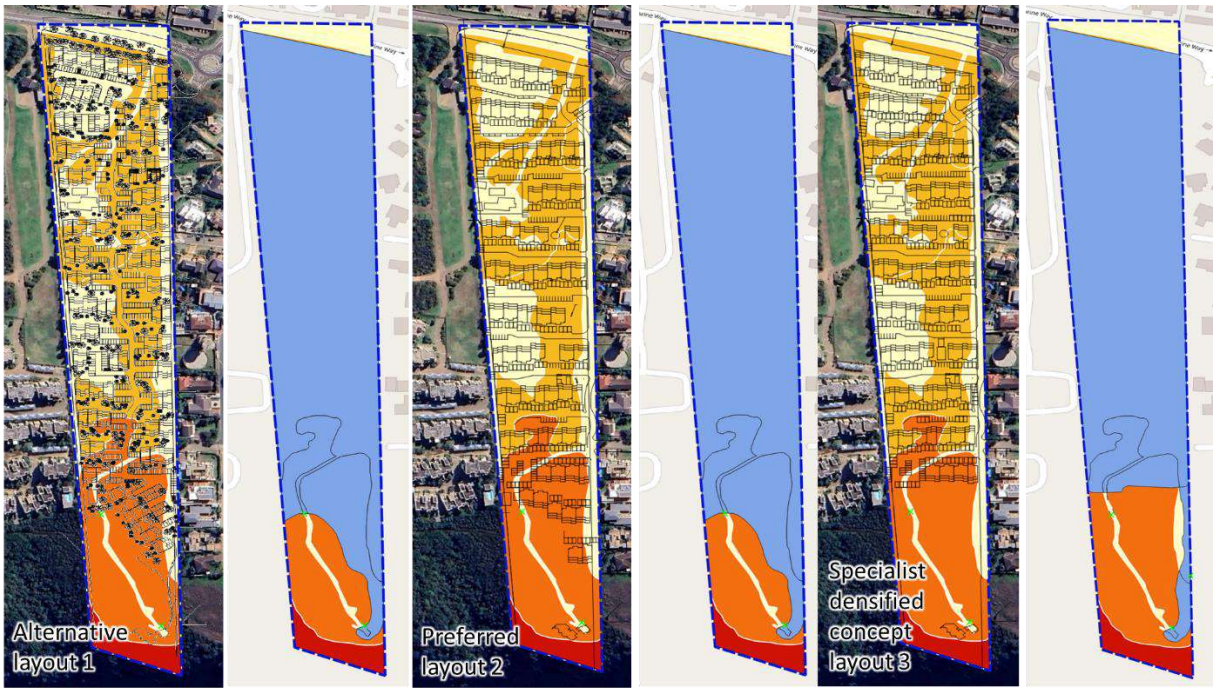

Figure 15: Three development options over the SEI map, with the PAOI for each illustrated in blue.

The total area for the Medium SEI area is ca. 14491 sqm. By consulting Table 8 below, it is clear that development options one and two will lead to the development of over half of the Medium SEI category area, while the third proposed alternative (as in Fig. 15) will lead to the development of ca. 30% of the Medium SEI area, which is less than options one and two. Also note that the small section of existing gravel road is excluded from the calculation of the PAOI, as this area is not indicated on the SDPs that were presented for the Erf, rather a new access road along the eastern boundary of the site is proposed.

Table 8: The PAOI calculation for Erf 2074. Areas excluded from the PAOI are also shown

Development scenarios	Very Low & Low SEI	Medium SEI	Total area
PAOI: Proposed housing development			
Alternative option 1 (sqm)	4 3114	7 896	**51010**
% of Property	69.03%	12.64%	**81.67%**
Preferred option 2 (sqm)	43 114	7 891	**51006**
% of Property	69.03%	12.63%	**81.66%**
Alternative option 3 (sqm)	42 522	4 287	**46809**
% of Property	68.08%	6.86%	**74.95**
Excluded from PAOI: Existing Gravel Road outside of the SDP			
Options 1 & 2 (sqm)	446	NA	**446**
% of Property	0.7%	NA	**0.7%**
Alternative option 3 (sqm)	510	NA	**510**
% of Property	0.8%	NA	**0.8%**
Excluded from PAOI: Tarred Road & Sidewalk North of the Property			
Alternative 3 & 4 (sqm)	2 323	NA	**2 323**
% of Property	3.72%	NA	**3.72%**

9. IMPACT ASSESSMENT

The impact assessment of Erf 2074 is required due to the High botanical sensitivity and Very High Terrestrial Biodiversity sensitivity of the fynbos section in the southern half of the Erf. The SEI for the fynbos area worked out as Medium. For any impact assessment, the mitigation hierarchy is important (Brownlie et al., 2023; Ekstrom et al., 2015). If mitigation measures are likely to be ineffective at minimising large impacts, then avoidance mitigation must be implemented (Fig. 16). If an impact cannot be prevented, then minimisation is preferred. The methods used for this impact assessment is provided in Appendix 12.4.

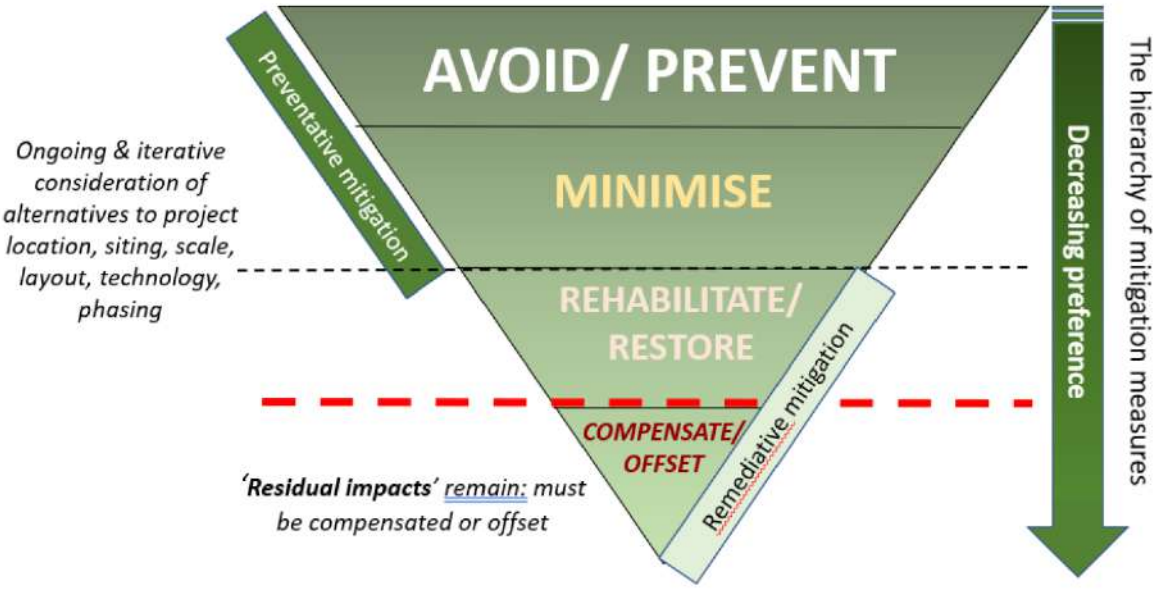

Figure 16: The mitigation hierarchy as presented in (Brownlie et al., 2023). Mitigation steps are illustrated in a hierarchy. The lower steps in the diagram should only be considered once the steps above have been duly considered.

9.1 Summary of Current Impacts

Erf 2074 already presents with several negative environmental impacts, which need to be assessed. Some of these impacts are:

1. The majority of the northern half of the Erf is very modified and transformed.
2. The fynbos section in the southern half of Erf 2074 is senescent and requires a fire. However, this is unlikely to occur given the close proximity of existing houses and developments.
3. The property is surrounded by housing developments to the east, west and north of the Erf.
4. Although the valley to the south still represents a functional corridor, there are developments & transformed landscapes that surround the drainage line. The majority of the valley is forest habitat, which means that it is not representative of a fynbos corridor.

9.2 Layout and Design Phase

This is an important part of any project and relates to the very first step in the mitigation hierarchy – consideration for impact avoidance. This phase includes steps such as site analysis, land-use planning, infrastructure & layout planning, impact assessments, stakeholder engagement, and the integration of feedback.

The third proposed alternative development presented in Fig. 15 of this report is an additional layout recommendation made by the specialist in order to reduce the overall footprint on the development. This is proposed since both alternative option one and two both have a very similar PAOI, but seemingly different development densities, therefore it is assumed that the density of the development can still be altered slightly in the layout and design phase.

In the provided SDPs, an access road to the existing built platform area in the south of the property is proposed along the eastern edge of the Erf. This proposal therefore seems to exclude the use of the existing dirt road running through the fynbos of the property (Fig 17 below).

Figure 17: An image of the dirt road in the fynbos of Erf 2074.

The dirt road could be rehabilitated if it will not be used, however this does not seem necessary, given that

a) The gravel road accounts for <1% of the Erf area, and
b) it has already been on the property for a long period of time (decades).

The gravel road and proposed development in the southern section of Erf 2074 has a negligible effect on landscape and fynbos fragmentation due to the already existing structures that exist. The existing gravel road may not be upgraded to a tarred road. If any improvement on that road is being considered, the owners may make use of permeable structures, such as

open pavers with grass growing in the open spaces (see Fig. 18 below). Furthermore. surrounding developments have also already removed most of the surrounding fynbos vegetation, leaving a relatively isolated fragment of fynbos on Erf 2074, which will make fire management difficult / not possible. For the above-mentioned reasons it is strongly recommended that the existing road be retained and used as opposed to development of a new road along the eastern boundary.

Figure 18: Examples of Open pavers and permeable road surfaces. The image on the left shows a minimal edge effect along the site of the road, where natural fynbos vegetation grows directly adjacent to the road.

9.3 Construction Phase

The construction phase of Erf 2074 will include several activities that relate to the specific themes assessed in this report. The construction phase is the most intense phase of the proposed development and will result in a permanent loss of habitat and vegetation on the site, including SCC and protected trees. The impacts presented in this section are shown from the most significant to least significant in terms of the Terrestrial Biodiversity and Plant Species Themes assessed. An Environmental Control Officer (ECO) needs to be appointed to oversee and ensure compliance with management plans and mitigation measures throughout the construction phase.

9.3.1 Construction Impact 1 – Permanent Loss of Biodiversity in South Outeniqua Sandstone Fynbos (LT)

Description: The construction of a housing complex on Erf 2074 will result in the permanent loss of habitats and diversity of species on Erf 2074, due to earthworks, excavation and cutting down of the majority of the vegetation on the site.

Mitigation:

1. Prior to construction: The disturbance footprint of proposed developments should be clearly defined and demarcated to prevent unnecessary damage to the surrounding environment.
    a. The proposed development must have a maximum disturbance envelope of 2m along the edges where it intersects fynbos vegetation
    b. Construction netting and fencing must be used to clearly indicate construction areas. Shade cloth used as fencing should be hammered into the ground using wooden pegs.

c. Clear signs for “no-go” areas for vehicles and personnel should be placed strategically on the site. No-go areas are anywhere outside of the direct area of influence of the construction phase.

d. A turning and parking area for construction and delivery vehicles may only take place in areas that are already cleared or part of the permanent disturbance footprint of the development plan

2. Prior to construction: Schedule vegetation clearance during the winter in order to minimize impact on plant life cycles & pollination.

3. During construction: Protection and re-use of topsoil.

a. The topsoil from the fynbos will be vital for the success of rehabilitation of fynbos vegetation following construction processes and must therefore be treated with care. Topsoil from elsewhere (northern half) 0f Erf 2074) may not be used in the rehabilitation of fynbos disturbance envelopes to avoid introducing alien and invasive species.

b. Topsoil excavated from fynbos vegetation on the site (excluding topsoil under dense stands of invasive plants) in new excavation areas must be stripped to a depth of ca. 30cm and kept in designated piles.

a. Topsoil piles must be suitably covered, labelled, and bunded (e.g., with sandbags). The topsoil piles must be clearly labelled so that it does not mix with subsoils excavated or any other construction material for the site. This will also prevent the material from washing away and contaminating the substrate of the site which likely still contains useful seeds and soil organisms.

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. On site storage is preferable.

Discussion of the Alternatives: Development options one and two are both moderate negative impacts before and after mitigation (Table 9). This is because both development options one and two have a similar PAOI, and therefore the extent of construction and habitat loss is very similar. It is only for development option three (which has the same number of housing units as option two, but a reduced PAOI) that the post mitigation impact can be reduced to a minor negative impact.

Table 9: Construction Impact 1 – Permanent Loss of Habitats & Biodiversity

CONSTRUCTION Impact no. 1	Alternative development option 1:		Preferred option 2:	
Mitigation	Without	With	Without	With
Duration	Permanent	Permanent	Permanent	Permanent
Extent	Limited	Limited	Limited	Limited
Intensity	Low	Very low	Low	Very low
Probability	Certain	Certain	Certain	Certain
SCORE	Moderate negative: -84	Moderate negative: -77	Moderate negative: -84	Moderate negative: -77
Confidence	High	High	High	High
Reversibility	Low	Low	Low	Low
Resource irreplaceability	Medium	Medium	Medium	Medium
	Alternative 3 proposed by specialist:		**No-go Alternative**	
Mitigation	Without	With	Without	
Duration	Permanent	Permanent	Immediate	
Extent	Limited	Limited	Very limited	
Intensity	Very low	Negligible	Negligible	
Probability	Certain	Certain	Rare	
SCORE	Moderate negative: -77	Minor negative: -70	Negligible negative: -6	
Confidence	High	High	High	
Reversibility	Low	Low	Moderate	
Resource irreplaceability	Medium	Medium	High	

9.3.2 Construction Impact 2 – Permanent Loss of Important Plant Populations

Description: A permanent loss of some SCC and important plant species will occur on Erf 2074 as a direct result of Earthworks and construction.

Mitigation:

1. Prior to construction: With the aid of a botanist, install protective barriers around protected tree stands (Yellowwood trees, and Milkwood trees) and other significant stands of SCC to prevent damage from construction activities (Fig. 19).
    a. Where protected trees need to be removed and trimmed, a forestry permit will need to be obtained before construction.

Figure 19: Images of a construction site where protected and indigenous trees were marked and protected on the site.

2. Prior to construction: A plant search and rescue for **geophytes and succulent plants only** must be conducted (with a botanist / ecologist on the site to provide guidance on best practice).
    a. Stands of plants could be removed carefully with an excavator, or using picks and shovels, to preserve as much as possible of the soil around the roots of the plants.
    b. Rescued plants must all be placed in suitable containers / bags
        i. These must then to be transported with care to a nursery that should preferably be set up on the site in an existing disturbed area.
        ii. Alternatively, arrangements with a suitable nursery / available receptor site should be made to keep and care for removed plants during the construction phase of the project.
    c. Any additional SCC and plants with a high survival likelihood that are observed during construction within a development footprint must be rescued (soil in-tact) and added to the rescued plants in the indigenous nursery.
    d. The rescued plants must be planted back with the aid of botanists and / or horticultural specialists within the
        i. 2m disturbance footprint around the permanent disturbance footprints.
        ii. In areas in the fynbos where alien clearing results in bare patches that could use some aid to enhance their recovery. This will promote the regeneration of natural fynbos abound the developments and reduce the possibility of negative edge effects on the site.
3. During construction: Materials used during construction must be sourced and transported responsibly to minimise the risk new invasive plants.
4. During construction: Staff, if suspected may be checked when they leave to ensure no plants have been poached from the natural surrounding environment. Staff should also be told that plants may not be collected outside of the search and rescue operation.
5. Post construction: Undertake revegetation of the disturbance envelope outside of the permanent disturbance footprint.

a. Start with the plants that have been rescued on the site

    i. Site preparation – remove all non-native weeds from the site of revegetation to reduce competition with native plant species.

    ii. Planting - Plant during the cooler, wetter months to reduce transplant shock and ensure moisture availability. This would ideally be during winter (June, July). Space plants according to their natural distribution & spacing, which will be visible in the surrounding remaining natural vegetation on the site. So not add any additional organic matter to the soil, as some fynbos species are sensitive to nutrient stress in a way most typical garden species are not.

    iii. Post planting care - Regularly water & monitor the newly planted fynbos, particularly during the establishment phase. Apply a thin layer of mulch to conserve moisture and suppress weeds. Continue removing any invasive species that may reappear.

b. If more plants are required for successful coverage of disturbed areas, augmentation with sourced plants can be done.

    i. Species selection – Choose a mix of pioneer species and slower-growing species to ensure quick coverage and long-term sustainability. Some species that could be considered include: *Helichrysum petiolare, H. odoratissimum, H, cymosum, Metalasia muricata, M. pungens, Osteospermum moniliferum, Searsia chirindensis, Senecio crenatus, Agathosma ovata, Chironia baccifera, Restio eleocharis, Passerina corymbosa*, etc. Base additional species selection first on important species listed for South Outeniqua Sandstone Fynbos (Appendix 12.2), and then only on availability from local nurseries.

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

Discussion of the Alternatives: The loss of specific plant populations from Erf 2074 is minor (Table 10). The only important plant species that will potentially be directly affected by the development are least concern (LC) protected tree species (Milkwood & two species of yellowwood trees). No SCC will be affected by the proposed development. All development scenarios have an impact rating of minor negative pre-, and post-mitigation. The no-go alternative had a negligible negative impact, as no construction will directly impact any plant populations.

Table 10: Construction Impact 2 – Permanent Loss of Important Plant Populations

CONSTRUCTION Impact no. 2	Alternative development option 1:		Preferred option 2:	
Mitigation	Without	With	Without	With
Duration	Permanent	Permanent	Permanent	Permanent
Extent	Limited	Very limited	Limited	Very limited
Intensity	Low	Very low	Low	Very low
Probability	Almost certain	Likely	Almost certain	Likely
SCORE	Minor negative: -72	Minor negative: -50	Minor negative: -72	Minor negative: -50
Confidence	High	High	High	High
Reversibility	Low	Low	Low	Low
Resource irreplaceability	Medium	Medium	Medium	Medium
	Alternative 3 proposed by specialist:		**No-go Alternative**	
Mitigation	Without	With	Without	
Duration	Permanent	Permanent	Immediate	
Extent	Limited	Very limited	Very limited	
Intensity	Very low	Negligible	Low	
Probability	Almost certain	Likely	Certain	
SCORE	Minor negative: -66	Minor negative: -45	Negligible negative: -35	
Confidence	High	High	High	
Reversibility	Low	Low	Low	
Resource irreplaceability	Medium	Medium	Medium	

9.4 Conclusion of the Construction Phase

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

1. All of the mitigation measures proposed above are only meaningful if construction is properly concluded.
2. Construction sites must be cleared of all waste material, rubble, and debris associated with the construction phase at regular intervals during, and at the conclusion of the construction phase.
3. Revegetation of bare soil following construction is an essential part of concluding the construction phase of the project. Some recommendations for revegetation are included in the second construction phase impact above.

4. Drainage structures must be checked to ensure that there are no blockages or pollution that is blocking the free flow of water over the site; these checks will prevent erosion during and after the construction phase that could have potentially far-reaching implications beyond the direct area of influence for the proposed development.

9.5 Operational Phase

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

9.5.1 Operational Phase Impact 1 – Negative Edge Effects on Habitats and Plant Species

Description: The fynbos remaining after construction in the southern half of the site will be negatively affected by landscaping and gardens in the residential development due to negative edge effects that result from these planted areas. Landscaping services often discard garden waste and slash into open spaces and could also result in cutting natural vegetation back further than defined in the PAOI. This may be the result of inappropriate control (cutting / herbicide use) in natural vegetation resulting from poor planning for alien clearing. Hard surfaces on the development will also affect rainwater runoff into the fynbos area, causing changes to microclimates and niches.

Mitigation:

1. The rehabilitation of the 2m disturbance footprint with topsoil and plants rescued on the site ,must occur as soon as possible after the conclusion of construction.
2. An alien management and control plan needs to be in place for the remaining open space on Erf 2074. This is a requirement by law.
    a. The infographic below (Fig. 20) is a conceptual framework that was made by the Centre for Invasion Biology (Van Wilgen et al., 2014) which may assist in the level of management required in different areas across Portion 76 of 216.

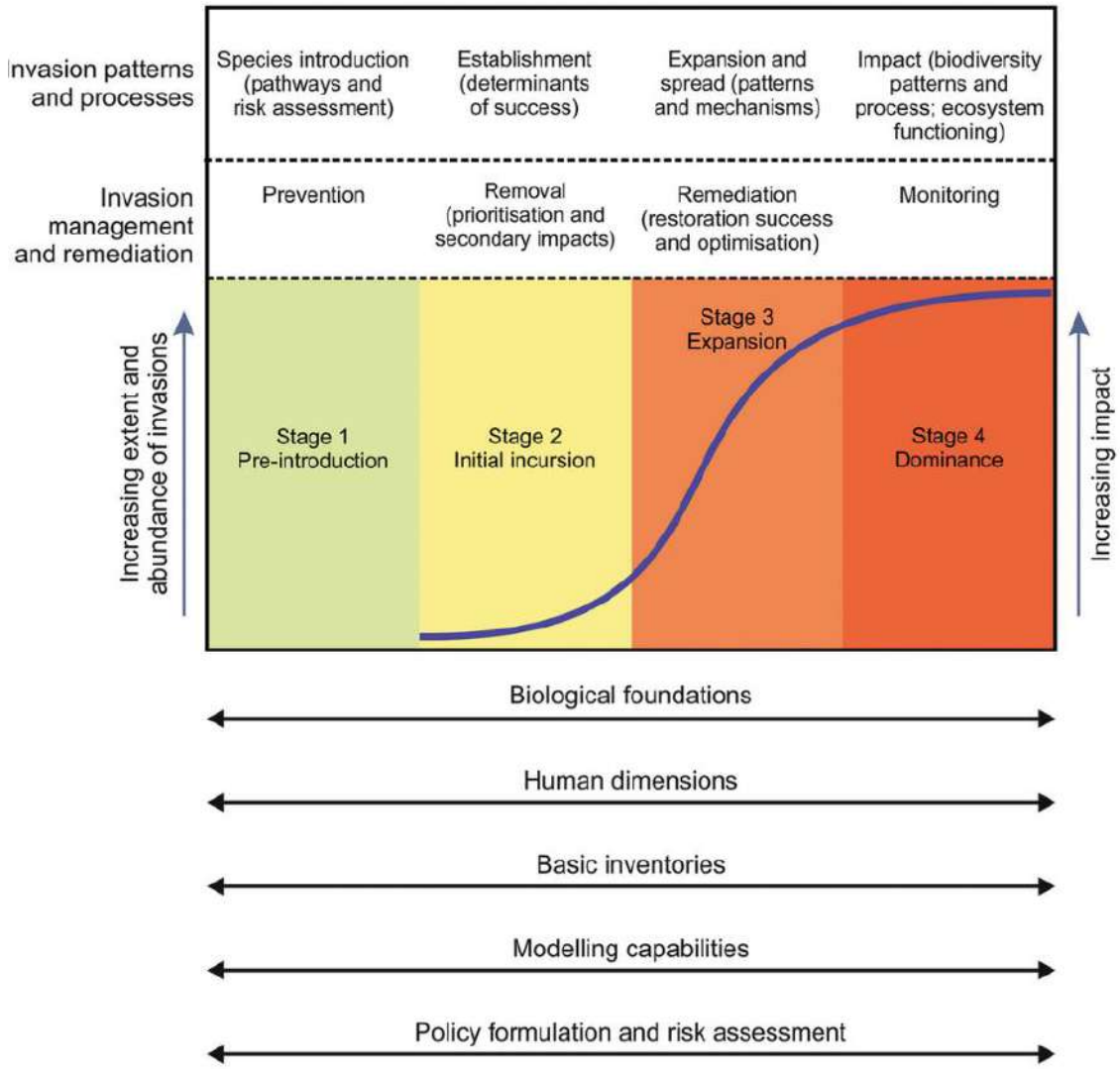

Figure 20: An infographic from the Centre for Invasion Biology showing how invasive alien plants should be managed depending on the degree of invasion severity (Van Wilgen et al., 2014).

3. If gardens need to be considered, they can be designed to be water wise (avoid erosion) and friendly to wildlife and the greater natural habitat. Fynbos Life in Cape Town is an inspirational indigenous landscaping project with very useful tips allowing a garden to add biodiversity value, instead of detract value.
    a. Gardens & the built environment should be planned with rainfall, slope/aspect, wind direction, & microclimates in mind. Gardens could be planned to capture rainfall & slow water loss. Create a grey-water wetland if there is a need for water filtration & absorption of extra nutrients.
    b. No garden waste may be dumped in any remaining natural area and must be disposed of in a responsible manner.
    c. Make sure not to plant NEMBA listed invasive plants (e.g., kikuyu grass, *Cenchrus clandestinus*) in your garden. Better grasses to plant in areas that are erosion prone or in lawns include kweek (*Cynodon dactylon*), *Eragrostis capensis*, Kangaroo grass (*Themeda triandra*), Rats tail grass (*Sporobolus africanus*), and buffalo grass (*Stenotaphrum secundatum*)

d. Select locally indigenous plants for gardens (see Appendices 12.1 and 12.2), making use of as many of the rescued plant species as possible. Avoid plants that are hybrids and cultivars.

e. Plant during the rainy season (early winter May/June) and add a 10cm thick layer of wood chip to keep in moisture.

f. Reduce or replace lawns with water-wise groundcovers or enlarging shrub beds.

g. Add local edible and aromatic plants to avoid water & nutrient intensive vegetable gardens.

h. Ensure soft landscaping is used as opposed to hard landscaping (Box 3).

BOX 3: Landscaping

Soft landscaping

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

Hard landscaping

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

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

Discussion of the Alternatives: The impact Table 11 shows that edge effects resulting from landscaping choices could potentially have a permanent moderate negative impact on remaining natural spaces on Erf 2074. The application of the mitigation measures proposed will result in the reduction of the impact to minor negative for all three development scenarios proposed.

Table 11: Operational Impact 1 – Negative Edge Effects on Habitats and Plant Species

OPERATIONAL Impact no. 1	Alternative development option 1:		Preferred option 2:	
Mitigation	Without	With	Without	With
Duration	Permanent	Permanent	Permanent	Permanent
Extent	Limited	Very limited	Limited	Very limited
Intensity	High	Moderate	High	Moderate
Probability	Almost certain	Almost certain	Almost certain	Almost certain
SCORE	Moderate negative: -84	Minor negative: -72	Moderate negative: -84	Minor negative: -72
Confidence	High	High	High	High
Reversibility	Low	Low	Moderate	Moderate
Resource irreplaceability	Medium	Medium	Medium	Medium
	Alternative 3 proposed by specialist:		**No-go Alternative**	
Mitigation	Without	With	Without	
Duration	Permanent	Permanent	Immediate	
Extent	Limited	Very limited	Very limited	
Intensity	Moderate	Low	Low	
Probability	Almost certain	Almost certain	Probably	
SCORE	Moderate negative: -78	Minor negative: -66	Negligible negative: -20	
Confidence	High	High	High	
Reversibility	Low	Low	Low	
Resource irreplaceability	Medium	Medium	Medium	

9.5.2 Operational Phase Impact 2 – Effect of Management on Habitats & Plant Species

Description: As mentioned earlier in this report, fire management on Erf 20674 will be problematic to near-impossible. However, with no management of the South Outeniqua Sandstone Fynbos in the south, it will start to present a fire risk, and will result in long-term biodiversity loss.

Furthermore, it is uncertain at the time of completion of this report if the plan will include a) just fencing the southern boundary of the proposed development (this seems to be the case given the provided SDPs) and / or b) fencing the entire property boundary along the south. Should a fence be planned along the southern edge of Erf 2074 (as opposed to just along the southern boundary of the proposed development) this fence (and potential associated fire breaks – consult the Southern Cape Fire Protection Association) present an additional management impact which is currently not captured within the PAOI presented in this report.

Mitigation:

1. Due to the fire risk inherent for any fire driven ecosystem (fynbos), it is important that this application be reviewed by the Southern Cape Fire Protection Association (SCFPA) so they can provide comments on the development layout, and management recommendations from a fire risk reduction perspective.
2. The current gravel road on Erf 2074 may be utilised as a fire access road in the event of a wildfire. Fire breaks may not be necessary along fence-lines that are not directly adjacent to dwellings (Fig. 21). Consult with the SCFPA for recommendations relating to the necessity of fire breaks.

Figure 21: An example of a palisade fence that would allow for the movement of small animals and seed dispersal with no associated fire break along the fenceline.

3. Alternatives to a fire management plan that is practical for Erf 2074, and that hopefully will result in fynbos retaining its diversity & resilience:
    a. Mechanical clearing
        i. Selectively thin areas where the veld is old, or where invasive species are becoming more dominant.
        ii. The thinning and cutting of vegetation will mimic an aspect of the effect of fire.
    b. Utilisation of biomass cleared (excluding that of cleared invasive or alien plants):
        i. Shred or chip cut fynbos. This can be used for paths, or as mulch in areas where aliens have been cleared. Distribute chipped material evenly and thinly to avoid fire hazards.
        ii. Use small-scale biochar kilns to convert biomass into biochar (these kilns can easily be made at a low cost should these not be available ready-made).

1. The ash and carbon can be spread back over the fynbos of Erf 2074 to improve soil health, and hopefully mimic the effect of fire.
2. Biochar production can be done with minimal smoke and emissions.
3. The burning of biomass does not always need to be complete, as fynbos fires are often cooler, and therefore not all biomass should be converted to ash.
4. Examples of kilns are in Fig. 22 below. These kilns can easily be made from simple plans at a minimal cost.

Figure 22: Two examples of biochar kilns that can be used. These kilns can be set up in a disturbed area away from flammable fynbos on Erf 2074.

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

Discussion of the Alternatives: The residual impact here is minor negative for all development scenarios, however the impact is slightly less for Alternative option number three (Table 12).

Table 12: Operational Impact 2 – Effect of Management on Habitats & Plant Species

OPERATIONAL Impact no. 2	Alternative development option 1:		Preferred option 2:	
Mitigation	Without	With	Without	With
Duration	Permanent	Permanent	Permanent	Permanent
Extent	Limited	Very limited	Limited	Very limited
Intensity	High	Moderate	High	Moderate
Probability	Almost certain	Almost certain	Almost certain	Almost certain
SCORE	Moderate negative: -84	Minor negative: -72	Moderate negative: -84	Minor negative: -72
Confidence	High	High	High	High
Reversibility	Low	Low	Moderate	Moderate
Resource irreplaceability	Medium	Medium	Medium	Medium
	Alternative 3 proposed by specialist:		**No-go Alternative**	
Mitigation	Without	With	Without	
Duration	Permanent	Permanent	Immediate	
Extent	Limited	Very limited	Very limited	
Intensity	Moderate	Low	Low	
Probability	Almost certain	Almost certain	Probably	
SCORE	Moderate negative: -78	Minor negative: -66	Negligible negative: -20	
Confidence	High	High	High	
Reversibility	Low	Low	Low	
Resource irreplaceability	Medium	Medium	Medium	

9.6 Cumulative Impacts

The surrounding environment around Erf 2074 is already very developed, and cumulative impacts are already significant in this area. Multiple housing developments have led to an incremental loss and degradation of habitats, which could over time lead to a negative shift in the conservation status of South Outeniqua Sandstone Fynbos[1].

Habitat degradation also leads to a loss of biodiversity in the long term. Where some species are lost from the landscape, while other populations of plants could face reduced genetic diversity, making them more susceptible to pests etc. Edge effects with minimal control means

[1] While this is not a result of the current development, it is a real possibility for the wider vegetation type. As invasive alien plants and developments increase in areas that fall outside of formally protected areas the possibility of a changed status increases. Currently this vegetation type is well conserved, with ca. 50% conserved (the true conserved percentage can be obtained from SANBI), however the remaining 50% is vulnerable to transformation and habitat loss through development and the spread and establishment of invasive species. It is also noteworthy that past assessments of this vegetation type places it in the Vulnerable category, as stated, for example, in Mucina & Rutherford (2006).

that more areas become invaded, and permanently altered so that pollination networks and edaphic modification become permanent features of the landscape. Cumulative impacts can push ecosystems beyond ecological thresholds, leading to sudden and irreversible changes in plant communities. These sudden irreversible changes can be very difficult to predict, especially when an assessment is localised, being focussed on a single development alone.

10. CONCLUSION

Erf 2074 contains a complex mixture of vegetation and ecosystems, ranging from highly modified and transformed, to near natural fynbos. The fynbos on the Erf is only in the southern section of Erf 2074, and is South Outeniqua Sandstone Fynbos, which is least threatened (LT). Despite the low threat status, the fynbos vegetation has the potential to support SCC, and one SCC (*Lampranthus pauciflorus*) was observed. The SCC was also observed near an established invasive pine tree, which means it is not safe from disturbance and impacts, even under the status quo (current scenario).

The impact assessment assessed the construction and operational phases, assuming that the decommissioning phase will not take place as the development here will result in the erection of permanent structures. Three alternative development scenarios were assessed. The first development option represents the Alternative option, and the second represents the Preferred option. There is a negligible difference between the PAOIs of the first two development options, however the second option is associated with fewer housing units than the first. This must mean that the second development option is less densified compared to the first.

It is according to this reasoning than the specialist recommended the third development option, which is essentially a slightly more densified version of development option number two. No housing units or parking spaces are sacrificed in this third development option compared to option 2. The only difference is that Alternative option three represents a slightly more densified development (which the architects and engineers can modify in order to avoid any complications a botanist would be unaware of). The increased density of the development should not be problematic due to the higher density development already proposed in the first preferred development scenario.

The impact assessment presented in this report is most in favour of the third development scenario, which will lead to a reduced transformation of Medium SEI areas. For three of the four impacts presented in this report, post mitigation impacts (residual impacts) can be reduced to minimal negative impacts for all three proposed development scenarios. However, the first impact relating to habitat and ecosystem loss can only have a minor residual impact under alternative option number three.

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12. APPENDIX

12.1 Provisional Plant Species List

A species accumulation curve for all the species recorded on the site during the assessment are presented in Fig. 23. All species that were observed during the site visit are in Table 13. The site assessment species list is not exhaustive.

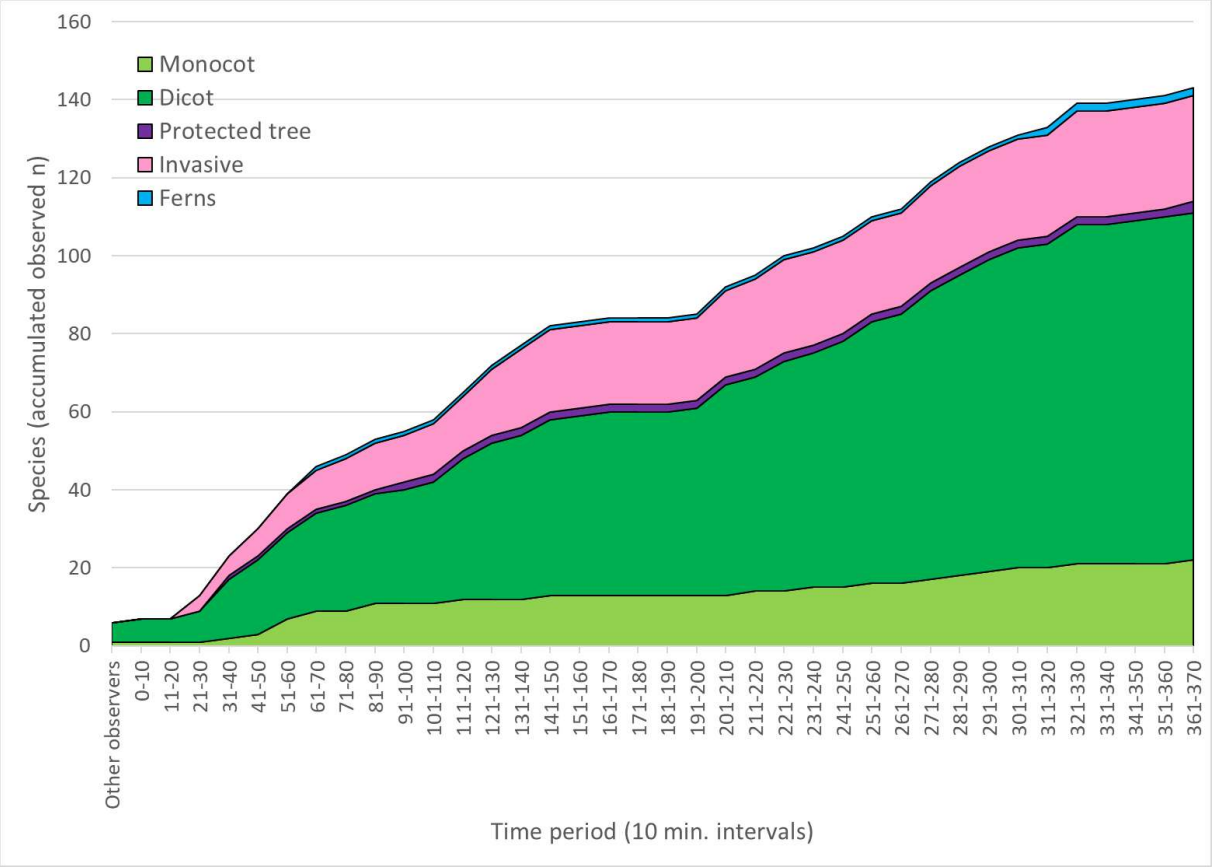

Figure 23: A plant species accumulation curve for the site assessment.

Table 13: A provisional species list made for plants found during the site assessment on Erf 2074. The orange species are naturalised exotic plants, and red rows are listed invasive species. In green are the protected tree species, and the purple entry is the potential SCC on the site.

Family	Species	Common name	Found in fynbos in Southern half of site? & Information
Liliopsida (Monocots)			
Amaryllidaceae	*Agapanthus praecox*	blue lily	Yes
Amaryllidaceae	*Tulbaghia violacea*	Society Garlic	No
Asparagaceae	*Agave angustifolia*	Caribbean Agave	No. Naturalised exotic from central & south America. *A. sislana* is an invasive species
Asparagaceae	*Albuca sp.*	Slimelilies	Yes
Asparagaceae	*Asparagus aethiopicus*	African Asparagus	No
Asphodelaceae	*Bulbine latifolia*	Waterglass Kopieva	No
Commelinaceae	*Commelina africana*	African Yellow Dayflower	No Naturalised exotic from sub-saharan Africa & Madagascar.
Commelinaceae	*Commelina benghalensis*	tropical spiderwort	Yes Naturalised exotic from Bangladesh & India
Cyperaceae	*Cyperus albostriatus*	Dwarf striped umbrella sedge	No
Cyperaceae	*Cyperus congestus*	Purple Umbrella Sedge	No
Cyperaceae	*Cyperus erectus*	Cyperus species	Yes
Cyperaceae	*Epischoenus sp.*	Schoenus "Epischoenus" Group	No
Hypoxidaceae	*Hypoxis cf. argentea*	Stargrasses	Yes
Iridaceae	*Bobartia aphylla*	Garden Route Rushiris	No
Iridaceae	*Gladiolus maculatus*	Speckle-brown Afrikaner	No
Orchidaceae	*Monadenia*	Monadisas	Yes
Poaceae	*Cenchrus clandestinus*	Kikuyu Grass	No Invasive plant from North Africa NEMBA cat. 1b CARA cat. 1
Poaceae	*Cynodon dactylon*	Bermuda grass	No
Poaceae	*Eragrostis curvula*	African love grass	Yes
Poaceae	*Lagurus ovatus*	Hare's Tail Grass	Yes Naturalised exotic from The Mediterranean
Poaceae	*Megathyrsus maximus*	guinea grass	No
Poaceae	*Melinis repens*	Natal grass	Yes
Poaceae	*Sporobolus africanus*	Parramatta Grass	No
Poaceae	*Stenotaphrum secundatum*	Saint Augustine grass	No
Restionaceae	*Restio eleocharis*	Beach Pegreed	Yes
Restionaceae	*Restio triticeus*	Wheat Capereed	No

Thurniaceae	*Prionium serratum*	Palmiet	No
Magnoliopsida (Dicots)			
Aizoaceae	*Carpobrotus sp.*	sea figs	No
Aizoaceae	*Delosperma neethlingiae*	Sheepfig species	No
Aizoaceae	*Lampranthus cf. pauciflorus*	dewplants	Yes
Aizoaceae	*Mesembryanthemum aitonis*	Coast Solfig	No
Anacardiaceae	*Searsia chirindensis*	Red Currant-rhus	Yes
Anacardiaceae	*Searsia glauca*	Blue Kunibush	No
Anacardiaceae	*Searsia lucida*	Glossy Currantrhus	No
Anacardiaceae	*Searsia pallens*	Ribbed Kunirhus	No
Anacardiaceae	*Searsia refracta*	Roughleaf Currantrhus	Yes
Anacardiaceae	*Searsia rehmanniana*	Bluntleaf Currantrhus	Yes
Apiaceae	*Anginon difforme*	Common Finkel	No
Apiaceae	*Centella asiatica*	Gotu Cola	No Naturalised exotic from Asia
Apiaceae	*Centella virgata*	Branching Capepurse	No
Apiaceae	*Lichtensteinia interrupta*	Kalmoes species	Yes
Apocynaceae	*Carissa macrocarpa*	Natal Plum	No
Apocynaceae	*Cynanchum obtusifolium*	Roundleaf Buckhorn	No
Asteraceae	*Arctotheca prostrata*	Prostrate Capeweed	No
Asteraceae	*Bidens pilosa*	Hairy Beggarticks	No Naturalised exotic from South America
Asteraceae	*Cirsium vulgare*	Bull Thistle	No Invasive plant from Europe, Asia, & North Africa NEMBA cat. 1b CARA cat. 1
Asteraceae	*Curio crassulifolius*	Blue Fingers	No
Asteraceae	*Delairea odorata*	Cape-ivy	No
Asteraceae	*Euryops virgineus*	Virgin True-Eye	Yes
Asteraceae	*Gerbera serrata*	Strap Gerbera	No
Asteraceae	*Helichrysum cymosum*	Fume Everlasting	No
Asteraceae	*Helichrysum felinum*	Strawberry Everlasting	No
Asteraceae	*Helichrysum nudifolium*	Icholocholo	Yes
Asteraceae	*Helichrysum odoratissimum*	Kooigoed Everlasting	No
Asteraceae	*Helichrysum petiolare*	Licorice plant	No
Asteraceae	*Helichrysum rugulosum*	Wrinkly Everlasting	Yes
Asteraceae	*Metalasia densa*	Fynbos Blombush	No
Asteraceae	*Metalasia muricata*	White bristle bush	No
Asteraceae	*Metalasia pungens*	Stink Blombush	Yes
Asteraceae	*Metalasia trivialis*	Eastern Blombush	Yes
Asteraceae	*Nidorella ivifolia*	Ivy Vleiweed	No
Asteraceae	*Oedera calycina*	Perdekaroo species	No
Asteraceae	*Osteospermum moniliferum*	Bietou	Yes
Asteraceae	*Senecio crenatus*	Langeberg Ragwort	No

Asteraceae	*Senecio ilicifolius*	Kowanna Ragwort	Yes
Asteraceae	*Taraxacum officinale*	common dandelion	Yes Naturalised exotic from Eurasia & North America
Asteraceae	*Tarchonanthus littoralis*	Coastal Camphorbush	No
Asteraceae	*Ursinia sp.*	Paraseeds	No
Bignoniaceae	*Tecomaria capensis*	Cape Honeysuckle	No
Campanulaceae	*Lobelia tomentosa*	Woolly Lobelia	No
Campanulaceae	*Wahlenbergia desmantha*	Capebell species	No
Celastraceae	*Gymnosporia nemorosa*	White Forest Spikethorn	No
Celastraceae	*Pterocelastrus tricuspidatus*	Candlewood	Yes
Convolvulaceae	*Dichondra repens*	kidney weed	Yes Naturalised exotic from Australis & New Zealand
Crassulaceae	*Crassula cf. cultrata*	Subgenus Crassula	No
Crassulaceae	*Crassula rubricaulis*	Redstem Stonecrop	No
Ebenaceae	*Diospyros dichrophylla*	Poison Starapple	No
Ebenaceae	*Euclea crispa*	Blue Gwarrie	No
Ericaceae	*Erica discolor*	Discolorous Heath	Yes
Ericaceae	*Erica peltata*	Shield Heath	No
Euphorbiaceae	*Acalypha ecklonii*	Copperleaf species	Yes
Fabaceae	*Acacia cyclops*	western coastal wattle	No Invasive plant from Australia NEMBA cat. 1b CARA cat. 2
Fabaceae	*Acacia mearnsii*	black wattle	No Invasive plant from Australia NEMBA cat. 2 CARA cat. 2
Fabaceae	*Acacia melanoxylon*	blackwood	No Invasive plant from Australia NEMBA cat. 2 CARA cat. 2
Fabaceae	*Acacia saligna*	golden wreath wattle	No Invasive plant from Australia NEMBA cat. 1b CARA cat. 2
Fabaceae	*Argyrolobium molle*	Soft Silverpod	No
Fabaceae	*Argyrolobium tomentosum*	Velvet Silverpod	Yes
Fabaceae	*Aspalathus alopecurus*	Foxtail Capegorse	Yes
Fabaceae	*Dipogon lignosus*	Okie bean	Yes
Fabaceae	*Indigofera heterophylla*	Diverse Indigo	Yes
Fabaceae	*Indigofera pappei*	Slender Indigo	No
Fabaceae	*Podalyria myrtillifolia*	Myrtle Capesweetpea	No
Fabaceae	*Psoralea stachyera*	Spike Dottypea	No

Fabaceae	*Schizolobium parahyba*	Brazilian fern tree	No
Fabaceae	*Tephrosia capensis*	Cape Hoarypea	No
Fabaceae	*Virgilia divaricata*	Gardenroute Keurboom	Yes
Gentianaceae	*Chironia baccifera*	Christmas Berry	Yes
Geraniaceae	*Pelargonium alchemilloides*	Mantle Storksbill	No
Geraniaceae	*Pelargonium candicans*	Velvet Storksbill	No
Geraniaceae	*Pelargonium zonale*	horseshoe geranium	No
Lamiaceae	*Coleus barbatus*	Woolly Plectranthus	No Naturalised exotic from The Caribbean
Lamiaceae	*Leonotis ocymifolia*	Rock Lionspaw	No
Lamiaceae	*Mentha arvensis*	corn mint	No
Lamiaceae	*Salvia chamelaeagnea*	Rough blue sage	Yes
Malvaceae	*Grewia occidentalis*	Crossberry	No
Malvaceae	*Hermannia flammea*	Flaming Dollsrose	No
Malvaceae	*Hibiscus trionum*	flower-of-an-hour	No Naturalised exotic from Europe
Meliaceae	*Ekebergia capensis*	Cape Ash	No
Moraceae	*Ficus sp.*	Figs	Yes
Phytolaccaceae	*Phytolacca octandra*	Inkweed	No Invasive plant from The Americas NEMBA cat. 1b Not on CARA
Pittosporaceae	*Pittosporum undulatum*	Australian Cheesewood	No Invasive plant from NEMBA cat. CARA cat.
Polygalaceae	*Polygala myrtifolia*	Sweet Pea Shrub	Yes
Primulaceae	*Lysimachia arvensis*	scarlet pimpernel	No Naturalised exotic from Europe
Primulaceae	*Myrsine africana*	African Boxwood	No
Primulaceae	*Rapanea melanophloeos*	Cape beech	Yes
Proteaceae	*Leucadendron salignum*	Common Sunshine Conebush	No
Proteaceae	*Protea cf. laurifolia* (hybrid)	Sugarbushes	Yes
Proteaceae	*Protea cynaroides*	King Protea	No
Rosaceae	*Cliffortia linearifolia*	Stream Caperose	Yes
Rosaceae	*Cliffortia serpyllifolia*	Tangle Caperose	No
Rosaceae	*Cotoneaster glaucophyllus*	Bright bead cotoneaster	No Invasive plant from NEMBA cat. 1b Not on CARA
Rosaceae	*Eriobotrya japonica*	Loquat	No Invasive plant from NEMBA cat. CARA cat.

Rosaceae	*Rubus rigidus*	White Bramble	No
Rubiaceae	*Anthospermum aethiopicum*	Tall Flowerseed	No
Rutaceae	*Agathosma ovata*	False Buchu	No
Rutaceae	*Vepris lanceolata*	white-ironwood	No
Salicaceae	*Trimeria grandifolia*	Roundleaf Wild-Mulberry	Yes
Santalaceae	*Colpoon compressum*	Cape Sumach	No
Santalaceae	*Hagnothesium sp.*	Fours Rootthugs	Yes
Sapotaceae	*Sideroxylon inerme inerme*	Southern White Milkwood	No Protected tree no.
Scrophulariaceae	*Myoporum laetum*	Ngaio	No Invasive plant from NEMBA cat. CARA cat.
Scrophulariaceae	*Selago canescens*	Skinny Bitterbush	No
Scrophulariaceae	*Selago corymbosa*	Stiff Bitterbush	No
Solanaceae	*Datura stramonium*	jimsonweed	No Invasive plant from NEMBA cat. CARA cat.
Thymelaeaceae	*Passerina corymbosa*	Common Gonna	No
Thymelaeaceae	*Passerina falcifolia*	Weeping Gonna	No
Verbenaceae	*Lantana camara*	common lantana	Yes Invasive plant from NEMBA cat. CARA cat.
Verbenaceae	*Verbena bonariensis*	purpletop vervain	No Invasive plant from NEMBA cat. CARA cat.
Pinopsida			
Pinaceae	*Pinus radiata*	Monterey pine	No Invasive plant from NEMBA cat. CARA cat.
Podocarpaceae	*Afrocarpus falcatus*	Outeniqua yellowwood	Yes Protected tree no.
Podocarpaceae	*Podocarpus latifolius*	real yellowwood	No Protected tree no.
Polypodiopsida			
Nephrolepidaceae	*Nephrolepis cordifolia*	Fishbone Fern	No Invasive plant from NEMBA cat. CARA cat.
Pteridaceae	*Cheilanthes viridis*	Green Cliff Brake	Yes
Schizaeaceae	*Schizaea pectinata*	Toothbrush Fern	No

12.2 The Important Species Listed for South Outeniqua Sandstone Fynbos (FFs 19)

12.2.1 Important Taxa ([T]Cape thickets, [W]Wetlands)

Small Tree: *Widdringtonia nodiflora*.

Tall Shrubs: *Chrysanthemoides monilifera* (d), *Laurophyllus capensis*[T] (d), *Leucadendron conicum* (d), *L. eucalyptifolium* (d), *L. uliginosum* subsp. *uliginosum* (d), *Metalasia densa* (d), *Protea neriifolia* (d), *P. repens* (d), *Anginon difforme*, *Dodonaea viscosa* var. *angustifolia*, *Halleria lucida*[T], *Leucospermum glabrum*, *Liparia hirsuta*, *Metalasia trivialis*, *Mimetes pauciflorus*, *Osteospermum junceum*, *Passerina falcifolia*, *Podalyria burchellii*, *P. sericea*, *Protea mundii*, *Psoralea affinis*, *Pterocelastrus tricuspidatus*[T].

Low Shrubs: *Berzelia intermedia* (d), *Brunia nodiflora* (d), *Erica cordata* (d), *E. densifolia* (d), *E. glomiflora* (d), *E. triceps* (d), *E. uberiflora* (d), *Leucadendron ericifolium* (d), *Penaea cneorum* subsp. *cneorum* (d), *P. cneorum* subsp. *gigantea* (d), *Acmadenia maculata*, *A. tetragona*, *Anisodontea scabrosa*, *Aspalathus angustifolia* subsp. *angustifolia*, *A. ciliaris*, *A. rubens*, *Cliffortia ilicifolia*, *C. stricta*, *Erica deflexa*, *E. discolor* variant '*speciosa*', *E. formosa*, *E. fuscescens*, *E. gracilis*, *E. hispidula*, *E. lanata*, *E. nabea*, *E. similis*, *E. simulans*, *E. sparsa*, *E. versicolor*, *Euryops pinnatipartitus*, *Lachnaea diosmoides*, *Leucadendron comosum* subsp. *comosum*, *L. salignum*, *L. spissifolium* subsp. *fragrans*, *Leucospermum cuneiforme*, *L. wittebergense, Linconia alopecuroidea*, *Lobelia neglecta*, *Mimetes cucullatus*, *Otholobium carneum*, *Phaenocoma prolifera*, *Phylica confusa*, *Protea cynaroides*, *P. lorifolia*, *Pseudobaeckea cordata*, *Relhania calycina*, *Senecio glastifolius*, *Stoebe alopecuroides*, *Struthiola eckloniana*, *Syncarpha paniculata*, *Ursinia coronopifolia*, *U. scariosa* subsp. *scariosa*, *U. trifida*.

Semiparasitic Shrub: *Thesium virgatum*.

Herbs: *Carpacoce spermacocea*, *Centella affinis*, *C. virgata*, *Dichrocephala integrifolia* subsp. *integrifolia*, *Helichrysum felinum*, *Mairia crenata*. Geophytic Herbs: *Pteridium aquilinum* (d), *Blechnum attenuatum*, *Caesia contorta*, *Geissorhiza bracteata*, *G. fourcadei*, *G. inconspicua*, *Lanaria lanata*, *Romulea fibrosa*, *Tritoniopsis caffra*, *Watsonia fourcadei*.

Carnivorous Herb: *Drosera trinervia*[W].

Herbaceous Parasitic Climber: *Cassytha ciliolata*.

Graminoids: *Cannomois parviflora* (d), *C. virgata* (d), *Ehrharta dura* (d), *E. rupestris* subsp. *tricostata* (d), *Elegia fistulosa* (d), *E. galpinii* (d), *E. juncea* (d), *Epischoenus adnatus* (d), *Hypodiscus albo-aristatus* (d), *H. aristatus* (d), *H. striatus* (d), *H. synchroolepis* (d), *Ischyrolepis gaudichaudiana* (d), *Merxmuellera rufa* (d), *Pentameris distichophylla* (d), *Platycaulos anceps* (d), *P. compressus* (d), *Restio fourcadei* (d), *R. triticeus* (d), *Rhodocoma gigantea*[W] (d), *Tetraria cuspidata* (d), *T. involucrata* (d), *T. microstachys* (d), *Andropogon appendiculatus*, *Anthochortus ecklonii*, *Cannomois scirpoides*, *Capeobolus brevicaulis*, *Chrysitrix capensis*, *Cyathocoma hexandra*[W], *Ficinia gracilis*, *Mastersiella purpurea*, *Merxmuellera decora*, *Pentaschistis colorata*, *P. malouinensis*, *P. pallida*, *Restio strictus*, *Staberoha aemula*, *Tetraria capillacea*, *T. fimbriolata*, *T. sylvatica*, *T. thermalis*, *T. ustulata*, *Thamnochortus cinereus*, *Themeda triandra*, *Willdenowia teres*.

12.2.2 Endemic Taxa

Low Shrubs: *Erica unicolor* (d), *Penaea acutifolia* (d), *Acmadenia gracilis*, *A. rupicola*, *Agathosma alaris*, *A. planifolia*, *Amphithalea flava*, *Aspalathus bowieana*, *A. digitifolia*, *Erica aneimena*, *E. gillii*, *E. inconstans*, *E. juniperina*, *E. lehmannii*, *E. outeniquae*, *E. priorii*, *E. velatiflora*, *Leucadendron olens*, *Leucospermum hamatum*, *Phylica curvifolia*, *Prismatocarpus rogersii*, *Psoralea vlokii*, *Xiphotheca phylicoides, Zyrphelis outeniquae*.

Succulent Shrub: *Lampranthus pauciflorus*.

Herb: *Linum villosum*.

Geophytic Herb: *Geissorhiza outeniquensis*[W].

12.3 Vegetation Assets, States, and Transitions (VAST)

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

Increasing modification

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

12.4 Impact Assessment Methods

Individual impacts for the construction and operational phase were identified and rated according to criteria which include their intensity, duration, and extent. The criteria and their associated ratings are shown in Table 14. The ratings were then used to calculate the consequence of the impact which can be either negative or positive as follows:

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

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

Significance = *consequence x probability*

Table 14: Categorical descriptions for impacts and their associated ratings.

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

Categories assigned to the calculated significance ratings are presented in Table 15.

Table 15: Value ranges for significance ratings, where (-) indicates a negative impact and (+) indicates a positive impact

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

Each impact was considered from the perspective of whether losses or gains would be irreversible or result in the irreplaceable loss of biodiversity of ecosystem services. The level of confidence was also determined and rated as low, medium, or high (Table 16).

Table 16: Definition of reversibility, irreplaceability, and confidence ratings.

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