

Plant Species Assessment report

prepared in accordance with the
*"Protocol for the Specialist Assessment and minimum report content
requirements for environmental impacts on Terrestrial Plant Species"*

Farm 220/209 Aalwyndal in Mossel Bay (Western Cape Province)



David Hoare Consulting (Pty) Ltd



David Hoare
Consulting (Pty) Ltd

Address:
Postnet Suite #116
Private Bag X025
Lynnwood Ridge
0040

41 Soetdoring Avenue
Lynnwood Manor
Pretoria

Cell: 083 284 5111
david@davidhoareconsulting.co.za

Terrestrial Plant Species Assessment Report for Erf 220/209 Aalwyndal in Mossel Bay in the Western Cape Province

12 July 2024

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SPECIALIST DETAILS & DECLARATION

This report has been prepared in accordance with the "Protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial biodiversity", as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998), published in GN. No. 320 dated 20 March 2020. It has been prepared independently of influence or prejudice by any parties.

The details of Specialists are as follows –

Table 1: Details of Specialist

Specialist	Qualification and accreditation
Dr David Hoare (Pr.Sci.Nat.)	<ul style="list-style-type: none">• PhD Botany• SACNASP Reg. no. 400221/05 (Ecology, Botany)

Declaration of independence:

David Hoare Consulting (Pty) Ltd in an independent consultant and hereby declare that it does not have any financial or other vested interest in the undertaking of the proposed activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act 107 of 1998). In addition, remuneration for services provided by David Hoare Consulting (Pty) Ltd is not subjected to or based on approval of the proposed project by the relevant authorities responsible for authorising this proposed project.

Disclosure:

David Hoare Consulting (Pty) Ltd undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) and will provide the competent authority with access to all information at its disposal regarding the application, whether such information is favourable to the applicant or not.

Based on information provided to David Hoare Consulting (Pty) Ltd by the client and in addition to information obtained during the course of this study, David Hoare Consulting (Pty) Ltd present the results and conclusion within the associated document to the best of the author's professional judgement and in accordance with best practise.



Dr David Hoare

12 July 2024
Date

TERMS OF REFERENCE

PROTOCOL FOR THE SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS FOR ENVIRONMENTAL IMPACTS ON TERRESTRIAL PLANT SPECIES

This report is prepared in compliance with the PROTOCOL FOR THE SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS FOR ENVIRONMENTAL IMPACTS ON TERRESTRIAL PLANT SPECIES

This 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), published in GN. No. 1150 dated 30 October 2020 for Terrestrial Plant Species and Terrestrial Animal Species. As per these Regulations, the approach for assessing sensitivity with respect to Terrestrial Plant Species and Terrestrial Animal Species is in accordance with guidelines described in the latest version of the "*Species Environmental Assessment Guideline*", available at <https://bgis.sanbi.org/>.

The assessment and minimum reporting requirements of these protocols are associated with a level of environmental sensitivity identified by the national web based environmental screening tool (screening tool). The screening tool can be accessed at:

<https://screening.environment.gov.za/screeningtool>.

INTRODUCTION

Site location

The site, which is Erf 220/209, is within Aalwyndal in Mossel Bay, slightly west (inland) of Diaz Strand. Refer to Figure 1 below for the general location.

The property is one of the rural properties that forms part of Aalwyndal, close to the Mossel Bay Airport. It is accessed from the Hartenbos off-ramp from the N2 National road. The road, Klipheuwel Way, forms the northern and eastern boundaries of the site. A driveway of a neighbouring property forms the western boundary. A property boundary forms the southern boundary.

Surrounding areas are mostly similar rural plots consisting mostly of natural vegetation and existing homesteads. The current site has no existing infrastructure and is mostly in a natural state (Figure 2).

The scope of this report is the part of the property that is proposed for development. The entire site is 5.16 ha of which most is proposed for development - an area of 1.1 ha is indicated on the plan as being retained as "natural vegetation".



Figure 1: Location of the site.



Figure 2: Aerial image of the site and surrounding areas.

Identified Theme Sensitivities

A sensitivity screening report from the DEA Online Screening Tool was requested in the application category: Transformation of land | Indigenous vegetation. The DEA Screening Tool report for the area, dated 17/08/2023, indicates the following sensitivities (see Figure 3):

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Plant Species Theme			X	

Plant Species theme

Sensitivity features are indicated as follows:

Sensitivity	Feature(s)
Medium	Lampranthus ceriseus
Medium	Lampranthus diutinus
Medium	Lampranthus fergusoniae
Medium	Lampranthus foliosus
Medium	Lampranthus pauciflorus
Medium	Ruschia leptocalyx
Medium	Argyrolobium harmsianum
Medium	Aspalathus campestris

Medium	<i>Aspalathus obtusifolia</i>
Medium	<i>Lebeckia gracilis</i>
Medium	<i>Leucadendron galpinii</i>
Medium	<i>Leucospermum praecox</i>
Medium	<i>Wahlenbergia polyantha</i>
Medium	<i>Selago glandulosa</i>
Medium	<i>Selago ramosissima</i>
Medium	<i>Selago villicaulis</i>
Medium	<i>Freesia fergusoniae</i>
Medium	<i>Erica unicolor</i> subsp. <i>mutica</i>
Medium	<i>Hermannia lavandulifolia</i>
Medium	Sensitive species 153
Medium	Sensitive species 633
Medium	Sensitive species 268
Medium	<i>Thamnochortus muirii</i>
Medium	<i>Marsilea schelpeana</i>
Medium	<i>Duvalia immaculata</i>
Medium	Sensitive species 1024
Medium	<i>Athanasia cochlearifolia</i>
Medium	<i>Relhania garnotii</i>
Medium	<i>Agathosma eriantha</i>
Medium	<i>Agathosma muirii</i>
Medium	<i>Agathosma riversdalensis</i>
Medium	<i>Euchaetis albertiniana</i>
Medium	<i>Muraltia cliffortiifolia</i>
Medium	<i>Muraltia knysnaensis</i>
Medium	<i>Polygala pubiflora</i>
Medium	Sensitive species 980
Medium	<i>Ruellia pilosa</i>
Medium	<i>Nanobubon hypogaeum</i>
Medium	Sensitive species 516
Medium	<i>Drosanthemum lavisii</i>
Medium	Sensitive species 800
Medium	Sensitive species 500
Medium	Sensitive species 654
Medium	Sensitive species 763
Medium	<i>Diosma passerinoides</i>
Medium	<i>Agathosma microcarpa</i>

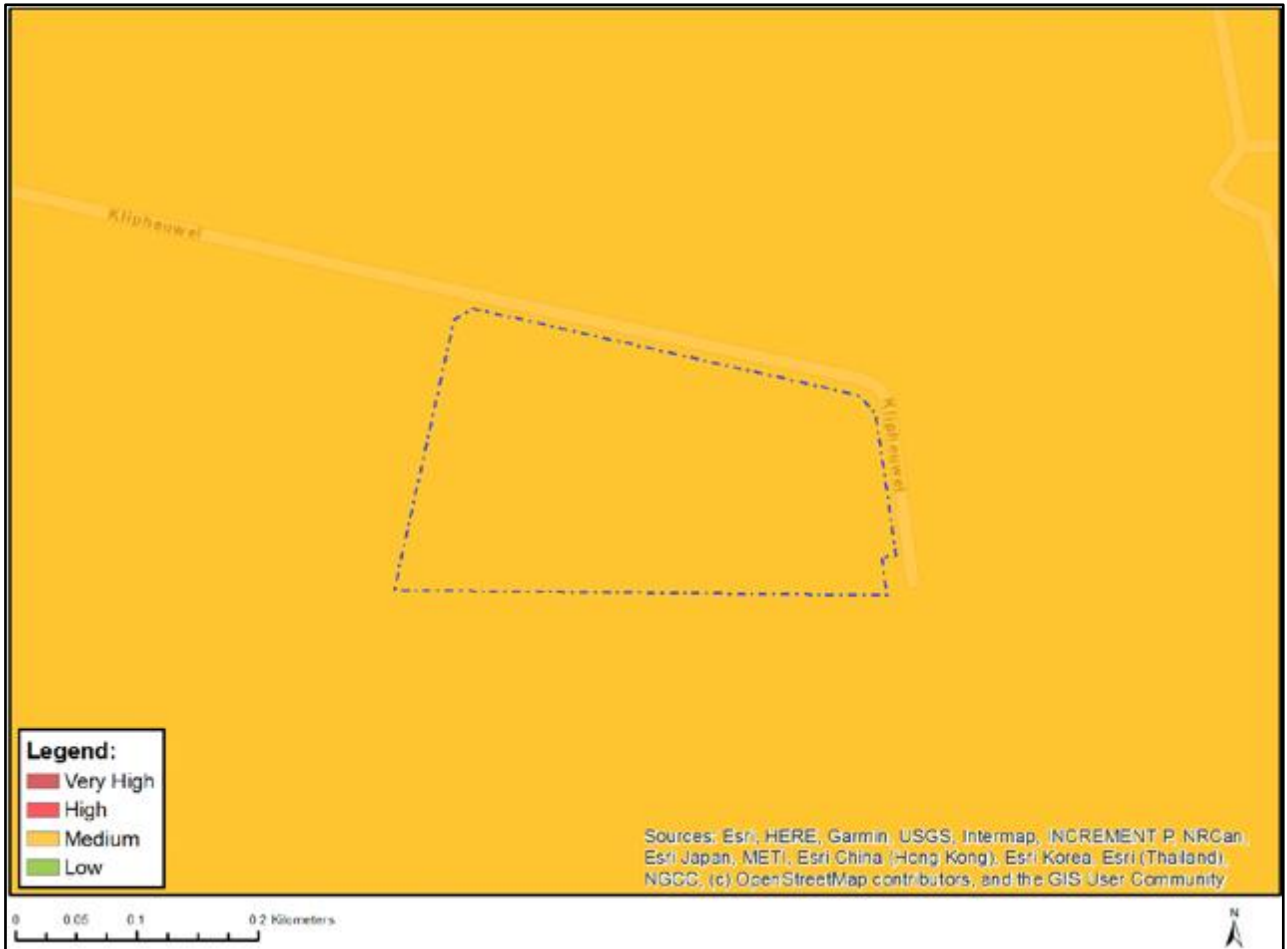


Figure 3: Map of relative plant species theme sensitivity.

ASSESSMENT METHODOLOGY

The detailed methodology followed as well as the sources of data and information used as part of this assessment is described below.

Project Area of Influence (PAOI)

The proposal is to develop the site for residential purposes. This will include various housing types and a small commercial portion (see Figures 4 - 6 for the proposed Alternative Designs). Anticipated impacts will mostly occur during the construction phase. These impacts are not expected to extend significantly beyond the boundaries of the study area, except for possible edge effects. The PAOI is therefore treated here as the development footprint within which direct impacts will occur.



Figure 4: Preferred Alternative (Alternative 2).

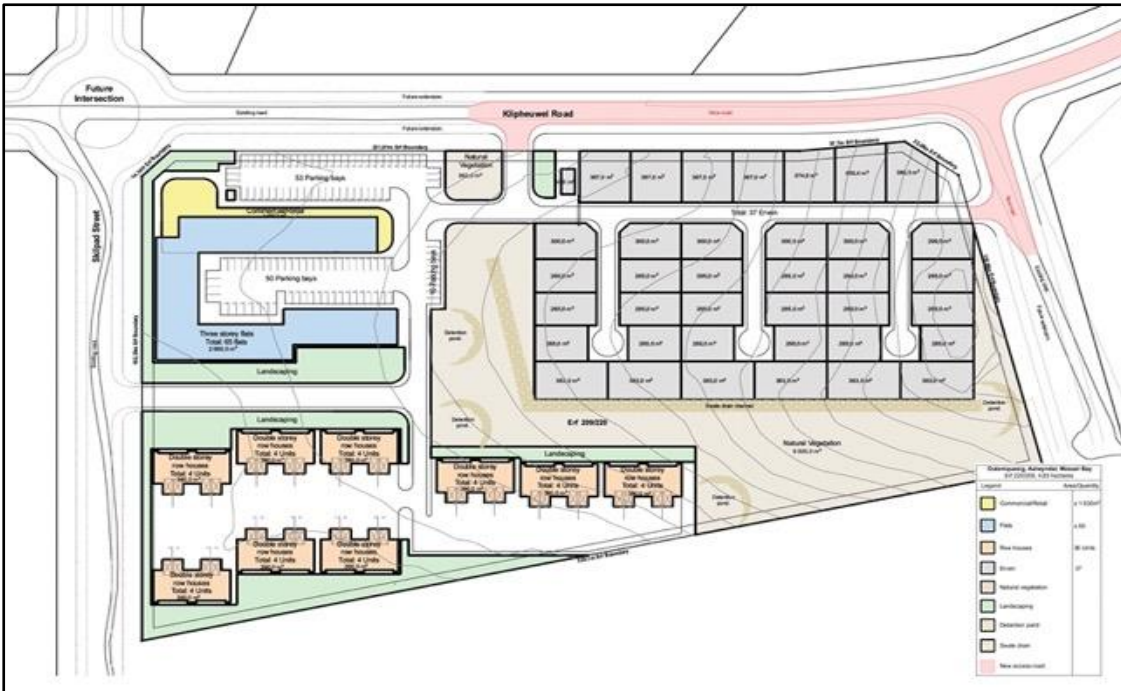


Figure 5: Alternative 3.



Figure 6: Alternative 4.

Survey timing

The study commenced as a desktop-study followed by site-specific field study on 26 February 2022 and 25 February 2023. The site is within the Fynbos Biome with an all-year rainfall season with a slight dip in early winter (Figure 7). A more accurate indication of rainfall seasonality, which drives most ecological processes, is shown in Figure 8, which shows that Mossel Bay has peak rainfall from August to November, with another smaller peak in March to April. The timing of the survey in February is therefore suitable in terms of assessing the flora and vegetation of the site. The overall condition of the vegetation was possible to be determined with a high degree of confidence.

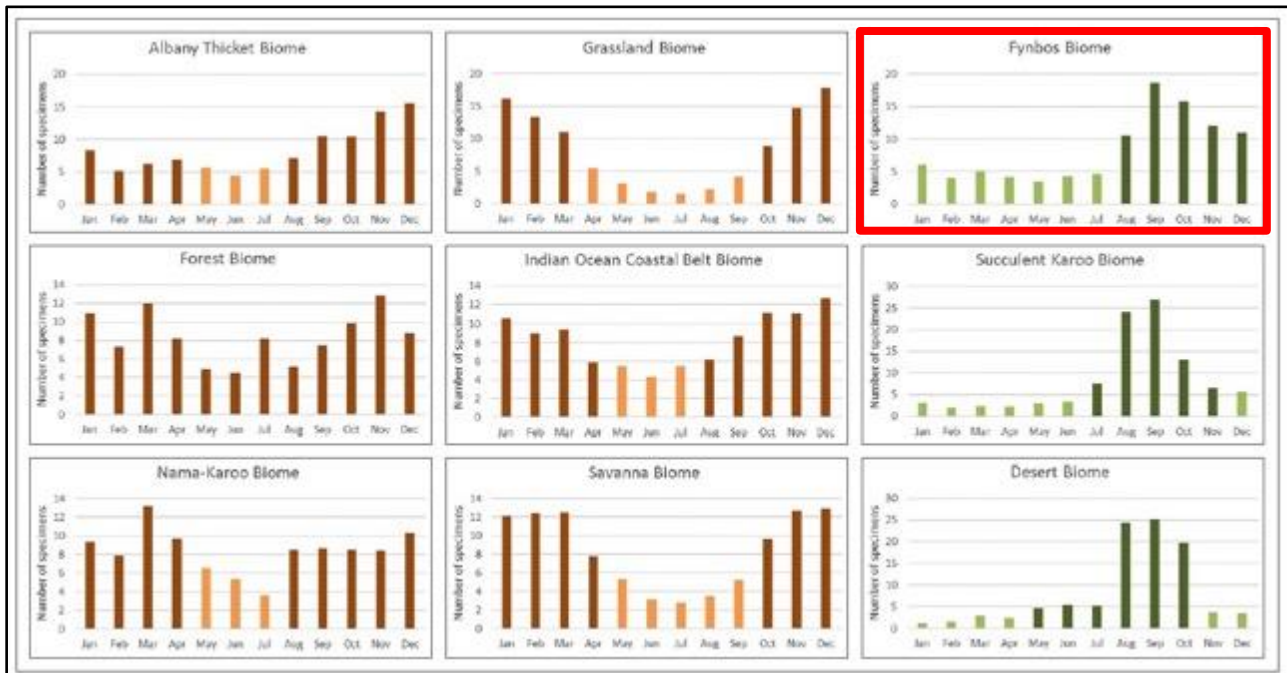


Figure 7: Recommended survey periods for different biomes (Species Environmental Assessment Guidelines). The site is within the Fynbos Biome.

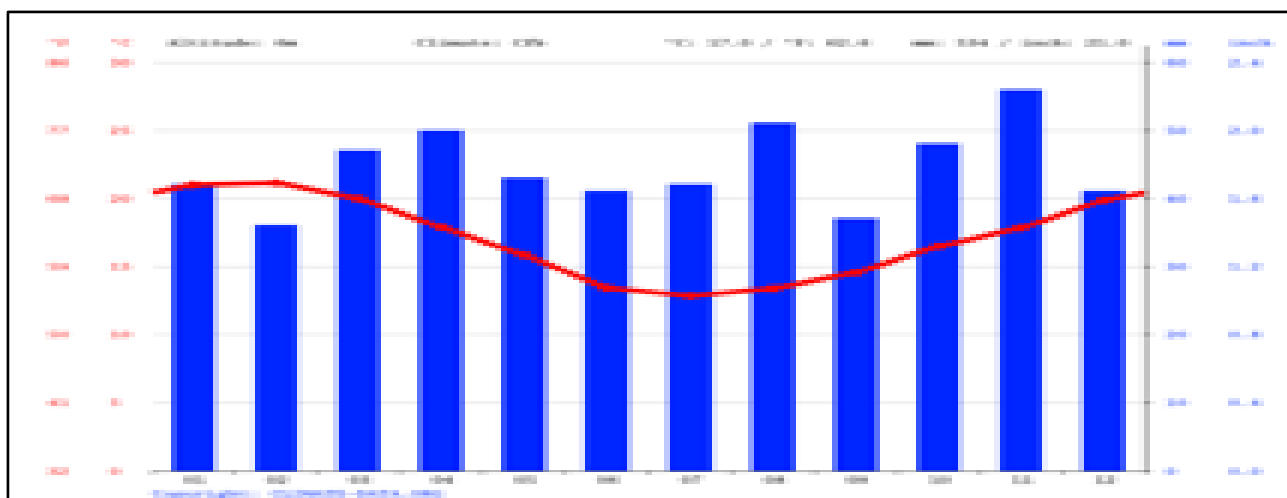


Figure 8: Climate diagram showing average monthly rainfall and temperature for Mossel Bay.

Field survey approach

The study commenced as a desktop-study followed by a site-specific field study. During the field survey of habitats on site, the entire property was assessed on foot. Field surveys included both meander searches of general areas, and active searching in habitats that were considered to be suitable for specific groups or species. Meander surveys were undertaken with no time restrictions - the objective was to comprehensively examine all natural areas. A hand-held Garmin GPSMap 64s was used to record a track within which observations were made (Figure 9). Digital photographs were taken of features and habitats on site, as well as of all plant species that were seen. All plant and animal species recorded were uploaded to the iNaturalist website (<https://www.inaturalist.org>) and are accessible by viewing the observations for the site (use the Explore menu, zoom and pan until the desired study area is within the browser window, click the button "Redo search in map", and all observations for that area will be shown and listed).

Aerial imagery from Google Earth was used to identify and assess habitats on site. This included historical imagery that may show information not visible in any single dated image. Patterns identified from satellite imagery were verified on the ground. Digital photographs were taken at locations where features of interest were observed. During the field survey, particular attention was paid to ensuring that all habitat variability was covered physically on the ground.



Figure 9: GPS track log of areas walked in the course of undertaking this assessment.

Sources of information

Vegetation and plant species

- Plant species that could potentially occur on in the general area was extracted from the NewPosa database of the South African National biodiversity Institute (SANBI) for the quarter degree grid/s in which the site is located.
- The IUCN Red List Category for plant species, as well as supplementary information on habitats and distribution, was obtained from the SANBI Threatened Species Programme (Red List of South African Plants, <http://redlist.sanbi.org>).
- Lists were compiled specifically for any species at risk of extinction (Red List species) previously recorded in the area. Historical occurrences of threatened plant species were obtained from the South African National Biodiversity Institute (<http://posa.sanbi.org>) for the quarter degree square/s within which the study area is situated. Habitat information for each species was obtained from various published sources. The probability of finding any of these species was then assessed by comparing the habitat requirements with those habitats that were found, during the field survey of the site, to occur there.
- Regulations published for the National Forests Act (Act 84 of 1998) (NFA) as amended, provide a list of protected tree species for South Africa. The species on this list were assessed in order to determine which protected tree species have a geographical distribution that coincides with the study area and habitat requirements that may be met by available habitat in the study area. The distribution of species on this list were obtained from published sources (e.g. van Wyk & van Wyk 1997) and from the SANBI Biodiversity Information System website (<http://sibis.sanbi.org/>) for quarter degree grids in which species have been previously recorded. Species that have been recorded anywhere in proximity to the site (within 100 km), or where it is considered possible that they could occur there, were listed and were considered as being at risk of occurring there.

Limitations

The following assumptions, limitations, uncertainties are listed regarding the assessment of the site:

- The assessment is based on two detailed site visits. The current study is based on extensive site visits as well as a desktop study of the available information. The time spent on site was adequate for understanding general patterns across affected areas.
- Compiling the list of species that could potentially occur on site is limited by the paucity of collection records for the area. The list of plant species that could potentially occur on site was therefore taken from a wider area and from literature sources that may include species that do not occur on site and may miss species that do occur on site. In order to compile a comprehensive site-specific list of the biota on site, studies would be required that would include different seasons, be undertaken over a number of years and include extensive sampling. Due to legislated time constraints for environmental authorisation processes, this is not possible.
- Rare and threatened plant species are, by their nature, usually very difficult to locate and can be easily missed.

Impact assessment methodology

The Impact Assessment Methodology assists in evaluating the overall effect of a proposed activity on the environment. Impact assessment must take account of the nature, scale and duration of effects on the environment and whether such effects are positive (beneficial) or negative (detrimental). The rating system is applied to the potential impact on the receptor. The impact assessment methodology provided below explicitly takes into account the value and condition of the biodiversity resources affected. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
BIODIVERSITY VALUE / SENSITIVITY CRITERIA					
Irreplaceability (I) The biodiversity value of the affected resource	Resource is widespread and common and /or regenerates itself (LC)	Resource is uncommon, endemic to a restricted area, moderately rare, or is already noticeably affected but still relatively widespread (e.g., NT, ESA)	Resource is naturally rare, restricted to limited localities, ephemeral, or is approaching a threshold of persistence (VU, CBA2)	Resource is highly localised / loss has already exceeded persistence thresholds (EN, CBA1)	Resource is critically rare / loss has already well exceeded persistence thresholds (CR, Protected)
Threshold (T) The scale of the impact relative to the overall distribution of a resource, therefore the degree to which the impact contributes towards exceeding an ecological threshold	Impact affects a negligible proportion of the overall biodiversity resource	Impact affects a proportion of the biodiversity resource that is within 6 orders of magnitude of the total extent / number of the resource (0.001-0.1%)	Impact affects a proportion of the biodiversity resource that is within 4 orders of magnitude of the total extent / number of the resource (0.1-1%)	Impact affects a proportion of the biodiversity resource that is within 2 orders of magnitude of the total extent / number of the resource (1-10%)	Impact affects a proportion of the biodiversity resource that is within 1 order of magnitude or more of the total extent / number of the resource ($\geq 10\%$)
Condition (C) The integrity of the resource in terms of its intactness and functionality, the coherence of its ecological structure and function	Resource in very poor condition, displaying advanced degradation		Moderately affected resource, functional but displaying obvious signs of minor degradation		Fully functional and in a state expected in a completely natural state, unaffected by human influence.
Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation	Mostly reversible: requires minor mitigation	Partly reversible: Recoverable with more intense mitigation	Barely reversible: unlikely to be reversed, even with intense mitigation	Irreversible: Not possible despite action

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
IMPACT MAGNITUDE CRITERIA					
Extent (E) The geographical extent of the impact on a given environmental receptor	Site: Within site boundary only	Site & surroundings: Extends for a limited distance beyond site boundaries	Landscape: Outside activity area	Regional: Affects patterns at a regional or provincial scale	Global: Across borders or boundaries
Duration (D) The length of permanence of the impact on the environmental receptor	Immediate: On impact, 0-1 years	Short term: 1-5 years	Medium term: 5-10 years	Long term: Project life, 10-25 years	Permanent: Indefinite
Magnitude (M) The degree of alteration of the affected environmental receptor	Very low: No impact on processes	Low: Slight impact on processes	Medium: Processes continue but in a modified way	High: Processes temporarily cease or continue in a highly modified way	Very High: Permanent cessation of processes
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	Improbable	Low Probability	Probable	Highly Probability	Definite
Significance (S) is determined by combining the above criteria in the following formula:	$S = [(E + D + M)/3 \times (R + I + T + C)/4 \times P]/25$ <p>Significance = (Extent + Duration + Magnitude)/3 × (Reversibility + Irreplaceability + Threshold + Condition)/4 × Probability</p>				
IMPACT SIGNIFICANCE RATING					
Total Score	0 - 1	1 - 2	2 - 3	3 - 4	4 - 5
Environmental Significance Rating (Negative (-))	Very low	Low	Moderate	High	Very High
Environmental Significance Rating (Positive (+))	Very low	Low	Moderate	High	Very High

OUTCOME OF THE ASSESSMENT

Regional vegetation patterns

There is one regional vegetation type mapped for the property within which the development is located, namely North Langeberg Sandstone Fynbos. Detailed published descriptions of this regional vegetation type is available online and in printed form and it is not described further here.

North Langeberg Sandstone Fynbos is not listed in the Revised National List of Ecosystems that are Threatened and in need of Protection.

Only North Langeberg Sandstone Fynbos is affected by the proposed development (Figure 10). The national vegetation map is not mapped at a fine scale and the on-site patterns do not necessarily match this description. The local topography includes river valleys that contain thicket vegetation that extends from the river system that exits at Diaz Strand. However, this thicket vegetation does not appear to extend on to the site. The original natural vegetation on the property is therefore assumed to be a single vegetation type.

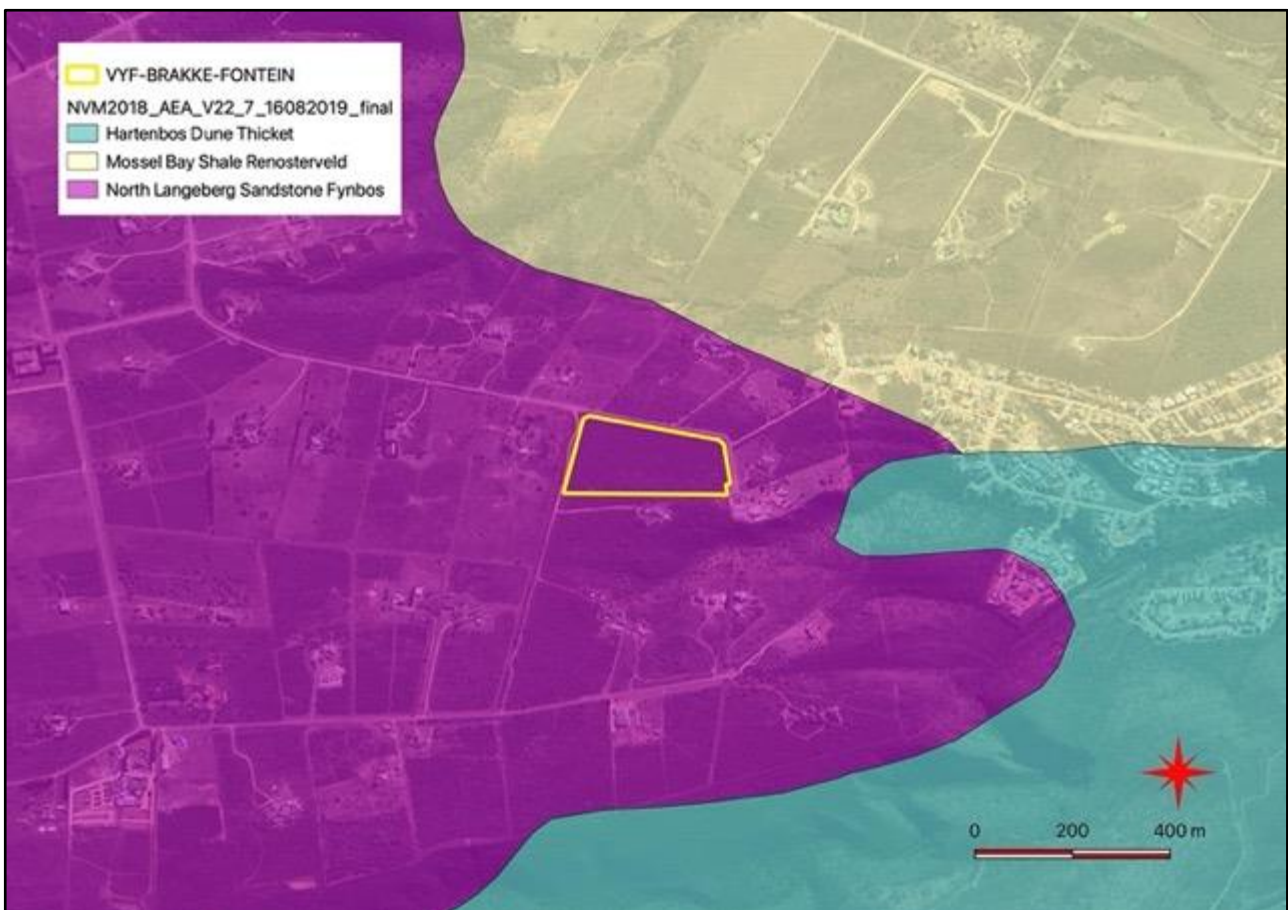


Figure 10: Regional vegetation types of the site and surrounding areas.

Historical disturbance on site

Historical aerial photographs (1939, 1963, 1974, 2003, 2006), as well as several aerial images on Google Earth (see Figure 11, for example), show that the property has always been in a natural state, with no soil disturbance from ploughing. These patterns are consistent with the vegetation patterns found on site, as determined from the site visit.

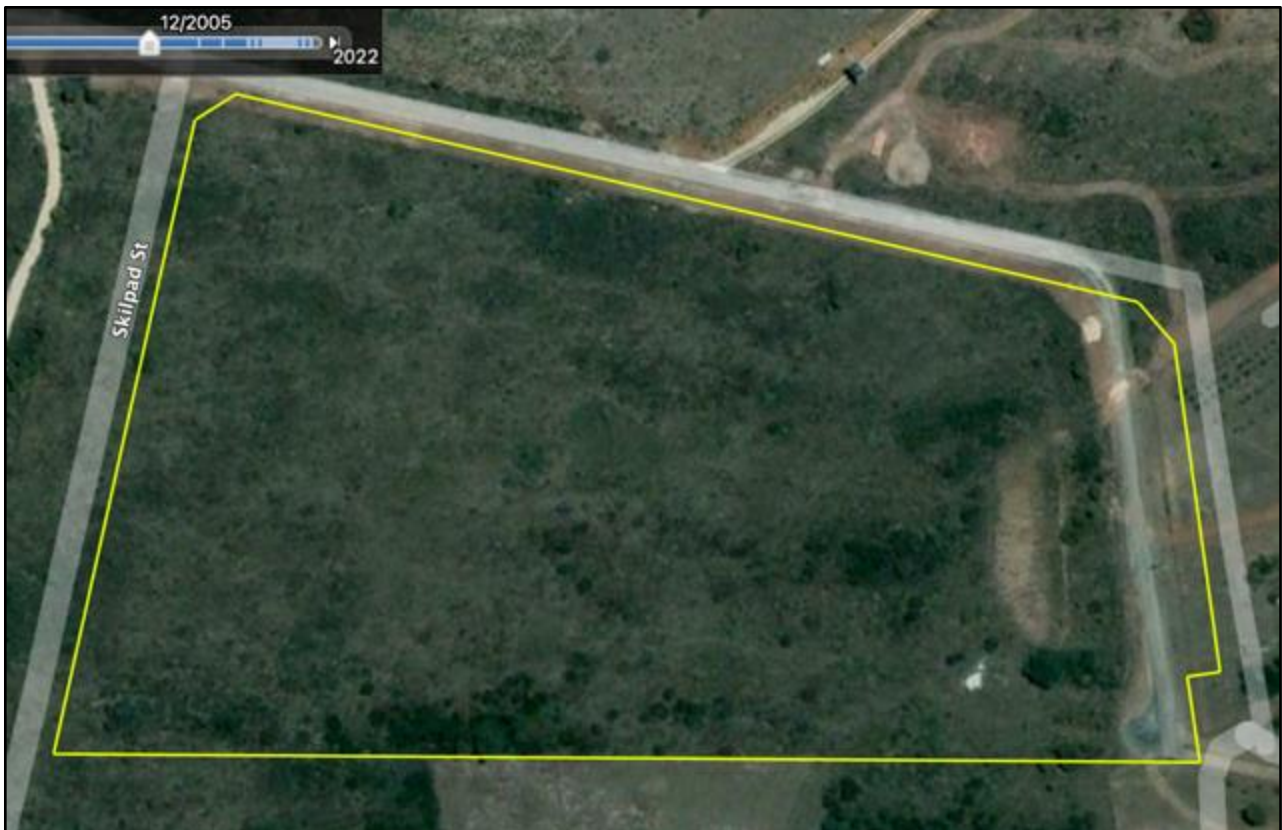


Figure 11: Historical aerial image of the property, dated December 2005.

Verification of observations on site

According to the "AMENDMENT TO THE PROTOCOLS FOR THE SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS FOR ENVIRONMENTAL IMPACTS ON TERRESTRIAL ANIMAL AND PLANT SPECIES IN TERMS OF SECTIONS 24(5)(a) AND (h) AND 44 OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998", a specialist report must include the following:

- 5.3.4A verifiable evidence from the specialist's site inspection, including as a minimum:
- 5.3.4A.1 a map showing the specialist's GPS track in relation to the study area; and
 - 5.3.4A.2 at least 4 spatially representative sample site descriptions from across the study area that include as a minimum:
 - (a) precise geographical coordinates of the sample site;
 - (b) at least one in situ photograph (taken on site by the specialist during the site inspection) of the sample site; and
 - (c) a habitat description of the sample site;"

To address these specific requirements, photographs of landscapes on site were taken at various localities to show conditions on site. A map showing the location of these photographs is provided in Figure 12. A GPS track log is provided in Figure 9 in the section of this report titled "Field Survey Approach".



Figure 12: Location of photographs taken on site during the site inspection.



Photo 4670
34° 9' 10.15" S, 22° 4' 53.36" E

Disturbed area on the edge of the intact fynbos (at the entrance to the site), containing a variety of grasses with *Carpobrotus* (typically occur in previously-disturbed areas in fynbos), some woody shrubs, and signs of past disturbance (such as bare ground).



Photo 4671
34° 9' 8.63" S, 22° 4' 52.76" E

Area that appears to have been partially disturbed in the past, dominated by grasses and *Erica discolor*.



Photo 4677
34° 9' 6.45" S, 22° 4' 51.13" E

Typical fynbos on site, near to the north-eastern boundary, looking eastwards.



Photo 4679
34° 9' 6.39" S, 22° 4' 48.61" E

Typical fynbos that occurs throughout the site, which has uniform structure and high cover. At a height of approximately 1 m tall, it is dominated by *Erica peltata*, *Erica discolor*, *Dicerothamnus rhinocerotis*, and *Metalasia acuta*, with a high diversity of accompanying species.

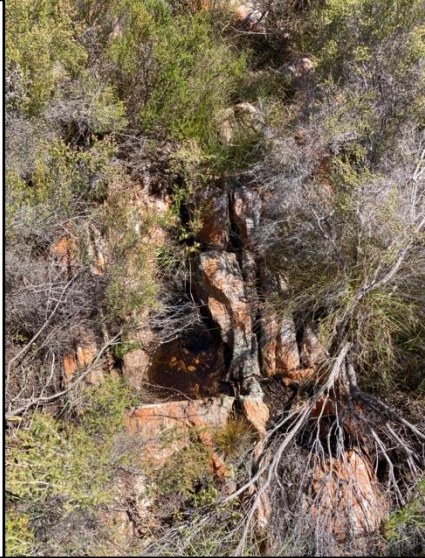


Photo 4680
34° 9' 5.02" S, 22° 4' 44.99" E

Outcrops of rocky bands within the fynbos areas.



Photo 4681
34° 9' 10.04" S, 22° 4' 40.49" E

Jeep track along southern boundary of the site. Photo taken at south-western corner.



Photo 4682

34° 9' 9.95" S, 22° 4' 41.95" E

Disturbed patch on southern boundary with large *Acacia cyclops* tree. Disturbance limited to vegetation cutting with substrate left intact.



Photo 4684

34° 9' 9.15" S, 22° 4' 47.23" E

Area along southern part of site dominated by *Protea lanceolata*. Note high grass cover in this area.



Photo 4687

34° 9' 9.08" S, 22° 4' 50.51" E

Typical vegetation in south-eastern corner of site with higher cover of woody shrubs than other parts of the site.

Natural habitats on site

Based on two detailed field surveys to verify conditions on site, it was determined that the site consists of a single vegetation community, namely Fynbos, with a small amount of disturbance around the edge. There is some woody encroachment that has taken place in recent years, otherwise this pattern has been stable for nearly 100 years. A general habitat map is shown for the entire property in Figure 13. A series of photographs are provided above that give various views of the vegetation on site (in section of report "Verification of observations on site" with locations shown in Figure 10). The habitat assessment is important for understanding the natural status of the vegetation on site (whether in a natural state or secondary, and whether degraded, disturbed or in good condition), which affects the sensitivity. For the Plant Species assessment, it also provides habitats in which sensitive species could potentially occur.

Fynbos

The general fynbos on site has uniform structure over most of the area, consisting of *Erica peltata*, *Erica discolor* and *Dicerothamnus rhinocerotis* growing to a height of approximately 1 m tall. The initial impression is of relatively low local species richness, but there is a diversity of microhabitats, including local areas with ground-level rock outcrops, that contains a relatively high overall species richness. Any localised area where there has been vegetation pruning also yields high local richness.

The species composition includes a diversity of species, including *Achyranthemum paniculatum*, *Amphithalea violacea*, *Aspalathus spinosa*, *Asparagus mariae*, *Aspidoglossum gracile*, *Athanasia quinquedentata*, *Barleria pungens*, *Bobartia robusta*, *Chaenostoma denudatum*, *Chironia baccifera*, *Commelina africana*, *Cynanchum obtusifolium*, *Cyphia sylvatica*, *Dicerothamnus*



Figure 13: Map of habitats on site.

rhinocerotis, *Erica discolor*, *Erica peltata*, *Eriocephalus africanus*, *Felicia muricata*, *Ficinia acuminata*, *Ficinia nigrescens*, *Anthospermum* sp, *Gerbera crocea*, *Gerbera piloselloides*, *Helichrysum patulum*, *Helichrysum rutilans*, *Helichrysum teretifolium*, *Hermannia flammea*, *Hermannia lavandulifolia*, *Hermannia salviifolia*, *Hibiscus aethiopicus*, *Indigofera heterophylla*, *Indigofera nigromontana*, *Jamesbrittenia microphylla*, *Jamesbrittenia tenuifolia*, *Lobelia tomentosa*, *Metalasia acuta*, *Metalasia muricata*, *Monsonia emarginata*, *Muraltia ericoides*, *Muraltia squarrosa*, *Oedera genistifolia*, *Oedera imbricata*, *Oedera pungens*, *Olea exasperata*, *Oxalis punctata*, *Oxalis stellata*, *Pelargonium carneum*, *Polygala pubiflora*, *Prismatocarpus candolleanus*, *Restio albotuberculatus*, *Rhynchosia ciliata*, *Rhynchosia leucoscias*, *Selago corymbosa*, *Senecio ilicifolius*, *Tephrosia capensis*, *Ursinia discolor*, *Viscum capense*, and *Wahlenbergia desmantha*.

There are a relatively high number of species of succulent herbs on site, including *Acrodon bellidiflorus*, *Adromischus caryophyllaceus*, *Crassula ericoides*, *Crassula nudicaulis*, *Crassula subulata*, *Delosperma neethlingiae*, *Drosanthemum* sp, and *Lampranthus elegans*. Typically for renosterveld-type vegetation, or dryer forms of fynbos, there are several grass species on site that dominate in some parts of the site. This includes the following species: *Cymbopogon pospischilii*, *Eragrostis capensis*, *Eragrostis curvula*, *Heteropogon contortus*, *Hyparrhenia hirta*, *Melinis nerviglumis*, *Stipagrostis zeyheri*, *Themeda triandra*, and *Urochloa serrata*.

Parts of the site are dominated by woody shrubs / small trees, including the following species: *Aloe ferox*, *Carissa bispinosa*, *Clusia ericoides*, *Colpoon compressum*, *Diospyros dichrophylla*, *Lauridia tetragona*, *Myrsine africana*, *Olea europaea*, *Osteospermum moniliferum*, *Phyllica axillaris*, *Protea lanceolata*, *Protea repens*, *Pterocelastrus tricuspidatus*, *Searsia incisa*, *Searsia lucida*, *Searsia pallens*, *Searsia pterota*, *Sideroxylon inerme* (PROTECTED TREE), and *Tarchonanthus littoralis*. It appears from historical aerial photographs that these areas are naturally more woody and may form part of the ecotone to thicket in the nearby valley system.

Although indicated as "Degraded areas" in the habitat map, these areas are mostly where vegetation has been cut to near ground level, or has been trampled. The original species composition is usually present in these areas, and sometimes it is the only place where some herbaceous species were observed, indicating that limited localised disturbance is important for enhancing species richness and providing opportunities for species that may be subdued by progressively aging fynbos, especially in the absence of fire for long periods of time.

Red List plant species flagged for the site

According to the National Web-Based Environmental Screening Tool (DFFE), a number of plant species of concern are flagged for the site (see previous section of this report). These are mostly fynbos species, or are species found in intact natural habitat. Two species, *Hermannia lavandulifolia* and *Polygala pubiflora*, both listed as Vulnerable, were found on site. This is within the proposed development footprint area and will be directly affected by the proposed development. None of the remainder were found on site and, based on the habitat assessment, it is not considered likely that any of them would occur there.

Agathosma eriantha

Vulnerable B1ab(ii,iii,iv,v)

Found from Bredasdorp to Stilbaai on sea level flats in dry, clay soil interspersed with limestone chips. The study area falls just outside the known distribution range and no suitable habitat occurs on site. It is therefore unlikely to occur there.

Agathosma muii

Vulnerable A4abc

Found from Stilbaai to Mossel Bay on deep sands on coastal dunes associated with limestone. No suitable habitat occurs on site. It is therefore unlikely to occur there.

Agathosma riversdalensis

Vulnerable B1ab(ii,iii,iv,v)

Found from Arniston to Albertinia on the arid transitions between limestone and sand plain fynbos. The site is just outside the known distribution and no suitable habitat occurs on site. It is therefore unlikely to occur there.

Argyrolobium harmsianum

Endangered B1ab(ii,iii)

Found from Agulhas to Mossel Bay on coastal limestone. No suitable habitat occurs on site. It is therefore unlikely to occur there.

Aspalathus arenaria

Vulnerable B1ab(ii,iii,iv,v)

Found from Stilbaai to Gourits River mouth in fynbos-thicket mosaic on coastal marine sands. The known distribution is very slightly west of the current site. No suitable habitat occurs on site. It is therefore unlikely to occur there.

Aspalathus obtusifolia

Vulnerable B1ab(ii,iii,v)+2ab(ii,iii,v)

Found from Riversdale to Mossel Bay in lowland fynbos in fine-grained, black soil, up to 130 m above sea level. The site is well within the known distribution range and there are numerous observations between Gouritz River mouth and Mossel Bay. However, no suitable habitat occurs on site. It is therefore unlikely to occur there.

Aspalathus odontoloba

Endangered B1ab(iii)+2ab(iii)

Found near Albertinia in lowland fynbos below 10 m. It has been recorded numerous times around Gouritz, which is nearby. However, no suitable habitat occurs on site. It is therefore unlikely to occur there.

Athanasia cochlearifolia

Endangered B1ab(ii,iii,v)

Found from Stilbaai to Mossel Bay in lowland fynbos, often associated with limestone outcrops. Suitable habitat occurs on site within the fynbos, but no plants were seen there. The potentially suitable habitat on site is very limited in extent and was carefully searched. It is therefore assumed to be absent on the basis of not being seen.

Drosanthemum lavisii

Endangered B1ab(ii,iii,iv,v); C2a(i)

Found from Montagu and Bredasdorp to Albertinia on the ecotone between fynbos and renosterveld, at elevations of 150-200 m. The site is just outside the known distribution and no suitable habitat occurs on site. It is therefore unlikely to occur there.

Duvalia immaculata

Endangered B1ab(ii,iii,iv,v)

Found from Cape Infanta to Klein Brak River near Mossel Bay in the arid fynbos-renosterveld ecotone vegetation, on shale and limestone. No suitable habitat occurs on site. It is therefore unlikely to occur there.

Erica unicolor subsp. mutica

Vulnerable A4abc

Found from Mossel Bay to Herbertsdale and George on lowlands and lower south and north-facing slopes in fynbos. No suitable habitat occurs on site. It is therefore unlikely to occur there.

Hermannia lavandulifolia

Vulnerable A2c

Found from Worcester to the Overberg, and extends along the southern Cape coastal lowlands as far east as Plettenberg Bay. It is found on on clay slopes in renosterveld and valley thicket. Suitable habitat occurs on site.

Large numbers of this plant were found on site within the fynbos area (<https://www.inaturalist.org/observations/149810664>, 149809890, 108661176, 108655303). Personal observations of this species at various sites suggests that it is a relatively weedy species that prefers habitat that is burnt, mowed, or otherwise cleared (without soil disturbance), otherwise it gets outgrown.

The status of this species is currently being re-assessed and it is likely to be listed as Least Concern. Nevertheless, it only occurs on site within untransformed habitats, not secondary vegetation, although it tends to occur in more disturbed parts of the natural habitat. However, on the basis of the probable re-assessment of this species (SANBI, personal communication), it is not assessed here as a listed species.



Figure 14: *Hermannia lavandulifolia* (VU) found on site.

Erica viscosissima

Vulnerable B1ab(ii,iii,v)+2ab(ii,iii,v)

Found from Duiwenhoks River to Albertinia in fynbos on sandy flats. It has been recorded several times at Boggomsbaai. No suitable habitat occurs on site. It is therefore unlikely to occur there.

Euchaetis albertiniana

Endangered A2c

Found from De Hoop to George along the coast, inland to Albertinia on deep red sands over limestone in Canca Limestone Fynbos, Garden Route Granite Fynbos, Albertinia Sand Fynbos and Hartenbos Strandveld. It has been recorded multiple times around Mossel Bay, as well as at Klein Brakrivier and Tergniet. It could possibly occur on site, within fynbos. Suitable habitat occurs on site within the fynbos, but no plants were seen there. This area was carefully searched for SCC. It is therefore possible for it to occur there, but assumed to be absent on the basis of not being seen.

Lampranthus ceriseus

Vulnerable B1ab(ii,iii,iv,v)

Found from Agulhas Plain to Riversdale in coastal limestone fynbos. Nearest recent observation is from Gouritz, which is relatively nearby. However, no suitable habitat occurs on site. It is therefore unlikely to occur there.

Lampranthus diutinus

Endangered B1ab(ii,iii,iv,v)

Found from Mossel Bay to Riversdale on coastal sands in Albertinia Sand Fynbos and Hartenbos Strandveld. Recorded recently from east of Gouritz mouth, which is relatively nearby. However, no suitable habitat occurs on site. It is therefore unlikely to occur there.

Lampranthus fergusoniae

Vulnerable B1ab(ii,iii,iv,v)

Found from Pearly Beach to Knysna on calcareous soils often associated with limestone dunes. The site is well within the distribution range, as well as within the ecological zone in which the species occurs. However, no suitable habitat occurs on site. It is therefore unlikely to occur there, although not impossible. It was not seen on site.

Lampranthus foliosus

Endangered B1ab(ii,iii,iv,v)

Found from Mossel Bay to Gansbaai on limestone pavements. No suitable habitat occurs on site. It is therefore unlikely to occur there.

Lampranthus pauciflorus

Vulnerable A4abc

Found from Cape Infanta to Plettenberg Bay. Four known locations remain after most of this species' habitat has been transformed for coastal development. Habitat loss continues, especially around Plettenberg Bay, Mossel Bay and Knysna. It is found on rocky coastal slopes and clay hills. Major habitats are Groot Brak Dune Strandveld, Blombos Strandveld, Overberg Dune Strandveld, Potberg Sandstone Fynbos, Garden Route Granite Fynbos, Albertinia Sand Fynbos, Knysna Sand Fynbos, Hartenbos Strandveld, and Goukamma Dune Thicket. Suitable habitat occurs on site within the fynbos, but no plants were seen there. The potentially suitable habitat on site is very limited in extent and was carefully searched. It is therefore possible for it to occur there, but assumed to be absent on the basis of not being seen.

Lebeckia gracilis

Endangered A2bc; B1ab(ii,iii,iv,v)

Found from Gqeberha to Bredasdorp in coastal fynbos in deep, sandy soil below 300 m. No suitable habitat occurs on site. It is therefore unlikely to occur there.

Leucadendron galpinii

Vulnerable A4c

Found from De Hoop to Mossel Bay in low-lying areas between limestone hills on deeper, neutral soils. No suitable habitat occurs on site. It is a relatively large and conspicuous plant that would have been seen if it occurred there. It is therefore assumed to be absent on the basis of not being seen.

Leucospermum muiirii

Endangered A3c+4c (shown as Vulnerable on iNaturalist website)

Found from Stilbaai to Gouritz River mouth on deep sandy flats near the coast, 90-260 m. No suitable habitat occurs on site. It is a relatively large and conspicuous plant that would have been seen if it occurred there. It is therefore assumed to be absent on the basis of not being seen.

Leucospermum praecox

Vulnerable A2c+3c+4c

Found from Gourits River Mouth to Mossel Bay on tertiary acid sands associated with limestone formations on the coastal forelands. No suitable habitat occurs on site. It is a relatively large and conspicuous plant that would have been seen if it occurred there. It is therefore assumed to be absent on the basis of not being seen.

Metalasia luteola

Vulnerable B1ab(iii,v)+2ab(iii,v)

Found on the Riversdale coastal plain between Duiwenhoks and Gourits rivers in limestone hills. No suitable habitat occurs on site. It is therefore unlikely to occur there.

Polygala pubiflora

Vulnerable B1ab(ii,iii,iv)+2ab(ii,iii,iv)

Found from Cape Infanta to Mossel Bay on limestone and shale rocky outcrops. It is very common in the Aalwyndal and neighbouring areas and probably occurs on most of the properties in this area in which fynbos occurs.



Figure 15: *Polygala pubiflora* (VU) found on the property.

Large numbers of this plant were found on site within the fynbos areas, often along the margins of the fynbos on site (<https://www.inaturalist.org/observations/149812020>, 149808791, 108660680, 108658361). A total of more than 40 plants were found on site (Figure 16).

Habitat loss and degradation is the main threat to this species. Nearly 40% of this species habitat has already been lost to crop cultivation (calculated using GIS) and loss continues. Coastal development, as well as competition from alien invasive plants are the main ongoing threats to this species.

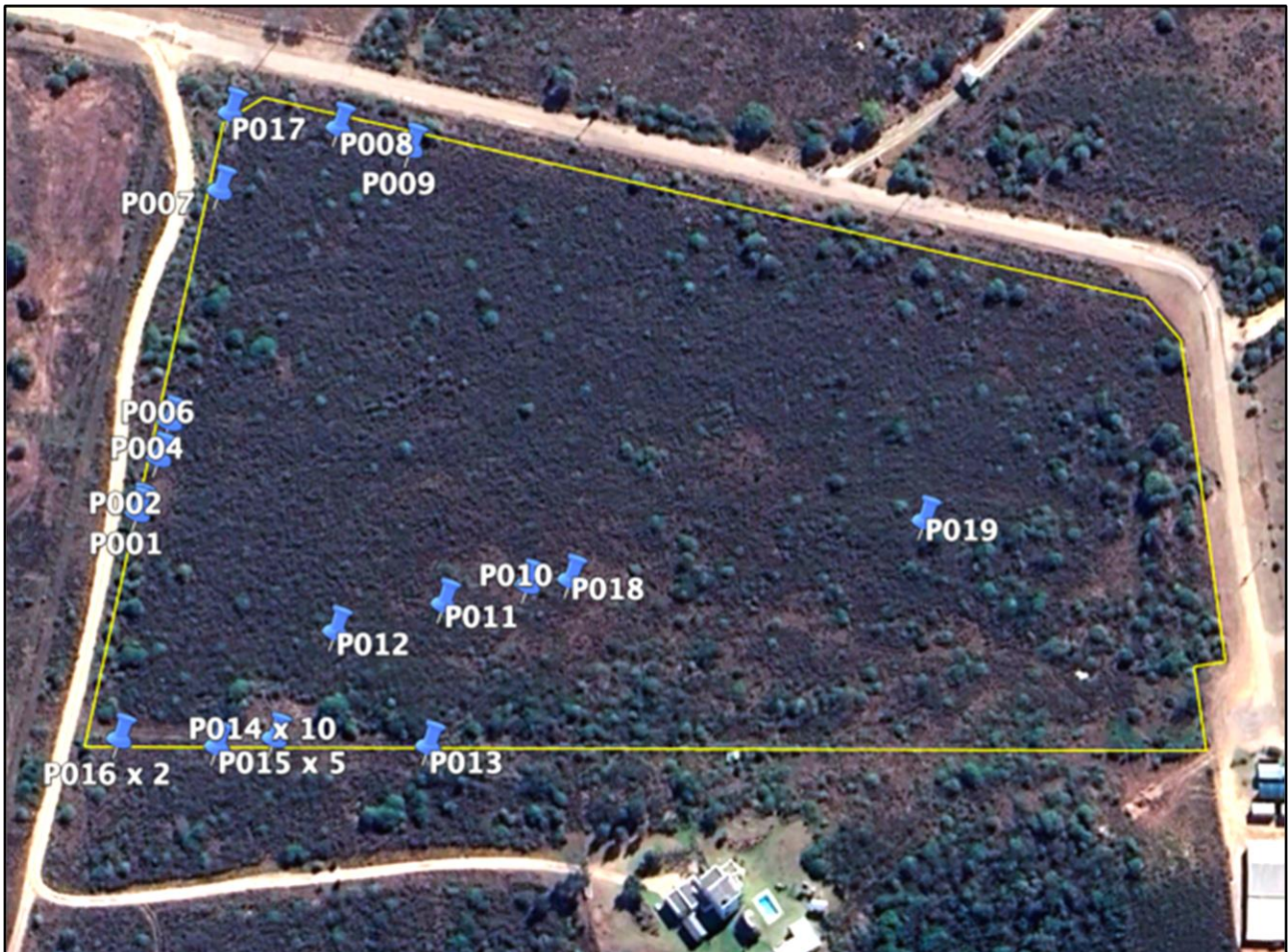


Figure 16: Locations where *Polygala pubiflora* (VU) was found on the property.

Ruschia leptocalyx

Endangered B1ab(ii,iii,iv,v)

Found from Potberg to Hartenbos on gravelly quartzitic and shale outcrops. No suitable habitat occurs on site. It is therefore unlikely to occur there.

Selago glandulosa

Vulnerable B1ab(ii,iii,iv,v)

Found from Potberg to Mossel Bay on coastal dunes and on limestone hills and outcrops. Suitable habitat occurs on site within the fynbos, but no plants were seen there. The potentially suitable habitat on site is very limited in extent and was carefully searched. It is therefore possible for it to occur there, but assumed to be absent on the basis of not being seen.

Selago villicaulis

Vulnerable B1ab(ii,iii,iv,v)

Found from Stilbaai to Knysna on fixed dunes up to 150 m. No suitable habitat occurs on site. It is therefore unlikely to occur there.

Sensitive species 500 (orchid)

Endangered C2a(i)

Found from Cape Flats to Gqeberha on lowland sandy flats, stabilised dunes and coastal rock promontories. Observations include coastal and mountain habitats. Suitable habitat occurs on site within the fynbos, but no plants were seen there. The potentially suitable habitat on site is very limited in extent and was carefully searched. It is therefore assumed to be absent on the basis of not being seen.

Sensitive species 800 (bulb)

Vulnerable B1ab(iii)

Found from Cape Peninsula to Knysna on limestone and clay loam soil, fynbos and renosterveld on coastal lowlands. Suitable habitat occurs on site within the fynbos, but no plants were seen there. The potentially suitable habitat on site is very limited in extent and was carefully searched. It is therefore assumed to be absent on the basis of not being seen.

Sensitive species 153 (small geophyte)

Endangered B1ab(ii,iii,v)+2ab(ii,iii,v)

Found in the area that includes the site (from near George to near Witsand) in Garden Route Shale Fynbos and Hartenbos Strandveld on lower slopes or flats, in sandy soil amongst low bushes. The distribution and habitat requirements appear to indicate that it could occur on site. The potentially suitable habitat on site is very limited in extent and was carefully searched. No plants were seen and it is therefore assumed that it does not occur there.

Sensitive species 268 (small succulent)

Endangered B1ab(iii,iv,v)

Found from Herbertsdale and the Gourits Valley to the Great Brak River in renosterveld-thicket mosaic, in gravelly, clay soil on south-facing slopes. Suitable habitat occurs on site within the fynbos, but no plants were seen there. The potentially suitable habitat on site is very limited in extent and was carefully searched. It is therefore assumed to be absent on the basis of not being seen.

Sensitive species 1024 (orchid)

Endangered B1ab(iii,v)+2ab(iii,v); C2a(ii)

Found from Riversdale to Knysna and on the northern slopes of the Langeberg Mountains in fynbos and renosterveld up to 200 m elevation. Suitable habitat occurs on site within the fynbos, but no plants were seen there. The potentially suitable habitat on site is very limited in extent and was carefully searched. It is therefore assumed to be absent on the basis of not being seen.

Sensitive species 654 (orchid)

Vulnerable C2a(i)

This species has a wide distribution from the Cape Peninsula to Somerset East and Cathcart, where it is found in variable habitats, including in acidic and alkaline sands, on coastal lowlands and mountain slopes and plateaus. Near the coast it is often in association with restios. Habitat conditions on site are probably suitable for this species, given its wide habitat tolerance, but it appears to be associated with restios near the coast, which excludes vegetation on site. No plants were seen and it is therefore assumed that it does not occur there.

Thamnochortus muirii

Vulnerable B1ab(i,ii,iii,iv,v)

Found from Potberg to Mossel Bay on deep sandy habitats associated with limestone, 30-200 m. Potentially suitable habitat occurs on site. Suitable habitat occurs on site within the fynbos, but no plants were seen there. The potentially suitable habitat on site is very limited in extent and was carefully searched. It is therefore assumed to be absent on the basis of not being seen.

Wahlenbergia polyantha

Vulnerable B1ab(ii,iii,iv,v)

Found from Kleinmond to Knysna on sandy flats. No suitable habitat occurs on site. It is therefore unlikely to occur there.

Summary

Two listed plant species were found on the property, namely *Hermannia lavandulifolia* (Vulnerable) and *Polygala pubiflora* (Vulnerable). Both were found in relatively high numbers on site, within the footprint of the proposed development. They will therefore be directly affected by the proposed development.

There are another eight species for which suitable or marginally suitable habitat occurs on site, namely *Erica viscosissima* (Vulnerable), *Euchaetis albertiniana* (Endangered), *Lampranthus pauciflorus* (Vulnerable), *Leucadendron galpinii* (Vulnerable), *Leucospermum galpinii* (Endangered), *Leucospermum praecox* (Vulnerable), *Selago glandulosa* (Vulnerable) and Sensitive species 500 (Endangered).. These areas were carefully searched for SCC and none of these species were found.

There are therefore two threatened species that occur on site within the proposed development area. It is therefore verified that the Plant Species Theme has HIGH sensitivity for the development footprint. (confirmed habitat for SCC based either on historical records prior to 2002 or being a natural area included in a habitat suitability model for this species). Where SCC are found on site or have been confirmed to be likely present, a Terrestrial Plant Species Specialist Assessment must be submitted in accordance with the requirements specified for “very high” and “high” sensitivity (GN 1150: PROTOCOL FOR THE SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS FOR ENVIRONMENTAL IMPACTS ON TERRESTRIAL PLANT SPECIES).

SITE ECOLOGICAL IMPORTANCE

The Species Environmental Assessment Guidelines require that a Site Ecological Importance (SEI) is calculated for each habitat on site, and provides methodology for making this calculation. The SEI is assessed separately for each biodiversity theme and is assessed below specifically for the Terrestrial Biodiversity theme.

As per the Species Environmental Assessment Guidelines, Site Ecological Importance (SEI) is calculated as a function of the Biodiversity Importance (BI) of the receptor and its resilience to impacts ($SEI = BI + RR$). The Biodiversity Importance (BI) in turn is a function of Conservation Importance (CI) and Functional Integrity (FI), i.e. $BI = CI + FI$.

An assessment of habitats on site is provided below (Table 3).

Note that Receptor Resilience is calculated relative to the CURRENT status of the site. In other words, if a habitat is highly degraded and contains mostly weeds then the resilience is scored as high, because it would be easy to return it to that particular state. Conversely, where a site is in a pristine state and the vegetation is removed through development, it is almost certain that the original composition is impossible to restore, therefore the resilience is scored as Very Low.

Table 2: Site ecological importance for habitats found on site

Habitat	Conservation importance	Functional integrity	Receptor resilience	Site Ecological Importance (BI)
Fynbos	<p style="text-align: center;">Medium</p> <p>Confirmed occurrence of a VU plant species listed under criterion B (= High CI). > 50% of receptor contains natural habitat with potential to support SCC (= Medium CI).</p>	<p style="text-align: center;">High</p> <p>No or minimal current negative ecological impacts with no signs of major past disturbance (e.g. ploughing) (= Very High FI). Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types (= Medium FI) - if site considered in isolation; it is currently part of much larger connected area. Good habitat connectivity with potentially functional ecological corridors and a regularly used road network</p>	<p style="text-align: center;">Very low</p> <p>Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.</p>	<p style="text-align: center;">High</p> <p>(BI = Medium)</p>

		<p>between intact habitat patches (if considering site as part of larger landscape - within the site the habitat connectivity is high) (= High FI). Taking three factors together (no ecological impacts, good connectivity & size of site), FI score of High is assigned.</p>		
Disturbed areas	<p style="text-align: center;">High</p> <p>Confirmed occurrence of a VU plant species listed under criterion B (= High CI). > 50% of receptor contains natural habitat with potential to support SCC (= Medium CI).</p>	<p style="text-align: center;">Low</p> <p>Mostly minor current negative ecological impacts with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential (=High FI). Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types (= Medium FI) - if site considered in isolation; it is currently part of much larger connected area. Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches (if considering site as part of larger landscape - within the site the habitat connectivity is high) (= High FI). Taking three factors together (minor ecological impacts, good connectivity & size of site), FI score of Medium is assigned.</p>	<p style="text-align: center;">Very low</p> <p>Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.</p>	<p style="text-align: center;">High (BI = Medium)</p>

Guidelines for development activities within different importance levels are given in the Table below (Table 8).

Table 3: Guidelines for interpreting SEI in the context of the proposed development activities

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

Summary of site sensitivity

Although the site is within a vegetation type that is not threatened, and does not occur within any CBA or ESA, the vegetation on site is in good condition with relatively high species richness, and contains a healthy population of a vulnerable plant species. The good condition of vegetation in a natural state, the presence of the Vulnerable plant species, the good functional integrity and the low resilience to the type of disturbance that will result from the proposed development result in the SEI score being High or Very High (depending on whether the Vulnerable plant species is considered or not).

Follow-up surveys after detecting the Vulnerable plant species indicate that areas mapped as "Degraded" are, in fact, primarily where vegetation has been cut down without any significant soil disturbance. These areas have equivalent species composition as "natural" areas, including presence of the Vulnerable plant species. Sometimes these disturbed zones are the location for species not detected elsewhere on site, meaning that the disturbance is sufficient enough to open the vegetation up in a similar way as burning, but not enough to degrade the species composition of the vegetation.

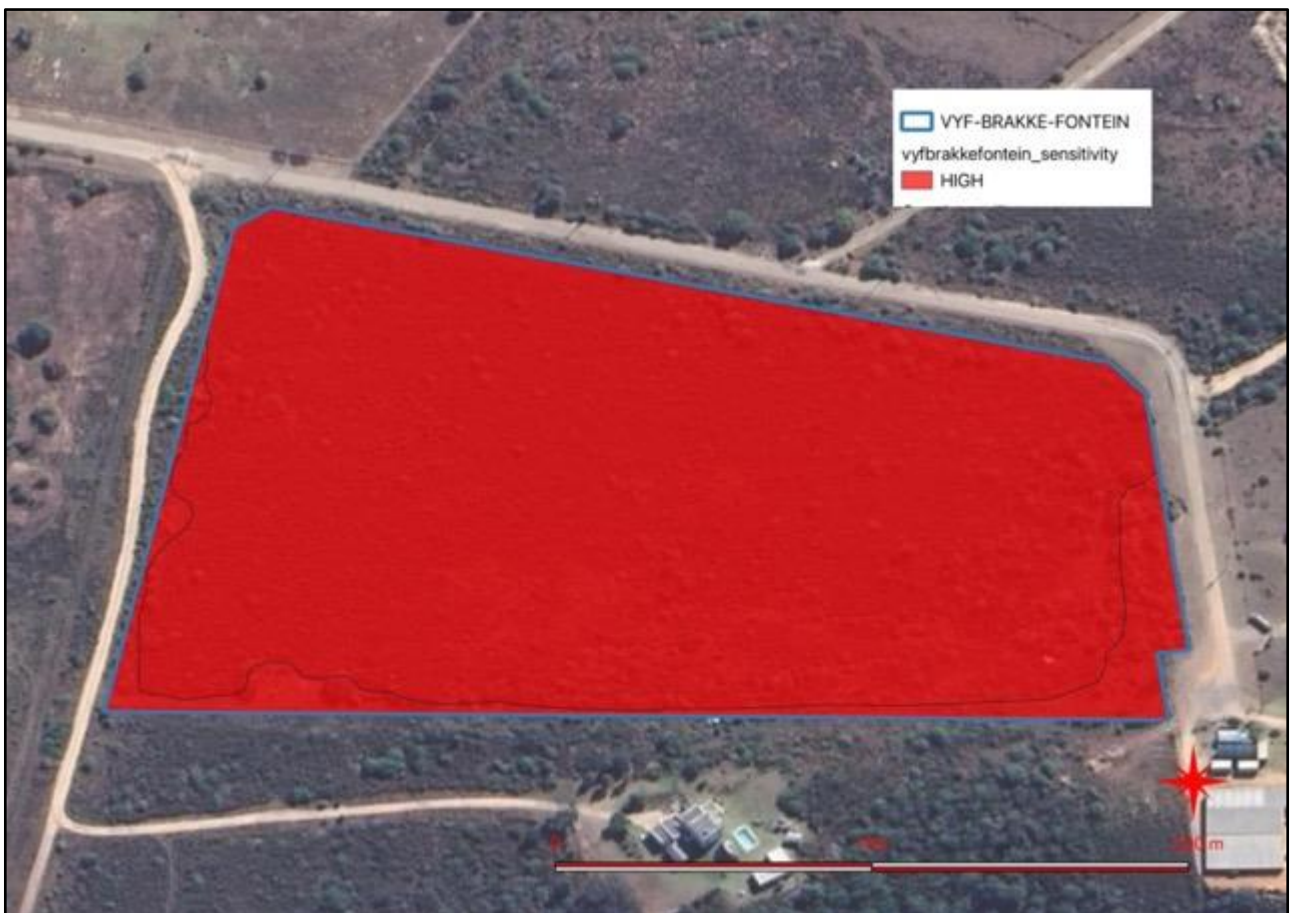


Figure 17: Terrestrial Plant Species theme sensitivity for the site.

IMPACT ASSESSMENT

Proposed development

The proposal is to develop residential areas on site. The proposed development alternatives are shown in Figures 4 - 6, which are variations. The development will be located within habitats in the VERY HIGH and HIGH Site Ecological Importance classes.

For the assessment undertaken here, four alternatives are being considered:

1. Alternative 1: No-Go Alternative: continued current land use.
2. Alternatives 2 - 4: Development Alternative: development of most of the site.

Any comparisons below between the development proposal and the "No-go" alternative are for the same area (proposed development area).

Alternative 1

This is the "No-go" alternative. The property will remain vacant and under current management. Current burning regimes and alien invasive levels are likely to remain relatively static. There is currently no ecological burning regime for the site. The impact of this is uncertain but likely to lead to fynbos senescence and possible loss of species. Fynbos becomes moribund in the absence of fire, therefore any fynbos species would require some fire management. Alien invasive plants are under control, which may continue under the present ownership, but could change.

Alternatives 2

This is the preferred development option. Under this option there is likely to be almost complete loss of natural vegetation on site. Areas not lost to development are likely to undergo elevated disturbance into the future, including absence of fire and probable increase in invasion by alien plant species, which are favoured by disturbance.

Alternatives 3 & 4

These are the original development options (not preferred). Under this option there is likely to be almost complete loss of natural vegetation on site. Areas not lost to development are likely to undergo elevated disturbance into the future, including absence of fire and probable increase in invasion by alien plant species, which are favoured by disturbance.

Affected sensitivities

All areas within the proposed development footprint are within areas of natural vegetation.

The impacts assessed here are therefore as follows:

1. LOSS OF POPULATIONS OF LISTED THREATENED PLANT SPECIES
2. LOSS OF INDIVIDUALS OF PROTECTED TREE SPECIES

Loss of populations of listed threatened plant species

Resource irreplaceability

The plant species affected are *Polygala pubiflora*, listed as VULNERABLE, and *Hermannia lavandulifolia*, listed as VULNERABLE. Score = 3.

Threshold

The potential impact affects a small proportion of the overall known population of each species. The species with the more restricted distribution is *Polygala pubiflora*, for which the site is part of a general area (Aalwayndal) that is an area of high for the species. Score = 2.

Resource condition

For *Polygala pubiflora* the population on site and in surrounding areas is relatively healthy and self-sustaining. Score = 5.

Reversibility of impact

For *Polygala pubiflora*, it may be IRREVERSIBLE. The loss of habitat means that the plants have a smaller overall resource space. Score = 5.

Extent of impact

The impact will occur within the site boundary. For *Polygala pubiflora* it is unlikely that loss of plants on site will affect the regional status of the species - this could change if cumulative impacts in this area occur due to development of a number of properties in the area. Score = 1.

Duration of impact

Loss of the habitat on site is assessed as being permanent. Score = 5

Intensity of impact

At a local scale, the impact is of VERY HIGH intensity, since it would result in the permanent loss of the populations on site. Score = 5.

Probability of occurrence

Based on the proposed development plan and the known location of the individuals found on site, the impact will be DEFINITE. Score = 5.

Confidence

There is a high understanding in the identity and distribution of the species on site, as well as the nature and extent of the proposed activity. A high proportion of suitable habitats were checked on site and it is not expected that the on-site population varies much from what was observed. Additional searches will improve the overall count but not the on-site distribution. However, it is unknown whether any individuals of *Erica platycalyx* or *Euchaetis albertiniana* occur in surrounding areas or not. Additional measures are therefore required to improve the confidence in the assessed impact.

Significance of impact

The significance is a combination of the value of the biodiversity resource, the magnitude of the expected impact and the probability of the impact occurring.

Biodiversity value score: $(3 + 2 + 5 + 5)/4 = 3.75$

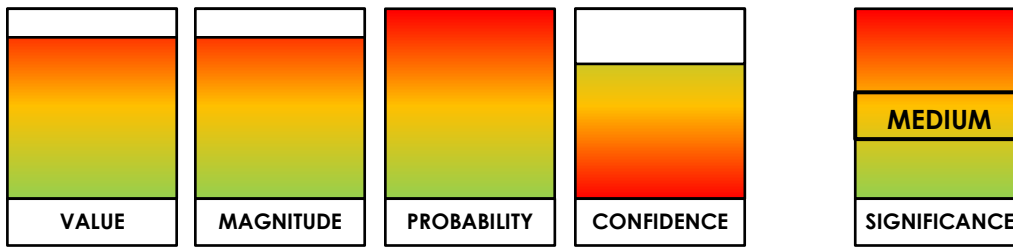
Impact magnitude: $(1 + 5 + 5)/3 = 3.67$

Impact probability: 5.00

The calculation of the significance of an impact uses the following formula:

Significance = (Biodiversity value) x (Magnitude) x (Probability).

On this basis, the impact is calculated as $(3.75 \times 4.33 \times 5.00 = 68.75) / 25 = 2.75 = \text{MEDIUM}$ significance



Possible mitigation measures

Possible mitigation measures that can be applied are as follows:

1. Leave a natural corridor around the southern and western boundaries of the site, as well as a small part of the northern boundary (Figure 18). This will exclude most of the population on site from development and reduce the magnitude of the impact (to 3: *processes continue but in a modified way*) and the probability of the impact occurring (to 4: high likelihood). Any smaller area retained would preserve a proportion of the current population. It appears that mechanically controlling vegetation within this area is likely to promote persistence of this species (as currently occurs along the southern boundary).
2. Plant rescue is not recommended, except for horticultural purposes. The ecological effects on receiver habitats is considered to be as damaging as the loss of individuals within the original habitat. There are no circumstances related to the current situation that would warrant rescue. The plant is relatively widespread and there are healthy populations at other locations. The current population was previously unknown therefore the new effect on the conservation status of the species is unchanged.



Figure 18: Proposed areas to be retained in a natural state, rather than landscaped.

Significance of impact after mitigation

Biodiversity value score: $(3 + 2 + 5 + 5)/4 = 3.75$

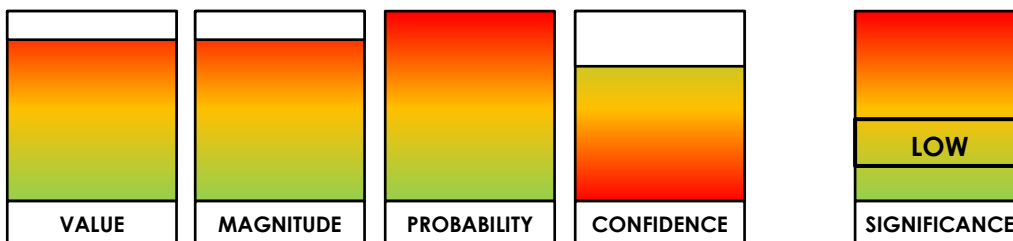
Impact magnitude: $(1 + 5 + 3)/3 = 3.00$

Impact probability: 4.00

The calculation of the significance of an impact uses the following formula:

Significance = (Biodiversity value) x (Magnitude) x (Probability).

On this basis, the impact is calculated as $(3.75 \times 3.00 \times 4.00 = 45.00)/25 = 1.80 = \text{LOW}$ significance



Loss of individuals of protected tree species

This assessment is for both layout options. For the preferred layout, most of the protected trees seen on site are retained (see Figure 18 below). This does not change the significance of the impact due to the categorical nature of determining this, but is preferred because it affects fewer trees.

Resource irreplaceability

The tree species affected are *Sideroxylon inerme* and *Pittosporum viridiflorum*, both protected under the National Forests Act. Several small trees were seen on site (Figure 18). The species are widespread but are key and, in the case of milkwoods, a dominant component of coastal forests in the Garden Route. Score = 2.

Threshold

The potential impact affects a very small proportion of the overall known population of the species. Score = 1.

Resource condition

The trees on site are in good condition but are not an important component of vegetation on site. Score = 3.

Reversibility of impact

Loss of individuals on site is possibly PARTLY REVERSIBLE in terms of replacement of individuals due to natural population processes or deliberate planting (milkwoods plant easily and grow well in this type of environment). Score = 2.

Extent of impact

The impact will occur within the site boundary (within the development footprint). Score = 1.

Duration of impact

Loss of the habitat on site is assessed as being long-term on the basis that trees removed can be replaced through planting - the timeframe is to allow planted individuals to achieve a reasonable size, which could take 10 years or more. Score = 5

Intensity of impact

At a local scale, the impact is of LOW intensity, since it would result (for the Alternative layout) in the permanent loss of a small number of small trees on site - for the preferred layout, it is possible to retain all the trees (see Figure 17). Score = 2.

Probability of occurrence

Based on the proposed development plan and the known location of the individuals found on site, the impact has LOW PROBABILITY. Score = 2.

Confidence

There is a moderate understanding in the identity and distribution of the species on site, as well as the nature and extent of the proposed activity. Additional searches will improve the overall count of the on-site distribution. Additional measures are therefore required to improve the confidence in the assessed impact.

Significance of impact

The significance is a combination of the value of the biodiversity resource, the magnitude of the expected impact and the probability of the impact occurring.

Biodiversity value score: $(2 + 1 + 3 + 2)/4 = 2.00$

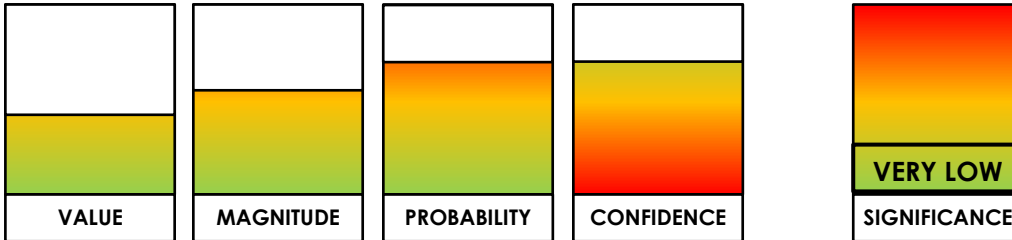
Impact magnitude: $(1 + 5 + 2)/3 = 2.67$

Impact probability: 2.00

The calculation of the significance of an impact uses the following formula:

Significance = (Biodiversity value) x (Magnitude) x (Probability).

On this basis, the impact is calculated as $(2.00 \times 2.67 \times 2.00 = 10.7) / 25 = 0.43 = \text{VERY LOW}$ significance



Possible mitigation measures

Possible mitigation measures that can be applied are as follows:

1. Avoid areas of protected trees (this is mostly achieved with the preferred layout - see Figure 18).
2. If any trees need to be removed or pruned then a permit is required, according to the National Forests Act.
3. Plant additional milkwoods in the development as part of the final landscaping. These can be planted along with other appropriate coastal forest species, but the proportions and composition should reflect habitat that would have occurred naturally at this site.



Figure 19: Location of protected trees found on site relative to the preferred layout.

CONCLUSION

Desktop information, field data collection and mapping from aerial imagery provides the following verifications of patterns for the plant species theme:

1. The habitat on site is fynbos with a relatively high species richness, including the presence of two Vulnerable plant species, *Polygala pubiflora* and *Hermannia lavandulifolia*. (The status of this second plant species is currently being re-evaluated and it is likely to be re-assessed as having lower threat status).
2. An impact assessment indicates that loss of the population of *Polygala pubiflora* (Vulnerable) on site has an impact of Medium significance. A possible mitigation is to retain a natural corridor along the southern and western boundary of the site where the largest concentration of the plants occur. With this mitigation measure implemented, the impact is scored as having Low significance.
3. There are a small number of protected trees on site (*Sideroxylon inerme* and *Pittosporum viridiflorum*). These are mostly avoided with the preferred layout, but would be lost with the alternative (original) layout. For both options the significance is scored as having Very Low significance, but it is preferable to limit the number of trees lost as much as possible.

RECOMMENDATIONS

- If any milkwood or cheesewood trees are to be affected by the proposed development, it is a requirement that a permit be obtained, as per the National Forests Act. These were recorded as a small number of small individuals in the south-eastern corner of the site.
- Retaining a narrow corriDOR along the southern and western boundary would avoid loss of most of the population on site. Mechanically controlling vegetation within this band (as is currently occurring along the southern boundary) appears to be all that is required to ensure survival.

REFERENCES

- Germishuizen, G., Meyer, N.L., Steenkamp, Y And Keith, M. (eds.) (2006). A checklist of South African plants. Southern African Botanical Diversity Network Report No. 41, SABONET, Pretoria.
- IUCN (2001). *IUCN Red Data List categories and criteria: Version 3.1*. IUCN Species Survival Commission: Gland, Switzerland.

APPENDICES:

Appendix 1: Plant species recorded on site.

Acacia cyclops (Invader Category 1b)

Achyranthemum paniculatum

Acrodon bellidiflorus

Adromischus caryophyllaceus

Aloe arborescens × *ferox*

Aloe ferox

Amphithalea violacea

Anthospermum sp

Aspalathus spinosa

Asparagus mariae

Aspidoglossum gracile

Athanasia quinquedentata

Barleria pungens

Bobartia robusta

Carissa bispinosa

Carpobrotus edulis

Chaenostoma denudatum

Chironia baccifera

Clutia ericoides

Colpoon compressum

Commelina africana

Crassula ericoides

Crassula nudicaulis

Crassula subulata

Cymbopogon pospischilii

Cynanchum obtusifolium

Cyphia sylvatica

Delosperma neethlingiae DDT

Dicrothamnus rhinocerotis

Diospyros dichrophylla

Drosanthemum sp

Eragrostis capensis

Eragrostis curvula

Erica discolor

Erica peltata

Eriocephalus africanus

Felicia muricata

Ficinia acuminata

Ficinia nigrescens

Gerbera crocea

Gerbera piloselloides

Helichrysum patulum

Helichrysum rutilans

Helichrysum teretifolium

Hermannia flammea

Hermannia lavandulifolia VU A2c

Hermannia salviifolia

Heteropogon contortus

Hibiscus aethiopicus

Hyparrhenia hirta

Indigofera heterophylla
Indigofera nigromontana
Jamesbrittenia microphylla
Jamesbrittenia tenuifolia
Lampranthus elegans
Lauridia tetragona
Lobelia tomentosa
Melinis nerviglumis
Metalasia acuta
Metalasia muricata
Monsonia emarginata
Muraltia ericoides
Muraltia squarrosa
Myrsine africana
Oedera genistifolia
Oedera imbricata
Oedera pungens
Olea europaea
Olea exasperata
Osteospermum moniliferum
Oxalis punctata
Oxalis stellata
Pelargonium carneum
Phyllica axillaris
Pittosporum viridiflorum
Polygala pubiflora VU B1 ab(ii,iii,iv)+2ab(ii,iii,iv)
Prismatocarpus candolleanus
Protea lanceolata
Protea repens
Pterocelastrus tricuspidatus
Restio albotuberculatus
Rhynchosia ciliata
Rhynchosia leucoscias
Searsia incisa
Searsia lucida
Searsia pallens
Searsia pterota
Selago corymbosa
Senecio ilicifolius
Sideroxylon inerme (Protected NFA)
Stipagrostis zeyheri
Tarchonanthus littoralis
Tephrosia capensis
Themeda triandra
Urochloa serrata
Ursinia discolor
Viscum capense
Wahlenbergia desmantha