Plants, Animals & Terrestrial Biodiversity Assessment

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

Portion 33 of Farm 437 Hillview, Plettenberg Bay in the Western Cape Province

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Plant Species, Animal Species and Terrestrial Biodiversity Assessment Report for Portion 33 of Farm 437 Hillview, Plettenberg Bay in the Western Cape Province

23 May 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.)	• PhD Botany • SACNASP Reg. no. 400221/05 (Ecology, Botany)
Dr Wynand Vlok	PhD Zoology Pr. Sci. Nat. 400109/95 (Zoological Science, Botanical Science)

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.

_____ 23 May 2024

Dr David Hoare Date

TERMS OF REFERENCE

This report is prepared in compliance with the PROTOCOL FOR THE SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS FOR ENVIRONMENTAL IMPACTS ON TERRESTRIAL BIODIVERSITY, TERRESTRIAL PLANT SPECIES AND TERRESTRIAL ANIMAL 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. 320 dated 20 March 2020 for Terrestrial Biodiversity, and 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 is Portion 33 of Farm 437 Hillview, Plettenberg Bay in the Western Cape Province. The site is adjacent to the N2 National Road between Knysna and Plettenberg Bay where it enters from the western side to Plettenberg Bay. This is to the north of Kwanokuthula. Refer to Figure 1 below for the general location.

The site is accessed directly from the N2 national road. The boundaries of the site are cadastral boundaries but these follow the Dieprivier River valley on the north-western side of the site and a smaller valley along the south-eastern side of the site. These two valleys are relatively steep-side and contain mesic woodland. The vegetation in the floor of the Dieprivier valley has all the structural and floristic characteristics of forest. The central part of the site is the summit of a ridge that projects north-eastwards between these two valleys.

The scope of this report is the entire property, part of which is planned to be developed. The entire site is 44.95 ha.

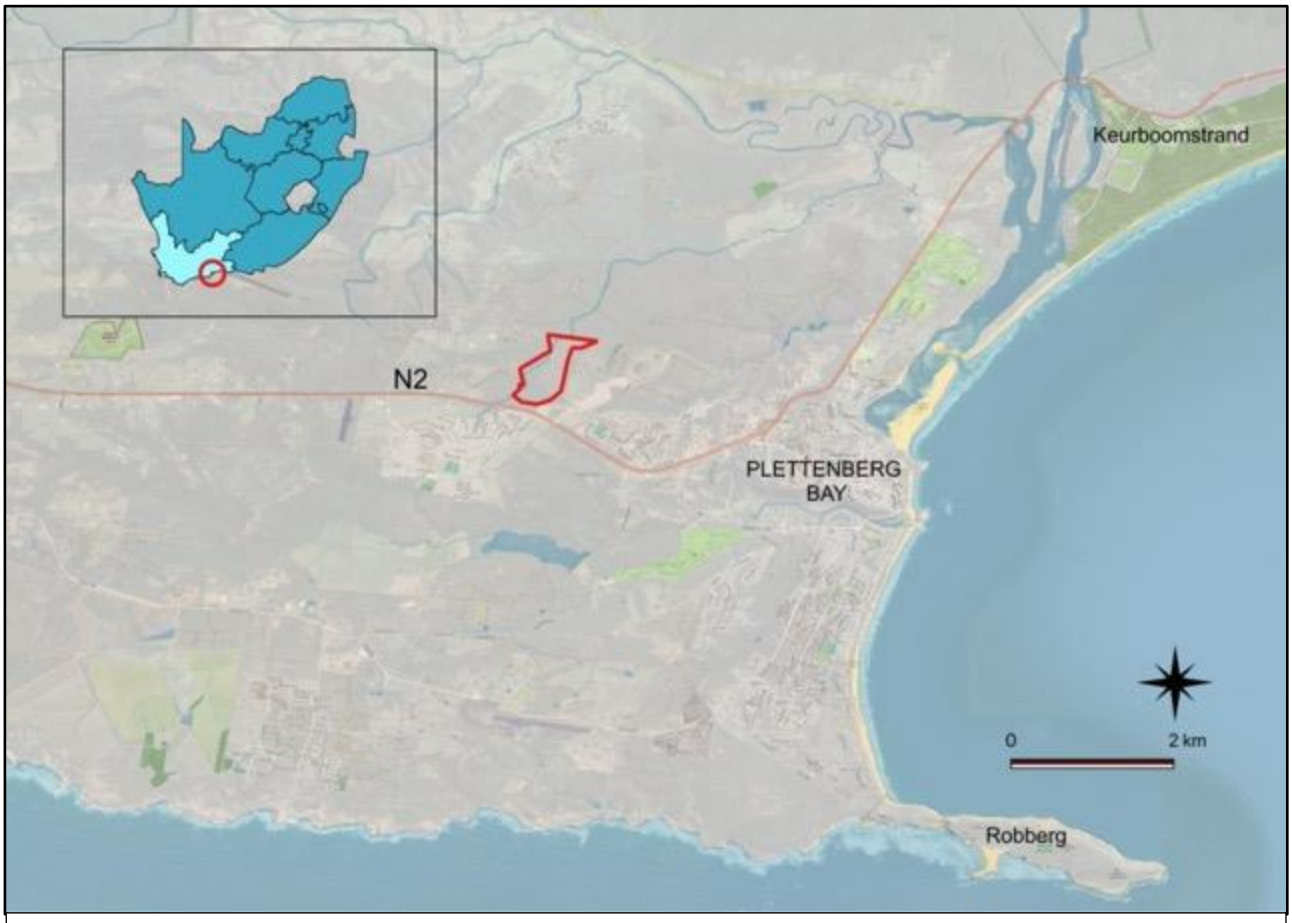


Figure 1: Location of the site (within red circle).

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: Services | Burial and cemeteries | Cemeteries. The DEA Screening Tool report for the area, dated 10/08/2022, indicates the following ecological sensitivities:

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Animal Species Theme		X		
Plant Species Theme			X	
Terrestrial Biodiversity Theme	X			

Animal Species theme

Sensitivity features are indicates as follows:

Sensitivity	**Feature(s)**
High	Aves-Circus ranivorus
High	Aves-Circus maurus
High	Aves-Stephanoaetus coronatus
High	Aves-Neotis denhami
High	Aves-Bradypterus sylvaticus
High	Aves-Polemaetus bellicosus

Medium	Amphibia-Afrixalus knysnae
Medium	Aves-Circus maurus
Medium	Aves-Stephanoaetus coronatus
Medium	Insecta-Aloeides thyra orientis
Medium	Insecta-Tsitana dicksoni
Medium	Mammalia-Chlorotalpa duthieae
Medium	Sensitive species 8
Medium	Invertebrate-Aneuryphymus montanus

Plant Species theme

Sensitivity features are indicates as follows:

Sensitivity	Feature(s)
Medium	Ruschia duthiae
Medium	Indigofera hispida
Medium	Aspalathus bowieana
Medium	Sensitive species 131
Medium	Leucospermum glabrum
Medium	Mimetes pauciflorus
Medium	Selago burchellii
Medium	Sensitive species 419
Medium	Erica glandulosa subsp. fourcadei
Medium	Pterygodium newdigateae
Medium	Felicia westae
Medium	Osteospermum pterigoideum
Medium	Acmadenia alternifolia
Medium	Muraltia knysnaensis
Medium	Erica glumiflora
Medium	Acrolophia lunata
Medium	Sensitive species 763
Medium	Pterygodium cleistogamum

Terrestrial Biodiversity theme

Sensitivity features are indicates as follows:

Sensitivity	Feature(s)
Very High	Critical biodiveristy area 1
Very High	FEPA Subcatchments
Very High	Strategic Water Source Areas
Very High	Critically Endangered ecosystem

PROPOSED DEVELOPMENT

The proposed development is described below.

The proposal is the development of a cemetery in the southern part of the site (Figure 3). This will include an access road and a memorial garden.

Project Area of Influence (PAOI)

Anticipated impacts will occur partly during the construction phase (road, fencing, utilities, etc.) and partly during the operational phase (use of the cemetery for burials). These impacts are not expected to extend beyond the boundaries of the development area. The PAOI is therefore treated here as the development footprint within which direct impacts will occur (Figure 3).

Figure 3: Proposed development footprint within the site.

ASSESSMENT METHODOLOGY

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

Survey timing

The study commenced as a desktop-study followed by site-specific field study on 5 and 7 June 2023. The site is within the Fynbos Biome with an all-year rainfall season with a slight dip in early winter (Figure 4). A more accurate indication of rainfall seasonality, which drives most ecological processes, is shown in Figure 5, which shows that Plettenberg Bay has peak rainfall from August to November, with another smaller peak in March to April. The timing of the survey in June is therefore acceptable 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.

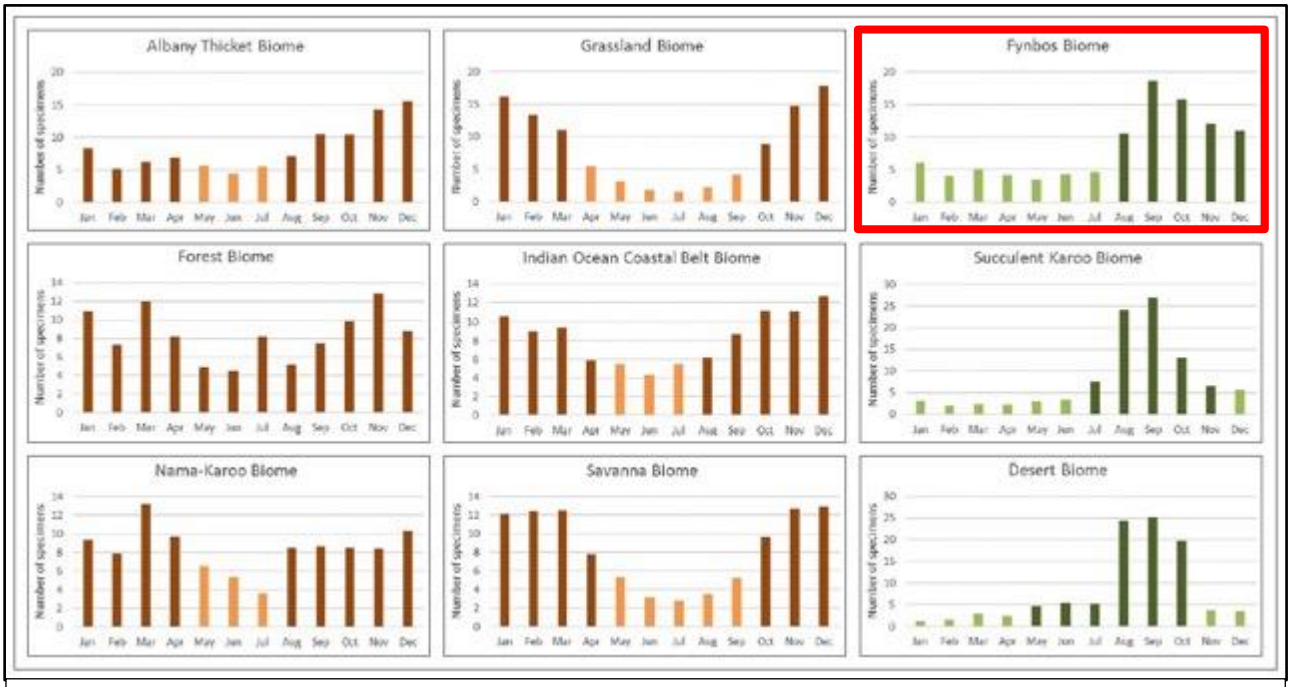


Figure 5: Recommended survey periods for different biomes (Species Environmental Assessment Guidelines). The site is within the Fynbos Biome.

Figure 4: Climate diagrams showing monthly rainfall for Mossel Bay (left), Knysna (centre) and Plettenberg Bay (right).

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 8). 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.

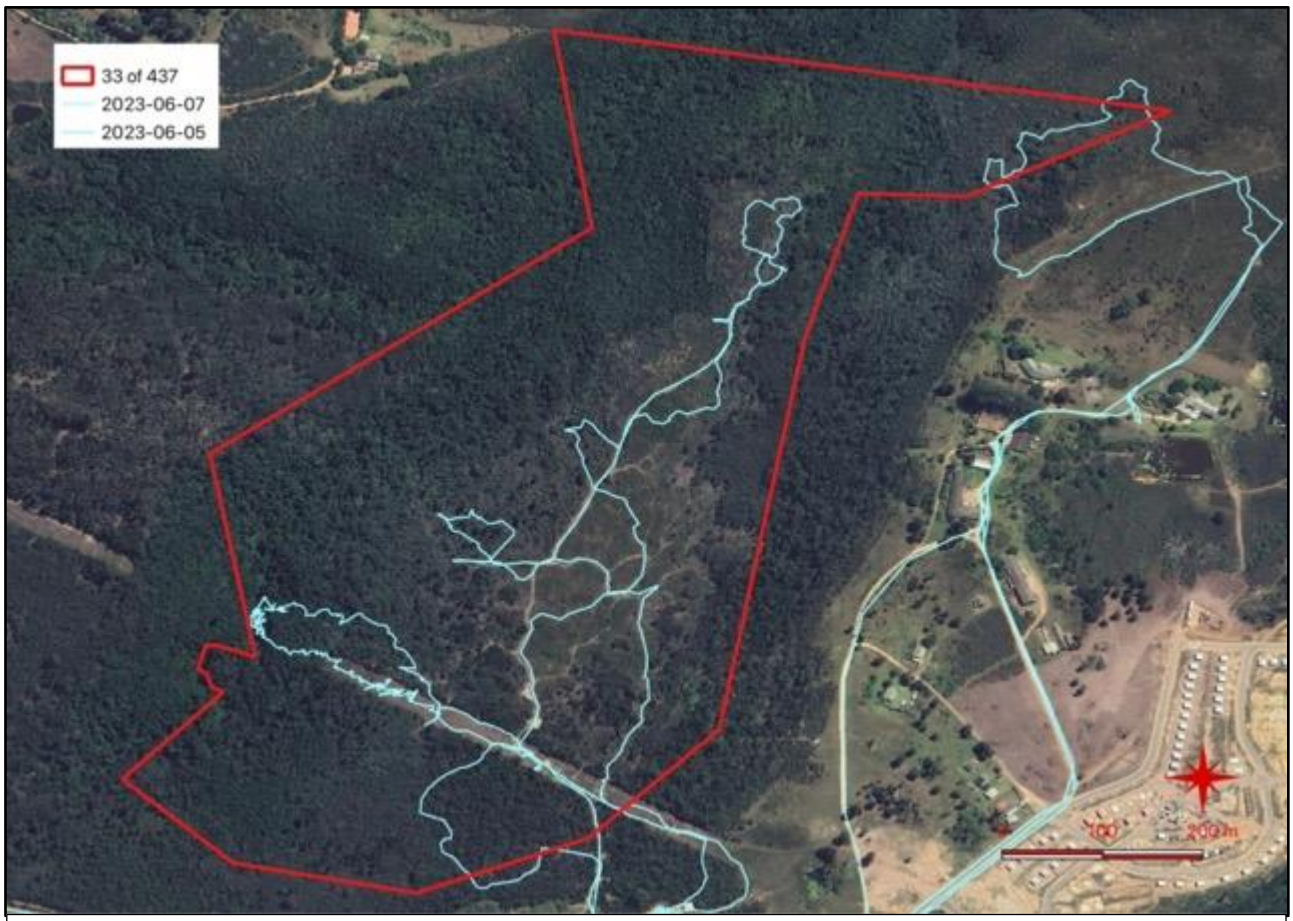


Figure 6: GPS track log of areas walked in the course of undertaking this assessment.

Sources of information

Regional Vegetation

- Broad vegetation types occurring on site were obtained from Mucina and Rutherford (2006), with updates according to the SANBI BGIS website (http://bgis.sanbi.org), as follows:
    - Mucina, L. and Rutherford, M.C. (editors) 2006. Vegetation map of South Africa, Lesotho and Swaziland: an illustrated guide. Strelitzia 19, South African National Biodiversity Institute, Pretoria.
    - South African National Biodiversity Institute 2018 Final Vegetation Map of South Africa, Lesotho and Swaziland [Vector] 2018. Available from the Biodiversity GIS website, downloaded on 23 September 2021.
- The description of each vegetation type includes a list of plant species that may be expected to occur within the particular vegetation type.

Threatened Ecosystems

- The conservation status of the vegetation types were obtained from Mucina and Rutherford (2006) and the National List of Ecosystems that are Threatened and in need of protection (GN1002 of 2011), published under the National Environmental Management: Biodiversity Act (Act No. 10, 2004). Updates from the National Biodiversity Assessment 2018 were taken into consideration, although these have not yet been gazetted.
- The plant species checklist of species that could potentially occur on site was compiled from a plant species checklist extracted from the NewPosa database of the South African National biodiversity Institute (SANBI) for the quarter degree grid 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).

Regional plans

- Information from the National Protected Areas Expansion Strategy (NPAES) was consulted for possible inclusion of the site into a protected area in future (available on http://bgis.sanbi.org).).
- The 2017 Western Cape Biodiversity Spatial Plan (WCBSP) Maps were consulted for inclusion of any parts of the site into any Critical Biodiversity Areas or Ecological Support Areas (CapeNature. 2017 WCBSP Bitou [Vector] 2017. Available from the Biodiversity GIS website (biodiversityadvisor.sanbi.org)).

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.

Fauna

- Lists of animal species that have a geographical range that includes the study area were obtained from literature sources (Bates et al., 2014 for reptiles, du Preez & Carruthers 2009 for frogs, Mills & Hes 1997 and Friedmann and Daly, 2004 for mammals). This was supplemented with information from the Animal Demography Unit website (adu.uct.ac.za) and literature searches for specific animals, where necessary.
- Appendix 1 is a summary of the expected animals (mammals, reptiles and amphibians) for the site.

Limitations

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

- The assessment is based on two site visits a few days apart. The current study is based on an extensive site visit 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 and animal 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 (≧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
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

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
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:	$\boldsymbol{S = [(E + D + M)/3 \times (R + I + T + C)/4 \times P]/25}$ $\boldsymbol{Significance = (Extent + Duration + Magnitude)/3 \times (Reversibility + Irreplaceability + Threshold + Condition)/4 \times Probability}$				
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**

REGIONAL CONTEXT

Broad vegetation patterns

There is one regional vegetation type that occurs on site within the footprint area of the proposed development, namely South Outeniqua Sandstone Fynbos (Figure 7). Another regional vegetation type cuts across the southern corner of the site, namely Eastern Coastal Shale Band Vegetation. There is a third vegetation type that occurs to the north of the site, namely Garden Route Shale Fynbos (Figure 7). Based on the site visit, it was found that the vegetation in the valleys most closely matches Southern Afrotemperate Forest, although this is not mapped as occurring on site.

Due to mapping inaccuracies, as well as the gradient nature of many boundaries between vegetation types, there are likely to be floristic and vegetation structural influences from any of these vegetation types within the site, depending on local ecological conditions. The national vegetation map is not mapped at a fine scale and it is probable that local topography could support other habitat types. The vegetation types that occur on site and nearby areas, according to the national map, are briefly described below.

Figure 7: Regional vegetation types of the site and surrounding areas.

South Outeniqua Sandstone Fynbos

Distribution

This vegetation type is found in the Western and Eastern Cape Provinces: Patches along the coastal foothills of the Langeberg at Grootberg (northeast of Heidelberg), the Outeniqua Mountains from Cloete's Pass via the Groot Brak River Valley, Hoekwil, Karatara, Barrington and Knysna to Plettenberg Bay. Patches from the Bloukrans Pass along coastal platform shale bands south of the Tsitsikamma Mountains via Kleinbos and Fynboshoek to south of both Clarkson and the Kareedouw Mountains. Altitude 0–500 m.

Vegetation & Landscape Features
Undulating hills and moderately undulating plains on the coastal forelands. Structurally this is tall, dense proteoid and ericaceous fynbos in wetter areas, and graminoid fynbos (or shrubby grassland) in drier areas. Fynbos appears confined to flatter more extensive landscapes that are exposed to frequent fires—most of the shales are covered with afrotemperate forest. Fairly wide belts of Virgilia oroboides occur on the interface between fynbos and forest. Fire-safe habitats nearer the coast have small clumps of thicket, and valley floors have scrub forest (Vlok & Euston-Brown 2002).

Geology & Soils
Acidic, moist clay-loam, prismacutanic and pedocutanic soils derived from Caimans Group and Ecca (in the east) shales. Land types mainly Db and Fa.

Climate
Non-seasonal rainfall dominates the region, with MAP 310–1 120 mm (mean: 700 mm), relatively even throughout the year, but with a slight low in winter. Mean daily maximum and minimum temperatures 27.6°C and 6.5°C for January and July, respectively. Frost incidence 2 or 3 days per year.

Important Taxa

Growth form	Species
Tall shrubs	*Leucadendron eucalyptifolium* (d), *Protea aurea* subsp. *aurea* (d), *P. coronata* (d), *Leucospermum formosum*, *Metalasia densa*, *Passerina corymbosa*, *Protea neriifolia*, *Rhus lucida*[T]
Low shrubs	*Acmadenia alternifolia*, *A. tetragona*, *Anthospermum aethiopicum*, *Cliffortia ruscifolia*, *Elytropappus rhinocerotis*, *Erica hispidula*, *Helichrysum cymosum*, *Leucadendron salignum*, *Pelargonium cordifolium*, *Phylica axillaris*, *P. pinea*, *Psoralea monophylla*, *Selago corymbosa*.
Herbs	*Helichrysum felinum*
Geophytic herb	*Pteridium aquilinum* (d), *Eriospermum vermiforme*
Succulent herb	*Crassula orbicularis*
Herbaceous succulent climber	*Crassula roggeveldii*
Graminoid	*Ischyrolepis sieberi* (d), *Aristida junciformis* subsp. *galpinii*, *Brachiaria serrata*, *Cymbopogon marginatus*, *Elegia juncea*, *Eragrostis capensis*, *Ischyrolepis gaudichaudiana*, *Restio triticeus*, *Themeda triandra*, *Tristachya leucothrix*.

Southern Afrotemperate Forest

Distribution
Western Cape, Eastern Cape and (only few patches) in Northern Cape Provinces: The largest complex is found in the southern Cape along the narrow coastal strip (250 km long) between Humansdorp in the east and Mossel Bay (Knysna-Tsitsikamma forest region)—here occurring on sheltered seaward slopes, plateaux and coastal scarps. The easternmost outlier forest patches occur near Port Elizabeth, while westwards floristically impoverished forms of these forests occur along the feet of south- and east-facing slopes and in deep kloofs and ravines of the Cape Fold Belt mountains as far as the Cape Peninsula in the west. The northernmost localities are near Vanrhynsdorp Pass and in the Matsikamma Mountains. At altitudes ranging from about 10 m (Tsitsikamma region) to 600 m (most of patches), with notable outliers occurring as high as 1 060 m.
Vegetation & Landscape Features

Tall, multilayered afrotemperate forests dominated by yellowwoods (*Afrocarpus falcatus* and *Podocarpus latifolius*), *Ocotea bullata, Olea capensis* subsp. *macrocarpa, Pterocelastrus tricuspidatus, Platylophus trifoliatus* etc. In scree and deep-gorge habitats *Cunonia capensis, Heeria argentea, Metrosideros angustifolia, Podocarpus elongatus* and *Rapanea melanophloeos* predominate. The shrub understorey and herb layers are well developed, especially in mesic and wet habitats.

Geology & Soils

Soils varying from shallow (and skeletal) Mispah, Glenrosa and Houwhoek forms to sandy humic Fernwood form, derived from Table Mountain Group sandstones and shales of the Cape Supergroup and partly also from Cape Granite.

Important Taxa

Tall Trees: *Afrocarpus falcatus* (d), *Cunonia capensis* (d), *Curtisia dentata* (d), *Nuxia floribunda* (d), *Ocotea bullata* (d), *Olinia ventosa* (d), *Podocarpus elongatus* (d), *P. latifolius* (d), *Pterocelastrus tricuspidatus* (d), *Rapanea melanophloeos* (d), *Ilex mitis*, *Olea capensis* subsp. *macrocarpa*.
Small Trees: *Canthium inerme* (d), *Cassine peragua* (d), *Diospyros whyteana*.
Tree Fern: *Cyathea capensis* (d).
Herbaceous Climber: *Cissampelos torulosa*.
Epithytic Herb: *Angraecum pusillum*.
Tall Shrubs: *Burchellia bubalina* (d), *Trichocladus crinitus* (d), *Sparrmannia africana*.
Geophytic Herbs: *Blechnum capense* (d), *B. tabulare* (d), *Dietes iridioides* (d), *Rumohra adiantiformis* (d), *Todea barbara* (d), *Oxalis incarnata*.
Graminoid: *Oplismenus hirtellus* (d).

Biogeographically Important Taxa

([C]Endemic of Capensis, [W]Western distribution limit)
Tall Trees: *Brabejum stellatifolium*[C], *Ochna arborea* var. *arborea*[W].
Small Trees: *Gonioma kamassi*[W] (d), *Heeria argentea*[C] (d), *Metrosideros angustifolia*[C] (d), *Allophylus decipiens*[W], *Brachylaena neriifolia*[C], *Cassine schinoides*[C], *Lachnostylis hirta*[C], *Virgilia divaricata*[C].
Woody Climber: *Asparagus scandens*[C].
Epiphytic Herb: *Mystacidium capense*[W].
Tall Shrub: *Laurophyllus capensis*[C].
Herb: *Gerbera cordata*[W], *Streptocarpus rexii*[W].
Geophytic Herbs: *Liparis capensis*[C].
Graminoids: *Ischyrolepis subverticillata*[C], *Schoenoxiphium lanceum*[C].

Endemic Taxon

Tall Tree: *Platylophus trifoliatus* (d).
Small Trees: *Apodytes geldenhuysii*, *Cryptocarya angustifolia*, *Virgilia oroboides* subsp. *ferruginea*, *V. oroboides* subsp. *oroboides*.
Megaherb: *Strelitzia alba* (d).
Geophytic Herbs: *Amauropelta knysnaensis*, *Clivia mirabilis*, *Freesia sparrmannii*, *Polystichum incongruum*.
Graminoid: *Schoenoxiphium altum.*

Note that this is a desktop description of what could possibly occur on site, based on mapped vegetation types. The on-site habitat assessment, described in a section below, determines whether any such vegettion occurs on site or not: although mapped as occurring within Garden Route Shale Fynbos, such vegetation does not necessarily occur on site.

Conservation status of broad vegetation types

The threat status is in accordance with the Revised National List of Ecosystems (Government Notice No 2747 of 18 November 2022) published under the National Environmental Management: Biodiversity Act (Act No. 10, 2004), which lists national vegetation types that are afforded protection on the basis of rates of transformation.

Table 2: Conservation status of different vegetation types occurring in the study area.

Vegetation Type	**Ecosystem threat status:** **Government Notice No 2747 of 18 November 2022**
South Outeniqua Sandstone Fynbos	Least Concern
Southern Afrotemperate Forest	Least Concern
Eastern Coastal Shale Band Vegetation	Endangered
Garden Route Shale Fynbos	Endangered

Note that this is a desktop description of what could possibly occur on site, based on mapped ecosystems. The on-site habitat assessment, described in a section below, determines whether any such vegetation occurs on site or not.

It is therefore verified that the site occurs partly within a mapped Listed Ecosystem, as listed in The National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011). However, the proposed development does not affect these areas. Also, the characteristics of the on-site vegetation, as described in the on-site habitat assessment below, determine whether vegetation representative of a listed ecosystem occurs on site or not – if there is no natural habitat remaining on site then the sensitivity is LOW with respect to this attribute, or, if natural habitat occurs on site then those areas would have VERY HIGH sensitivity with respect to this attribute.

Biodiversity Conservation Plans

The Western Cape Biodiversity Spatial Plan (WCBSP) classifies the habitats of the province according to conservation value in decreasing value, as follows:

1. Protected Areas (PA);
2. Critical Biodiversity Areas 1 (CBA1);
3. Critical Biodiversity Areas 2 (CBA2);
4. Ecological Support Area 1 (ESA1);
5. Ecological Support Area 2 (ESA2);

The WCBSP map for Bitou shows that the entire development footprint on site (all natural areas except for roads) is within Other Natural Area (ONA) (Figure 9). There are also Ecological Support Areas (ESA1) on site that correspond with the bottoms of the valleys, and there is a small area of CBA1 at the southern end of the site (not affected by the proposed development).

Note that the purpose of the specialist study, as undertaken here, is to verify whether the vegetation on site meets the standards for inclusion in a conservation zone or not. Provincial-level conservation assessments make use of remote methods for mapping and do not ground-truth all locations. It is therefore necessary to verify on the ground whether natural habitat occurs on site or not in order to determine whether the inclusion in a conservation zone is supported by patterns on the ground.

Figure 8: Western Cape Biodiversity Spatial Plan of the site and surrounding areas.

This desktop description verifies that small parts of the site are included in conservation zones but that the development footprint is outside of such zones. The development therefore has LOW sensitivity with respect to this layer.

Historical disturbance

An aerial photograph from 1958 shows that the forested valley was in a natural state, but that some disturbances on site were already evident. The areas to the east of the site (at A in Figure 9), cultivation had taken place up to the windrow of trees that ends at D. The regular shape at C in Figure 9 suggests that this area may possibly also have been cultivated, but no clear evidence for this is available. There is a circular-shaped disturbance in the southern part of the site at B, but the identity of this is unknown.

No other disturbance can be detected on site from other image dates, except for a gradual increase in the level of alien infestation on site. An aerial image from 1989 shows an area of alien trees that has developed in an irregular band between the current N2 and position D in Figure 9. An image from March 2017 from Google Earth (Figure 10) shows a dark patch of vegetation in the central part of the site (, which is vegetation dominated by alien trees. This pattern becomes progressively worse over time, until the recent pattern is reached on site of cleared trees and no other vegetation in this central area (see Figure 2 in earlier sectoion of this report).

The importance of the historical aerial photographs is that they show that the area on the uplying parts of the southern half of the site are degraded from general disturbance, as well as severe alien infestation and additional disturbance of clearing associated with aliens. In contrast, the forested valleys and the northern part of the site have remained mostly natural and in relatively undisturbed condition.

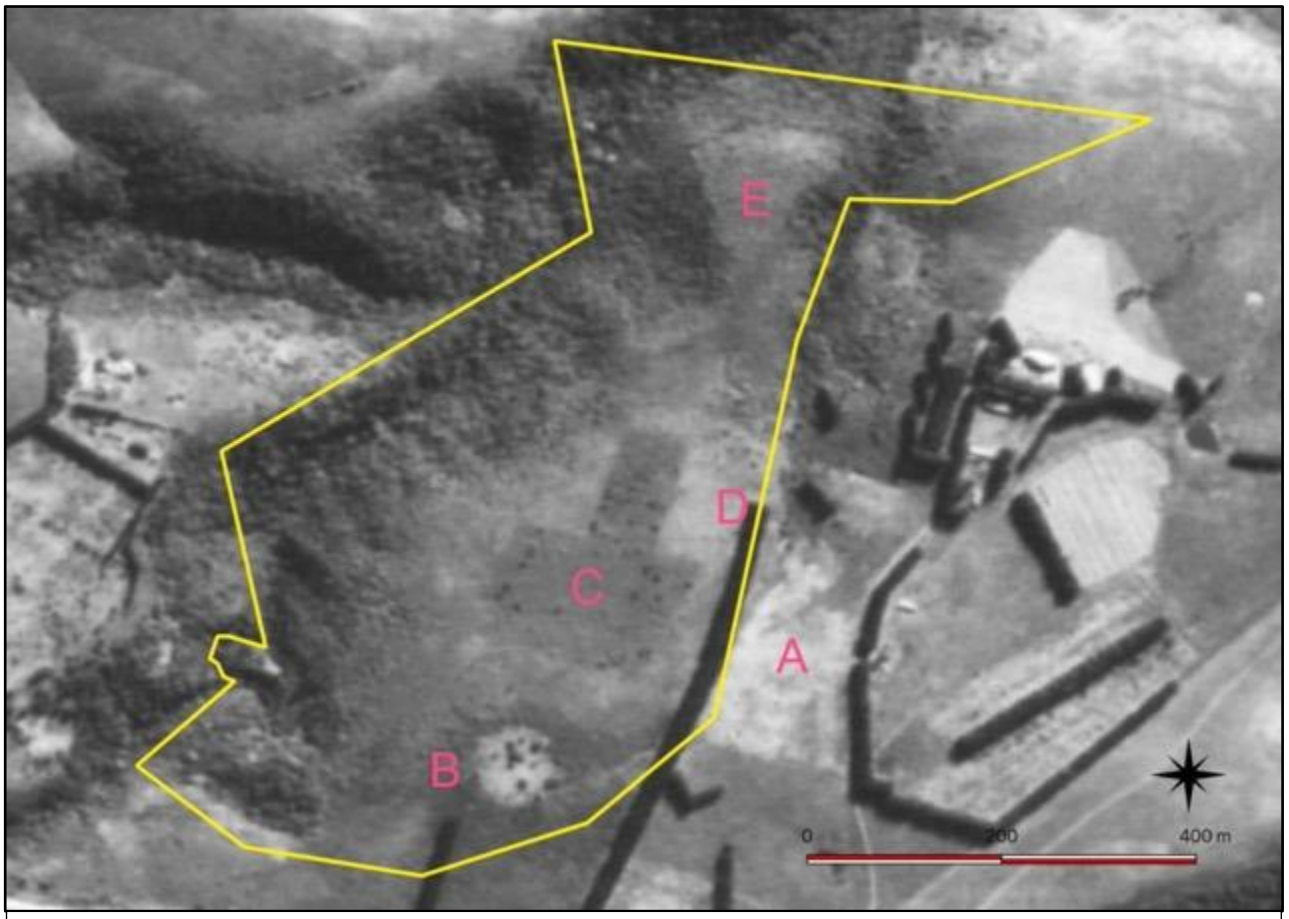


Figure 9: Aerial photograph from 1962.

Figure 10: Aerial image from 2017 with dense aliens indicated.

OUTCOME OF THE ASSESSMENT

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

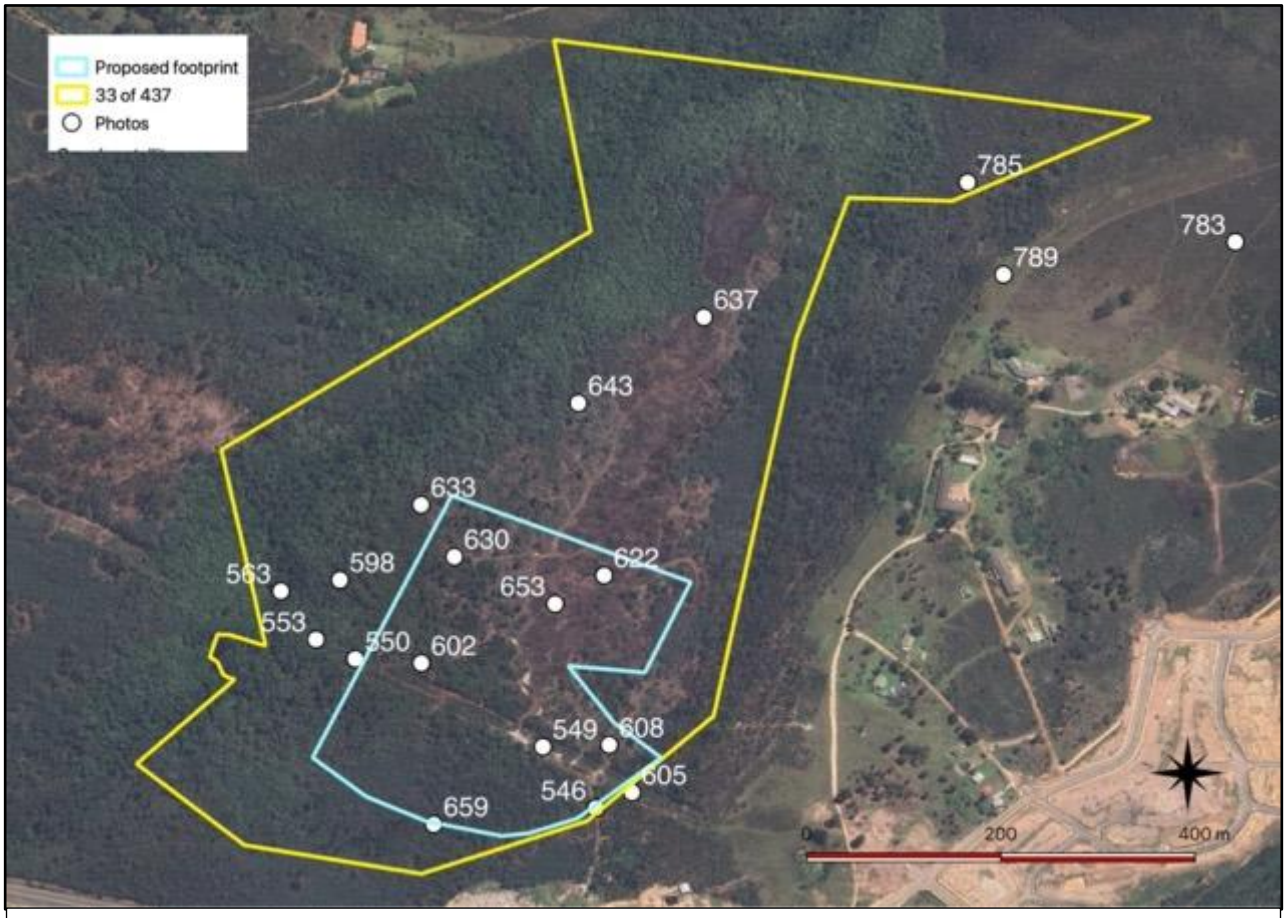


Figure 11: Location of photographs taken on site during the site inspection.

localities to show conditions on site. A map showing the location of these photographs is provided

in Figure 11. A GPS track log in provided in Figure 8 in the section of this report titled "Field Survey Approach".

	**Photo 553** **34° 02'35.03" S, 23° 19' 38.502" E** **Transitional thicket on the upslope side of the valley, above the forest and below the scrub fynbos. It contains a wide variety of mesic thicket species.**
	**Photo 563** **34° 02' 33.090" S, 23° 19' 37.092" E** **Bottom of valley in the stream bed. The vegetation is a tall forest. The valley is steeply sloping here with rock outcrops and small cliffs. The stream is flowing but very polluted with sewerage.**
	**Photo 633** **34° 02' 29.620" S, 23° 19' 42.720" E** **Invaded scrub thicket near the summit of the slope. Indigenous species include a suite of thicket precursor species that emerge in the absence of fire.**

	**Photo 605** **34° 02' 41.170" S, 23° 19' 51.192" E** **Open area under the powerline servitude near the southern part of the site, dominated by renosterbos and *Erica sparsa*. This is possibly what the entire summit area of the site would look like if it was not dominated by alien plants.**
	**Photo 637** **34° 02' 22.090" S, 23° 19' 54.078" E** **Recently burnt area that will probably recover as fynbos.**
	**Photo 642** **34° 02' 25.030" S, 23° 19' 52.428" E** **Recently burnt area cleared of aliens, now dominated by bitou (*Osteospermum moniliferum*).**

	**Photo 622** **34° 02' 32.460" S, 23° 19' 50.070" E** **Central part of the site. Heavily invaded, recently burnt, currently being cleared. Dominated by weeds.**
	**Photo 549** **34° 02' 39.340" S, 23° 19' 47.610" E** **Area near entrance to the site (under the powerline servitude), heavily invaded on both sides of the servitude, and being used as a dump.**
	**Photo 659** **34° 02' 39.340" S, 23° 19' 47.610" E** **Heavily invaded area near southern part of the site, contains primarily wattles and bare ground. Patches within this area are strewn with rubbish.**

Habitats on site

Based on a detailed field survey to verify conditions on site, a detailed landcover and habitat mapping exercise was undertaken for the site. This identified five main habitats occurring on site, shown in Figure 12. These are mapped as **Forest, Mesic Thicket, Scrub Thicket, Fynbos** and **Aliens**. There are also **transformed areas** associated with roads. The habitat assessment is important for understanding the suitability of habitat on site for various plant and animal species of concern, which usually have very specific habitat requirements.

Forest

The steep-sided slopes in the valleys of the site contain indigenous forest that should be classified and mapped as Southern Afrotemperate Forest. It has a closed canopy, open understorey and relatively tall structure, therefore does not qualify to be mapped as thicket. The vegetation follows the drainage valleys in which a permanent stream currently flows (see Photo 563).

No comprehensive tree survey was done within this area, but observed species in the forest include the trees / tall shrubs, *Sideroxylon inerme, Cassine peragua, Trichocladus crinitus, Diospyros whyteana,* and *Scutia myrtina*, the woody climber, *Rhoicissus tomentosa*, and the herbaceous species, *Scadoxus puniceus, Asplenium lunulatum, Pteris dentata, Phlegmariurus gnidioides, Peperomia tetraphylla, Albuca bracteata,* and *Streptocarpus rexii*.

The forests are a critical habitat and migration corridor for animal species, including three flagged species of concern that were assessed as having at least a moderate probability of occurring on site.

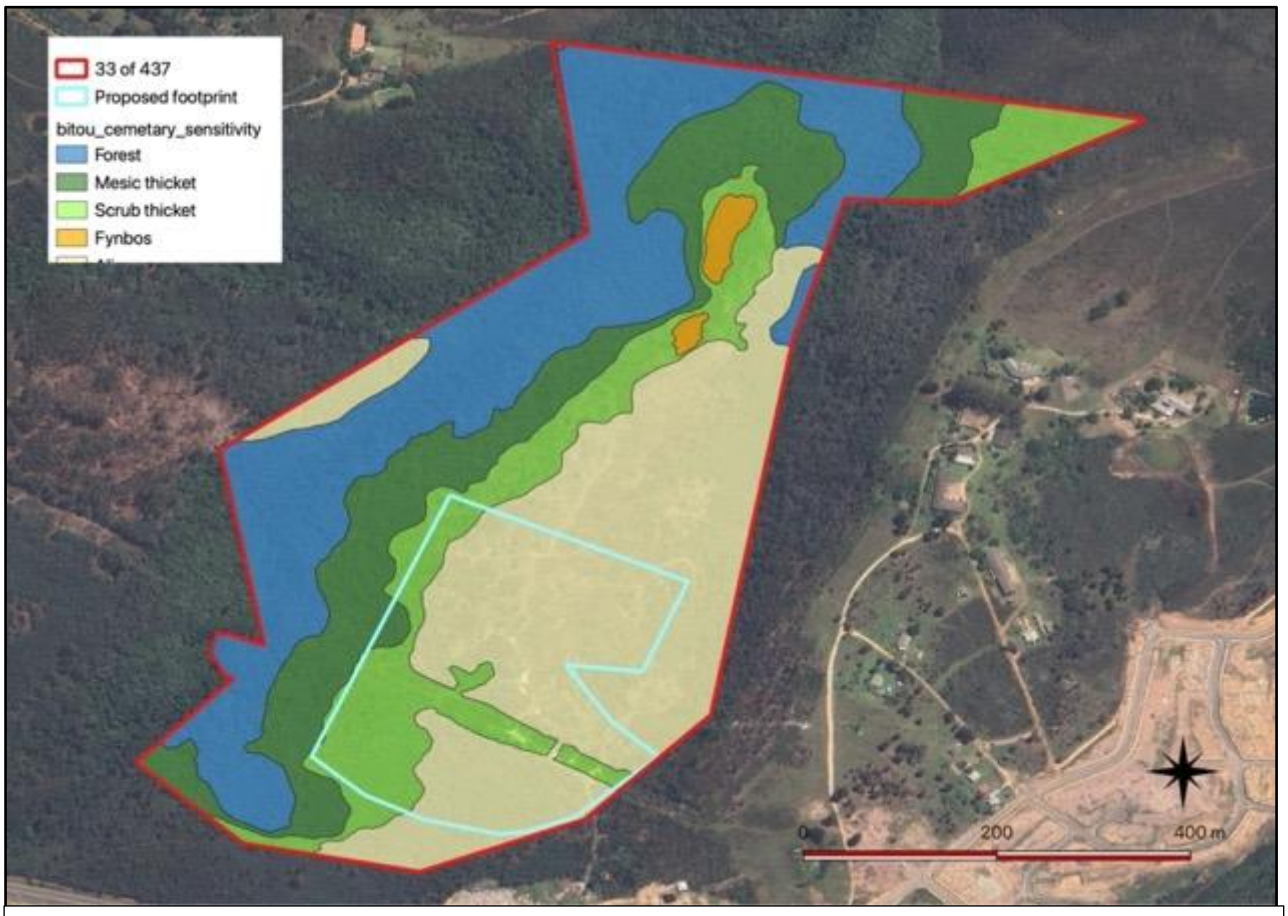


Figure 12: Map of habitats on site.

Mesic Thicket

The forest in the bottom of the valleys merges into mesic thicket higher up on the midslopes of the valleys. This change is especially evident on the warmer north-facing slopes - on south-facing, cooler slopes forest tends to occur higher up the slopes. It is a tangled, closed vegetation with no open understorey.

The thicket is dominated by a number of low-growing tree species, including *Sideroxylon inerme, Pterocelastrus tricuspidatus, Acokanthera oppositifolia, Cassine peragua, Elaeodendron croceum,* and *Pappea capensis*, along with the shrub species, *Gymnosporia nemorosa, Searsia pallens, Aloe arborescens, Morella humilis, Polygala myrtifolia, Rhoicissus digitata,* and *Cynanchum viminale*, the graminoids / restioids, *Ficinia indica,* and *Ficinia nigrescens*, and the herbaceous species, *Albuca bracteata, Asparagus macowanii, Asplenium rutifolium, Chaenostoma sp., Crassula orbicularis, Dietes iridioides, Gerbera cordata, Hypoestes forskaolii, Selago corymbosa,* and *Senecio angulatus.*

A typical example of the vegetation on site is shown in Photo 553.

The mesic thicket is ecologically part of the forested valley ecosystem, forming a continuation and buffer to the taller forest in the bottom of the valley. There is a gradient from the tall forest along the stream to the scrub thicket higher up. The mesic thicket is more fire-prone than forest, but not fire-driven. The ecosystem is on steep slopes that are vulnerable to erosion, if upslope areas are disturbed. In its intact state, it is resistant to invasion by alien species, but is quickly overwhelmed by aliens, such as Eucalyptus and Acacia species, when disturbed. They should be protected and no development within this zone allowed.

Scrub Thicket

There is a band of vegetation above the Mesic Thicket that would have previously formed a gradient to fynbos. It is the ecological zone between thicket and fynbos where fire would occasionally push the thicket back to be replaced by fynbos, but in the absence of fire would be colonised by thicket precursor species and eventually develop a woody structure. Unfortunately, on site this zone has been heavily invaded by alien invasive species. Many of the thicket precursor species are still present and there is a chance that some of these areas can be rehabilitated by controlling alien invasive species.

A typical example of the vegetation on site is shown in Photo 633.

The vegetation in this area has a relatively diverse species composition, including the woody species, *Gymnosporia nemorosa, Searsia lucida, Burchellia bubalina, Carissa bispinosa, Halleria lucida, Osteospermum moniliferum, Pappea capensis, Pterocelastrus tricuspidatus, Colpoon compressum, Elaeodendron croceum, Rapanea melanophloeos (Protected tree species), Diospyros dichrophylla, Lauridia tetragona,* and *Tarchonanthus littoralis*, the shrubs, *Erica sparsa, Helichrysum petiolare, Erica discolor, Metalasia muricata, Viscum rotundifolium, Metalasia pungens, Passerina corymbosa,* and *Phylica axillaris*, the herbaceous species, *Oxalis imbricata, Pelargonium grossularioides, Centella asiatica, Asplenium rutifolium, Schizaea pectinata, Asparagus rubicundus, Chaenostoma sp., Bobartia aphylla, Senecio ilicifolius, Selago corymbosa, Hermannia flammea, Hermannia salviifolia, Hibiscus aethiopicus, Hypoxis sobolifera, Indigofera poliotes,* and *Selago canescens*, and the graminoids, *Ehrharta erecta, Eragrostis curvula, Paspalum urvillei, Calamagrostis epigejos, Themeda triandra, Sporobolus africanus, Restio tetragonus, Melica racemosa, Carex Sect. Schoenoxiphium, Schoenus cuspidatus,* and *Trisetopsis imberbis*.

The scrub vegetation is a successional form of fynbos and is therefore representative of the regional vegetation type, South Outeniqua Sandstone Fynbos. In it's current state, it is unlikely to support any populations of threatened species. Rigorous control of alien invasive species and good fire management could result in improved condition, which may provide suitable habitat for future metapopulation dynamics for rare and/or threatened species.

Fynbos

There are only small patches on site that were mapped as fynbos vegetation, although these areas were all recently burnt and the exact delimitation is currently difficult to determine. Extensive areas on site are currently dominated by aliens, or recently cleared, that were probably fynbos (based on historical imagery). A photograph of one of these areas is shown in Photo 637. Another area under the powerline has been kept clear of aliens and gives an example of what the fynbos on site may possibly have looked like if it was not invaded (see Photo 605).

A small list of plant species recorded within areas mapped as fynbos include the following: *Aspalathus asparagoides, Scabiosa columbaria, Babiana sambucina, Crinum macowanii, Seriphium plumosum, Arctopus echinatus, Montinia caryophyllacea, Euclea crispa, Lobelia tomentosa, Selago corymbosa, Metalasia pungens, Passerina corymbosa, Dianthus albens, Helichrysum anomalum, Metalasia trivialis, Monsonia emarginata, Selago canescens, Megathyrsus maximus,* and *Osteospermum moniliferum*. A more extensive species list is likely after some post-fire recovery.

The fynbos vegetation is representative of the regional vegetation type, South Outeniqua Sandstone Fynbos. Good fire management and control of aliensvwill maintain and improve its condition, which will provide suitable habitat for future metapopulation dynamics for rare and/or threatened species. Areas currently dominated by aliens are probably permanently damaged, but could recover to develop some form of fynbos vegetation that would be ecologically supportive, and could also benefit through dispersal of species from the remaining patches of fynbos on site.

Alien trees

A large part of the site has been heavily invaded by alien trees, primarily *Acacia mearnsii, Acacia cyclops,* and *Acacia melanoxylon*. Large parts of the site have been cleared, leaving bare ground. Most of these areas look like Photo 622. Some cleared areas that have recently burnt are now dominated by *Osteospermum moniliferum* (Photo 642). Uncleared areas have a monospecific cover of aliens with nothing growing underneath (Photo 659).

Alien species recorded on site within these mapped areas include *Acacia cyclops, Acacia mearnsii, Acacia melanoxylon, Catharanthus roseus, Lantana camara, Paraserianthes lophantha, Physalis peruviana, Phytolacca octandra, Senna septemtrionalis,* and *Solanum mauritianum.* The only indigenous species found in these areas were the two low-growing herbaceous species, *Arctotheca prostrat* and *Lichtensteinia interrupta.*

Plant species recorded on site

A total of 106 plant species were recorded on site (see Appendix 1), of which eleven are declared weeds and/or alien invader plants, two are naturalized exotic species, and the remainder are indigenous species.

The alien invasive species are as follows:

- *Acacia cyclops** (NEMBA Category 1b)
- *Acacia mearnsii** (Invader category 1b)
- *Acacia melanoxylon** (Invader category 1b)
- *Catharanthus roseus** (Invader category 1b)
- *Hakea sericea** (Invader category 1b)
- *Lantana camara** (Invader category 1b)
- *Paraserianthes lophantha** (Invader category 1b)
- *Phytolacca octandra** (Invader category 1b)
- *Pinus* sp* (NEMBA Category 2)
- *Senna septemtrionalis** (Invader category 1b)
- *Solanum mauritianum** (Invader category 1b)

Two tree species protected under Section 15(1) of the National Forests Act, 1998 occur on site, as follows:

- *Rapanaea melanophloeos.*
- *Sideroxylon inerme*.

Plant species flagged for the study area

According to the National Web-Based Environmental Screening Tool, a number of plant species of concern are flagged as of concern for the site (see previous section of this report). Details of each of these species are provided in a table below (Table 4).

There are two tree species that could occur within forest habitats on site. These are *Ocotea bullata* (Endangered) and *Faurea macnaughtonii* (Rare) that have a moderate possibility of occurring there. The forest habitat on site is not directly affected by the proposed development, but any impacts on the upslope scrub thicket areas could also affect the integrity of the forest areas.

There are a number of herbaceous species / low shrubs that have a moderate possibility of occurring on site, although none were found during the field survey. This includes the following: *Indigofera hispida* (Vulnerable), *Acmadenia alternifolia* (Vulnerable), *Muraltia knysnaensis* (Endangered), *Pterygodium cleistogamum* (Vulnerable), and two Sensitive Species. For most of these, there is a possibility that they could occur on site, even though not seen during the site investigation. There is suitable habitat for *Leucospermum glabrum* (Endangered) on site, but it is a large / conspicuous species that would have been seen, if it occurred there.

There are therefore nine threatened, near threatened or rare species that could occur in the study area. It is therefore verified that the Plant Species Theme has <u>MEDIUM</u> sensitivity for this site (*suspected 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).

Table 3: Plant species of concern flagged for the site.

Family	Taxon	Common name	IUCN status*	Distribution	Habitat	Probability of occurrence
RUTACEAE	Acmadenia alternifolia	None	VU	Plettenberg Bay to Knysna, possibly extending as far as Nature's Valley. A number of observations from inland areas, including the mountain foothills north of Keurbooms, and north of the N2 at Harkerville.	South Outeniqua Sandstone **Fynbos**, Garden Route Shale **Fynbos**, Goukamma **Dune Thicket** Coastal headlands and steep slopes, exposed positions on dry cliffs near the coast from Knysna to Plettenberg Bay.	**MEDIUM** Distribution records suggest it could occur in the area, and suitable habitat on site. **NOT FOUND**
ORCHIDACEAE	Acrolophia lunata (called *Eulophia barbata* on iNaturalist website)		EN	Swellendam to Kouga Mountains.	**Fynbos**. Mesic fynbos from sea level to 750 m. Observations on iNaturalist indicate that it only occurs in the mountains, NOT near the coast, except for 1 observation near Wilderness.	**LOW** No typical habitat on site.
THELYPTERIDACEAE	Amauropelta knysnaensis	Knysna wood fern	VU	George District	**Southern Afrotemperate Forest**, damp places in coastal forest. Near streams and in seepage zones, sometimes away from streams.	**LOW** No typical habitat on site.
FABACEAE	Aspalathus bowieana	None	EN	Outeniqua and Tsitsikamma mountains on the border between the	Tsitsikamma Sandstone **Fynbos**, South Outeniqua	**LOW** No suitable habitat on site.

Family	Taxon	Common name	IUCN status*	Distribution	Habitat	Probability of occurrence
				Western and Eastern Cape provinces.	Sandstone Fynbos, North Outeniqua Sandstone Fynbos. Slopes and foothills below 850 m in fynbos.	
ERICACEAE	Erica chloroloma	None	VU	Wilderness to Fish River Mouth. Most observations are between Cape St Francis and Gqeberha. Nearest population known from Goukamma Nature Reserve (recent) and Buffalo Bay (1921).	Coastal dune fynbos.	**LOW** No dune fynbos on site
ERICACEAE	Erica glandulosa subsp. fourcadei	None	VU	Mossel Bay to Cape St. Francis.	Coastal fynbos. Common in Goukamma Nature Reserve and on coastal cliffs SW of Plettenberg Bay	**LOW** No coastal fynbos on site
ERICACEAE	Erica glumiflora	None	VU	Wilderness to East London, extending inland to Grahamstown. Recorded from Robberg peninsula near end.	Sandy coastal flats and dunes in low coastal hills. All observations are in sandy substrates.	**LOW** No suitable habitat on site.
PROTEACEAE	Faurea macnaughtonii		Rare	This species is widespread across eastern South Africa, from the Wolkberg in Limpopo Province southwards to the Amathole Mountains in the Eastern Cape. An isolated subpopulation occurs in the southern Cape forests around Knysna. It also	This species occurs deep inside mature forest, from near sea level up to 2000 m. Dispersal is limited, with seeds typically falling from the canopy to the forest floor, and therefore	**MEDIUM** Possibly suitable habitat on site. **NOT FOUND**

Family	Taxon	Common name	IUCN status*	Distribution	Habitat	Probability of occurrence
				occurs in eSwatini (Swaziland). Recorded from Harkerville.	this species is prone to fragmentation.	
ASTERACEAE	Felicia westae		EN	Knysna to Humansdorp.	Streambanks in low-lying areas near the coast. On hills and along rivers or near vleis. Wet places, often stream banks.	**LOW** No suitable habitat on site.
MALVACEAE	Hermannia lavandulifolia	None	VU	Western Cape, from Worcester to the Overberg, and extending along the southern Cape coastal lowlands to Plettenberg Bay. All observations on iNaturalist are west of Knysna. Only single observation near Plett is on coast near Robberg.	Clay slopes in renosterveld and valley thicket. Collected on western part of Robberg Peninsula in 1960 (Acocks Coll. No. 21141).	**LOW** Known locations are west of the site.
FABACEAE	Indigofera hispida		VU B1ab	Uniondale to Port Elizabeth. Numerous observations in Tsitsikamma area in areas above cliifs that overlook the sea	Montane fynbos from 100 - 1000 m. Recent observations from around Nature's Valley are in similar fynbos habitat as that found on site. Occurs in scrubby fynbos to thicket transitional areas.	**MEDIUM** Suitable habitat on site. **NOT FOUND**
PROTEACEAE	Leucospermum glabrum	Outeniqua Pincushion	EN	Outeniqua and Tsitsikamma mountains. Observed multiple times around George in the mountains, as well as north	Wet south slopes in Sandstone Fynbos.	**MEDIUM** Key habitat appears to be mesic mountain fynbos on the

Family	Taxon	Common name	IUCN status*	Distribution	Habitat	Probability of occurrence
				of Plett. and around Keurbooms.		southern flanks of mountains. **NOT FOUND**
PROTEACEAE	Mimetes pauciflorus		VU	Outeniqua and Tsitsikamma mountains.	Moist south-facing slopes in sandstone fynbos, 450 - 1400 m.	**LOW** All observations are within mountains, not close to current site.
POLYGALACEAE	Muraltia knysnaensis	Knysna butterflybush	EN	Coastal lowlands between Mossel Bay and Keeurbooms River.	Coastal fynbos on dry flats and hills.	**MEDIUM** Possibly suitable (degraded) habitat on site. **NOT FOUND**
LAURACEAE	Ocotea bullata	Stinkwood	EN	Widespread in South Africa from the Cape Peninsula to the Limpopo Province.	Grows in most high, cool, evergreen Afromontane forests.	**MEDIUM** Suitable habitat on site. Recorded numerous times in general area of Plettenberg Bay. **NOT FOUND**
ASTERACEAE	Osteospermum pterigoideum		EN	George and Humansdorp. Not recorded from near Plettenberg Bay.	Low sandstone slopes. Indigenous forest, fynbos-renosterveld.	**LOW** Possibly suitable habitat on site but known observations indicate that it does not occur near to the site.
ORCHIDACEAE	Pterygodium cleistogamum		VU	Knysna to Grahamstown.	Fynbos, stony slopes in sandstone derived soils, from sea-level to 340 m.	**MEDIUM** Suitable habitat on site. Recorded numerous times in general area of Plettenberg Bay. **NOT FOUND ON SITE**

Family	Taxon	Common name	IUCN status*	Distribution	Habitat	Probability of occurrence
ORCHIDACEAE	Pterygodium newdigateae		CR PE	Plettenberg Bay. Known records on SANBI website are identified as P. cleistogamum on iNaturalist. No recent herbarium specimens.	Stony slopes near sea level.	**LOW** Site in general known area and habitat may match but no recent observations - possibly extinct.
AIZOACEAE	Ruschia duthiae	None	VU	A highly range-restricted but locally common species, known from 10 locations from Sedgefield to Nature's Valley. Quite common in the sandy soils of the Lakes District between Wilderness and Knysna.	Gentle north-facing sandstone or shale slopes with grassy fynbos.	**LOW** No suitable habitat on site (sandy soils or grassy fynbos).
SCROPHULARIACEAE	Selago burchellii	None	VU	George to Plettenberg Bay, including Robberg coastal corridor, Knysna western heads, Goukamma, inland parts of the lakes area, and in the Outeniqua Mountains.	Coastal slopes and flats. Unverified observation from Robberg. Distribution data shows that it also occurs in the Outeniqua Mountains, which would be mountain fynbos.	**LOW** Possibly suitable habitat on site but known observations are west of the site, or in the mountains.
SCROPHULARIACEAE	*Selago rotundifolia*	None	VU	Knysna to Port Elizabeth.	Forest margins or grassy flats near the coast, 90-210 m.	**LOW,** potentially suitable habitat on site but all recent observations are all close to Gqeberha.
	Sensitive species 419		VU	George to Humansdorp. Recorded numerous times in Plett area.	Damp sandstone slopes in coastal fynbos. Numerous observations in mountains.	**MEDIUM** Distribution records suggest it could occur in the area. **NOT FOUND**

Family	Taxon	Common name	IUCN status*	Distribution	Habitat	Probability of occurrence
	Sensitive species 763		VU	Riversdale to Port St Johns. Recorded previously from near Keurbooms, as well as Diepwalle.	Dry coastal renosterveld and grassy places in coastal forest.	**MEDIUM** Distribution records suggest it could occur in the area. **NOT FOUND**

Animal species flagged for the study area

According to the National Web-Based Environmental Screening Tool, a small number of animal species have been flagged as of concern for the current project (see previous section of this report). These are all species that require specific habitat conditions to inhabit the site.

Circus ranivorus (African marsh harrier)

Endangered

This site was flagged as having **High sensitivity** potential for this species. Widespread but sparsely distributed throughout central, eastern and southern Africa, only absent from areas of lower rainfall (<300 mm p.a.). It is dependent on permanent wetlands for breeding, feeding and roosting. The main threat to this species is loss and degradation of wetlands. It also hunts over drier floodplains, grasslands, croplands, and Fynbos, where it preys mainly on small rodents, as well as birds, reptiles, frogs and insects.

There are no (suitable) wetlands on site although there are nearby in the Keurbooms River. The proposed development is located well away from these habitats. The species is unlikely to occur on site (except possible foraging in a small part of the site - fynbos) and the proposed project will have little effect on it.

Circus maurus (Black harrier)

Endangered

This site was flagged as having **High sensitivity** potential for this species. This is a rare endemic raptor with its main distribution centred on the fynbos and karoo inland of that. Black Harriers breed in the montane fynbos, renosterveld and strandveld habitats of the Western Cape and many individuals disperse into the karoo and grassland habitats during the autumn and winter months. This species prefers coastal and mountain fynbos, highland grasslands, Karoo sub-desert scrub and open plains with low shrubs and croplands. Harriers breed close to coastal and upland marshes, damp sites, near vleis or streams with tall shrubs or reeds. South-facing slopes are preferred in mountain areas where temperatures are cooler and vegetation is taller.

There are estuarine wetlands nearby that could potentially be suitable, but it is unknown if they occur there or not - there are no recent observations in the Plettenberg Bay area. In the event that they did occur in the area, the proposed project would have little effect on them.

Stephanoaetus coronatus (Crowned Eagle)

Near Threatened

This site was flagged as having **High sensitivity** potential for this species. Occurs from Guinea to South Africa, with an isolated population in Ethiopia. It is found at low densities in eastern and southern South Africa. It generally prefers forest habitats, such as gallery forest, dense woodland, forest gorges in savanna or grassland and alien tree plantations (such as *Eucalyptus* and pine). Not threatened internationally but Near-threatened in South Africa, largely due to persecution by small stock farmers and destruction of forest habitats, although it has adapted to living in alien tree plantations.

There are forest habitats on site in steep valleys, and extensive forests nearby, including suitable gorges and nesting sites. It has been recorded in the Plettenberg Bay area, as well as further west, therefore it must be assumed to be present in the general area. The forests on site may be of tall enough stature for nesting, and is likely to form part of foraging habitat. On condition forest areas on site are protected, there will be negligible impact on this species, but any impact on the forest could negatively effect habitat for this species.

Neotis denhami (Denham's Bustard)

Vulnerable

This site was flagged as having **High sensitivity** potential for this species. Has a wide but fragmented Afrotropical range. It occurs widely but sparsely over much of the mesic eastern half of South Africa.

In the Western Cape, it can be locally numerous in mosaics of cultivated pastures, agricultural croplands and natural vegetation with seasonal differences in the use of each habitat (Taylor et al. 2015).

It has been recorded several times in the general Garden Route area, including inland of Plettenberg Bay, but mostly in open landscapes with agricultural fields, not in urban areas or wooded areas. Based on the type and quality of habitat that occurs on site, it is possible but unlikely that it would occur there.

Bradypterus sylvaticus (Knysna warbler)

Vulnerable

This site was flagged as having **High sensitivity** potential for this species. Has a restricted and fragmented distribution in four areas of Eastern and Western Cape. One sub-population occurs in the Garden Route between Tsitsikamma and Stilbaai. It occurs along the edges of Afrotemperate forests and in thick, tangled vegetation along the banks of watercourses or drainage lines in forest patches in the Fynbos Biome (Taylor et al. 2015). Population decline is attributed to clearance of habitat for developments, agriculture and silviculture, leading to a decrease in the amount of available habitat, as well as the quality (Taylor et al. 2015).

Suitable forest and forest margin habitat occurs on site, as well as thick tangled vegetation along the drainage lines. It has been previously recorded in coastal thicket in Plettenberg Bay within the urban fringe. The species could occur on site within forest margin areas. These areas are not within the footprint of the proposed project, but forest margin areas need to be protected to ensure that forest ecosystems are not degraded. The presence of development does not seem to limit the species. On condition the habitat is preserved, the proposed project would have little effect on them.

Polemaetus bellicosus (Martial Eagle)

Endangered

This site was flagged as having **Medium sensitivity** potential for this species. The Martial Eagle is found throughout sub-Saharan Africa, only being absent from the lowland forests of West Africa (Ferguson-Lees and Christie 2001). With the exception of Lesotho, the species is widespread in the region but is more commonly encountered in protected areas such as in the Lowveld and Kalahari (Barnes 2000). Martial Eagles still require an exceptionally large home range, in excess of 130 km^2 (Brown et al. 1982). Densities in areas stocked with indigenous game are higher than in areas supporting only domestic stock, and the species is virtually absent from cultivated areas (Machange et al. 2005). Martial Eagles occur in a variety of habitats but seem to prefer arid and mesic savannah but are also commonly found at forest edges and in open shrubland (Simmons 2005). Birds will occupy most habitats provided there are adequate tall trees or pylons for nesting and perching (Machange et al. 2005). It rarely occurs in mountainous areas. It is known to nest on human-made structures, such as pylons and wind-pumps, and in alien trees (Tarboton and Allan 1984).

Suitable forest and forest margin habitat occurs on site, including possible nesting sites. It has been previously recorded north of Harkerville. If it occurs in the general area, the site may constitute a small part of the overall range of any individual or breeding pair (if they occur there). On condition natural habitat is preserved, the proposed project would have little effect on them - even loss of all habitat on site would be unlikely to affect the species, given the large ranges of individuals.

Afrixalus knysnae (Knysna Leaf-folding Frog / Spiny Reed Frog)

Endangered

This site was flagged as having **Medium sensitivity** potential for this species. Endemic to the Western Cape Province, occurring from Groenvlei (3422BB) in the west to Covie (3323DC) in the east, and is confined to the coastal region by the Outeniqua and Tsitsikamma mountains (Pickersgill 1996, 2000). Found in the coastal mosaic of Mountain Fynbos and Afromontane Forest. As examples of habitats in which the species is found, FitzSimons (1946) recorded specimens in glades, clearings and roadside pools at Diepwalle (3323CA), while Pickersgill (2000) collected juveniles from "arum blooms on boggy

ground near an irrigation dam at Barrington" (3322DD). The species has previously been recorded at Saasveld close to the Garden Route Dam (De Lange 2019, page 26 for locality information). The frogs breed in small dams and shallow semi-permanent water with much emergent vegetation and even in well vegetated ornamental garden ponds; it is suspected that this species requires high water quality for breeding. The species is threatened by habitat loss and degradation as a result of coastal development, forestry and agriculture, often due to draining, impoundment and eutrophication of wetlands near residential areas and agricultural lands, and encroachment of invasive alien vegetation.

There is a stream in the bottom of the valley on site, but the water quality is poor (smells of sewerage and contains litter washed down from upstream areas). No other suitable wetland habitat was seen on site, although the dense aliens made it difficult to see further than short distances in some areas. There were no obvious wet signals on aerial imagery to indicate any permanent ponds and the topography is not conducive to the presence of these. There is therefore unlikely to be any suitable habitat on site for breeding, and the species is unlikely to currently be found within the forested areas due to the pollution of the stream. Although the site is well within the known distribution range of the species, with numerous geographically nearby recent observations, it is considered unlikely that the species occurs on site or nearby.

Aloeides thyra orientis (Red Copper)

Endangered

This site was flagged as having **Medium sensitivity** potential for this species. This species is endemic to the southern coastal regions of the Western Cape Province in South Africa, from Witsand to Gouritsmond in the west, to the Brenton Peninsula near Knysna in the east. It is found in coastal fynbos on flat sandy ground (either naturally occurring or from anthropogenic disturbances such as footpaths or unsurfaced track) between 40 m to 240 m above sea level. The nominate species larvae feed on *Aspalathus acuminata, A. laricifolia* and *A. cymbiformis* (Woodhall 2005), but none of these plant species occur on the Brenton Peninsula, where *Aloeides thyra orientis* is known to occur, therefore presence of these species is not a requirement. The larvae are attended to by *Lepisiota capensis* ants.

No suitable fynbos habitat occurs on site and the species is unlikely to occur there. The proposed project will therefore have no effect on it.

Tsitana dicksoni (Dickson's Sylph)

Rare

This site was flagged as having **Medium sensitivity** potential for this species. This species is found in the Eastern Cape and Western Cape Provinces, in the Baviaanskloof Mountians, near Patensie, in the Franschhoek Pass, Du Toit's Kloof, Klein Drakenstein Mountains, Garcia's Pass and in Robinson Pass. The habitat in which it is found is grassy spots in montane fynbos vegetation (Williams 2020). Male butterflies establish territories near larval host-plants (published as the grass, *Pseudopentameris macrantha*), often using a shrub as the central point of their territory. They perch on grass stems, or on the ground or a rock. Note that the grass, *Pseudopentameris macrantha*, only occurs in the Cape, centred on the Cape Penisinsula, therefore butterfly occurrence in other localities would mean that other larval host species are being utilized.

No suitable montane fynbos habitat occurs on site and the species is unlikely to occur there. The proposed project will therefore have no effect on it.

Chlorotalpa duthieae (Duthie's Golden Mole)

Vulnerable

This site was flagged as having **Medium sensitivity** potential for this species. Found in a narrow coastal band from Wilderness to Storms River mouth, as well as near Port Elizabeth. There is a disjunction in the distribution of this species showing that it does not occur in the Plettenberg Bay area, probably due to the absence of proper Afromontane forests in this area. Locally common in coastal and scarp southern Cape Afrotemperate forest habitats, and adjacent pasturelands, cultivated lands and

gardens. Restricted to alluvial sands and sandy loams in deeper forest habitats. They construct shallow subsurface foraging tunnels that radiate outwards from under the roots of trees.

There is forest habitat on site, as well as sandy soils in which the species is likely to occur. Most of the soils on site within the forest area is relatively stony, but upslope areas in the scrubby vegetation has sandy soils. No sub-surface tunnels were observed to occur. There are no records of this species in the Plettenberg Bay area. It is therefore unlikely that this species occurs on site. Nevertheless, if it did occur there, it would be within the forest, none of which is in the direct footprint of the proposed development.

Sensitive species 8 (small antelope)

Vulnerable

This site was flagged as having **Medium sensitivity** potential for this species. Found in a variety of forested and wooded habitats, including primary and secondary forests, gallery forests, dry forest patches, coastal scrub farmland and regenerating forest (Venter et al. 2016). Within South Africa, they occur mainly within scarp and coastal forests, thickets or dense coastal bush (Skinner & Chimimba 2005), although they can occupy modified habitats. They frequent forest glades and open areas but need dense underbrush to rest or take cover. They are selective foragers which mainly feed on fruit, dicots and a small percentage of monocots (Venter et al. 2016).

There are several records of the species in areas around Plettenberg Bay, all within thicket or forest areas. Forest occurs on site and the species could occur there, but these areas are outside the direct footprint of the project. In the event that the species occurs on site, the proposed project is unlikely to have an effect on them, in terms of habitat loss, loss of forage, and loss of migration corridors.

Aneuryphymus montanus (Yellow-winged Agile Grasshopper)

Vulnerable B2ab(iii,v)

This site was flagged as having **Medium sensitivity** potential for this species. Only known from six localities in the Cape region (Brown 1960). The species is associated almost strictly with fynbos vegetation, although extending geographically towards East London, where it has been collected "amongst partly burnt stands of evergreen Sclerophyll in rocky foothills" (Brown 1960). It prefers south-facing cool slopes (Kinvig 2005). It is a medium-sized, robust, active geophilous insect which readily flies off when disturbed and is easily distinguished in flight by the pale lemon base of the hind wing (Brown 1960).

Published descriptions suggest that it is not often seen but, when observed, occurs in obvious numbers. No grasshoppers were seen on site that matched the description of this species. If it occurred in the area it would be found within fynbos, which occurs in a degraded state on site. It is therefore unlikely that it would occur on site.

Summary

- The Knysna Warbler, *Bradypterus sylvaticus*, (Vulnerable) has been recorded from Plettenberg Bay and the site has suitable habitat, therefore there is a moderate to high probability of this species occurring in forest margin areas on site.
- The forests on site may constitute part of the general foraging range of Crowned Eagle (Near Threatened), but it is unlikely that they occur on site, or are dependent on it.
- There is a moderate to high probability of the small antelope (Vulnerable) occurring in the forests on site. If not resident, it is very likely to migrate through the site.

It is therefore verified that the Animal Species Theme has <u>MEDIUM</u> sensitivity for the site (*suspected 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 Animal 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 ANIMAL SPECIES).

SITE ECOLOGICAL IMPORTANCE

The Species Environmental Assessment Guidelines require that a Site Ecological Importance is calculated for each habitat on site, and provides methodology for making this calculation.

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.

Sensitivity scores provided in the Species Environmental Assessment Guidelines allow evaluation relative to ecosystem status and/or presence of sensitive species.

Table 4: Site ecological importance for habitats found on site.

Habitat	Conservation importance	Functional integrity	Receptor resilience	Site Ecological Importance (BI)
Forest	Medium SPECIES CRITERION: MEDIUM: > 50% of receptor contains natural habitat with potential to support SCC. Two Vulnerable and one Near Threatened animal species are likely to occur within extended forest system that includes current site. One Endangered and one Rare tree species could occur within the extended forest system that includes the current site.	Very High Very large (> 100 ha) intact area for any conservation status of ecosystem type. Forest on site is evaluated in terms of entire connected extent, both on-site and in surrounding areas, because it acts as a continuous unit = >100 ha. High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. Minimal current negative ecological impacts although parts of system have been developed.	Very low Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed. Based on the fact that the habitat is structurally dominated by long-lived tree species.	Very High (BI = High)
Mesic Thicket	Medium MEDIUM: > 50% of receptor contains natural habitat with potential to support SCC. Two Vulnerable and one Near Threatened animal species are likely to occur within	High Good habitat connectivity with potentially functional ecological corridors and a regularly used connection between intact habitat patches. Only minor current negative ecological	Low Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor	High (BI = Medium)

	extended forest system that includes current site. One Endangered and three Vulnerable plant species could occur within this habitat on site (not seen there).	impacts (alien invasion) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential.	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.	
Scrub Thicket (invaded)	Low No confirmed or highly likely populations of SCC.	Medium Several minor and major current negative ecological impacts. Moderate to good rehabilitation potential. Good habitat connectivity and functional ecological corridors.	Low Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.	Medium (BI = Low)
Fynbos	Medium MEDIUM: > 50% of receptor contains natural habitat with potential to support SCC. Two Vulnerable and one Near Threatened animal species are likely to occur within extended forest system that includes current site. One Endangered and three Vulnerable plant	High Good habitat connectivity with potentially functional ecological corridors and a regularly used connection between intact habitat patches. Only minor current negative ecological impacts (alien invasion) with no signs of major past disturbance (e.g. ploughing) and good	Very low Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed. Based on the fact that the habitat is structurally	Very High (BI = High)

	species could occur within this habitat on site (not seen there).	rehabilitation potential.	dominated by long-lived tree species.	
Secondary vegetation in alien-cleared areas	Low No confirmed or highly likely populations of SCC.	Medium Several minor and major current negative ecological impacts. Low to moderate rehabilitation potential. Good habitat connectivity and functional ecological corridors.	Medium Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality. Vegetation is recently cleared dense aliens with only weeds currently occurring there - unknown soil seed bank.	Low (BI = Low)
Transformed (roads)	Very low No natural habitat remaining.	Very low Several major current negative ecological impacts.	Very High Habitat that can recover rapidly	Very low (BI = Very low)

The calculation of Site Ecological Importance includes an explicit recognition of the ability of each ecosystem to tolerate and recover from disturbance. Guidelines for development activities within different importance levels are given in the Table below. This shows that impacts within Forests should be avoided, and impacts within Secondary vegetation should be minimized, followed by restoration activities.

Table 5: 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.

Habitat sensitivity

According to the "PROTOCOL FOR THE SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS FOR ENVIRONMENTAL IMPACTS ON TERRESTRIAL BIODIVERSITY", there are only two sensitivity classes for the Terrestrial Biodiversity Theme, namely VERY HIGH or LOW. The VERY HIGH category includes any area of natural vegetation that falls within one of the following categories:

1. terrestrial critical biodiversity areas (CBAs).
2. terrestrial ecological support areas (ESAs).
3. protected areas as defined by the National Environmental Management: Protected Areas Act, 2004.
4. priority areas for protected area expansion.
5. strategic water source areas (SWSAs).
6. freshwater ecosystem priority areas (FEPA) subcatchments.
7. indigenous forests.

Any area that is in a natural state and that falls within one of these categoriers is therefore automatically assigned a sensitivity class of VERY HIGH and requires a Terrestrial Biodiversity Specialist Assessment.

It is important to note that the definition of natural vegetation, according to the National Environmental Management Act, 1998 (Act No. 107 of 1998) is "*vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding 10 years*." According to this description, the vegetation on site (including secondary vegetation) is legally in a natural state.

The current site is almost entirely within an area mapped as Other Natural Area (ONA) and Ecological Support Areas (ESA1), some of which is also indigenous forest. It is confirmed from the site visit that some of these areas are in a natural state, and others are highly degraded due to dense alien invasion, mechanical clearing of aliens, and a recent fire. Although none of these factors change the legal status from "natural", it is observed that these degraded areas no longer support the original vegetation that would have occurred there and are unlikely to be restored to such a state in any reasonable human timeframes. The natural (undisturbed) forested areas therefore have VERY HIGH sensitivity according to the Terrestrial Biodiversity Theme (ESA and "indigenous forest"). Remaining areas have LOW sensitivity according to the Terrestrial Biodiversity Theme.

There is habitat on site that is suspected habitat for threatened plant and animal species. This is the forest habitat and the adjacent scrub thicket and fynbos ecotone habitats. The species that could potentially occur within this habitat are as follows:

- Knysna Warbler (Vulnerable) has a moderate probability of occurring in forest margin areas.
- Crowned Eagle (Near Threatened) - the forests on site may constitute part of the general foraging range but it is unlikely that they are resident on site, or are dependent on it.
- Small antelope (Vulnerable). There is a moderate to high probability of it occurring in the forests on site.

A map of combined habitat sensitivity on site for the Plant Species Theme and Animal Species Theme is provided in Figure 13, mapped according to the calculations provided through the process of calculating Site Ecological Importance.

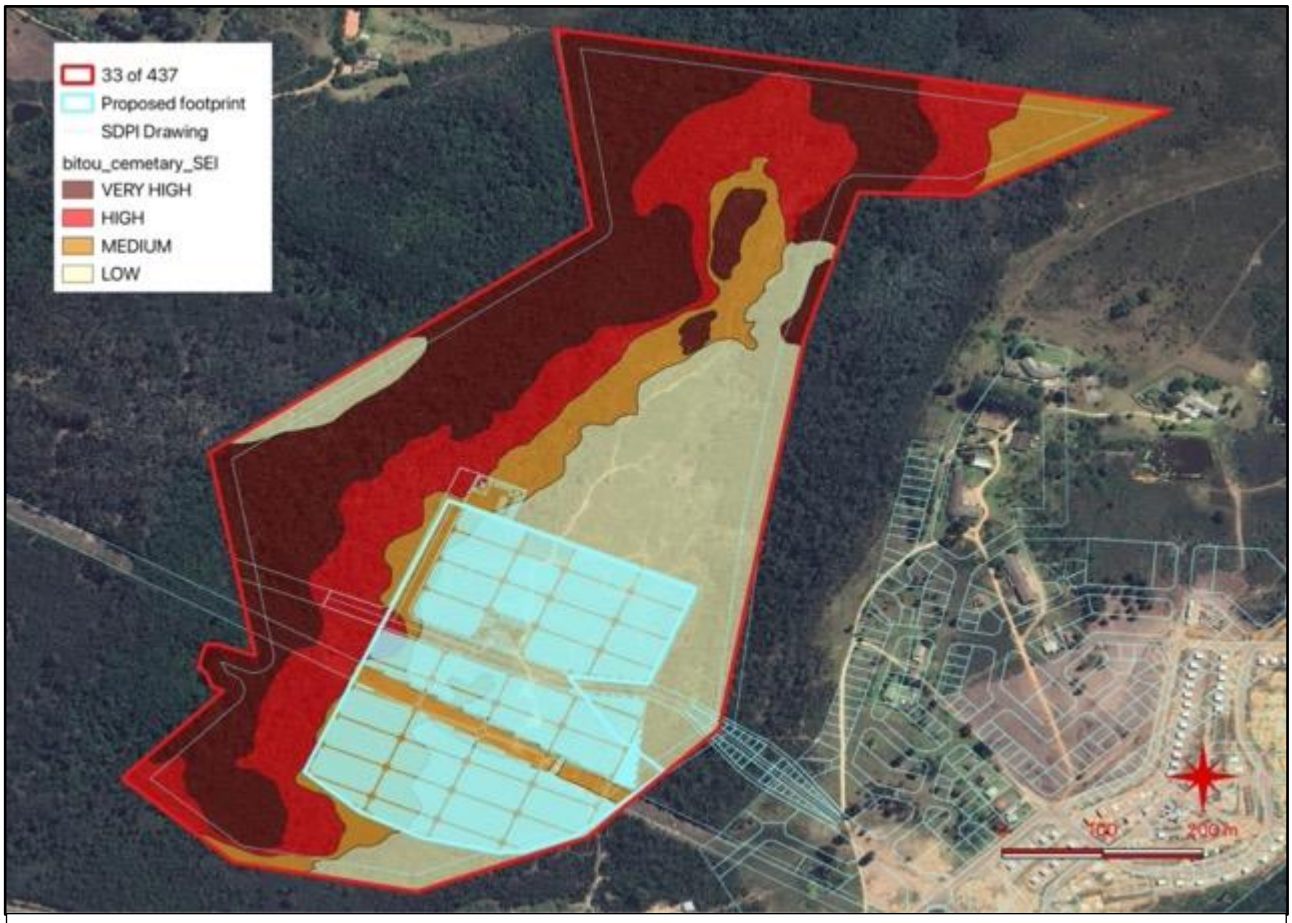


Figure 13: Habitat Site Ecological Importance (SEI) on site relative to the proposed footprint.

IMPACT ASSESSMENT

The proposal is to develop a cemetery on site. The footprint of the proposed development is within areas mapped as "Aliens" (Low sensitivity / SEI), "Scrub Thicket" (Medium sensitivity / SEI), and "Mesic Thicket" (High sensitivity / SEI).

No plant species of concern were found on site, but the habitat on site is suitable for a variety of plant and animal SCC. There are also Cape Beech trees (*Rapanaea melanophloeos*) on site that are protected under the National Forests Act.

There are various sensitive animal species that are likely to use part of the site.

The impacts assessed here are therefore as follows:

1. LOSS OF NATURAL VEGETATION.
2. LOSS OF INDIVIDUALS OF A PROTECTED TREE SPECIES
3. LOSS OF HABITAT FOR LISTED THREATENED ANIMAL SPECIES

Loss of natural vegetation

Resource irreplaceability
The vegetation type (South Outeniqua Sandstone Fynbos) is not listed. All valley areas of the site on the steep slopes are covered with forest that matches the description for Southern Afrotemperate Forest, which is not threatened, but is protected under the National Forests Act. Other than the drainage valleys (ESA1) all other natural areas on site fall within ONA. Score = 1 (3 without mitigation - if forest is affected).

Threshold
The potential impact affects a small proportion of the vegetation type (South Outeniqua Sandstone Fynbos) and the edges of areas mapped here as Southern Afrotemperate Forest. Score = 1 (2 without mitigation - if forest is affected).

Resource condition
The vegetation on site (within the proposed development footprint) is mostly in poor condition, and consists either of natural or invaded areas with a species composition that is not representative of the natural habitat. Score = 1 (5 without mitigation - if forest is affected).

Reversibility of impact
Loss of habitat on site (within the proposed development footprint) is REVERSIBLE - most is degraded and can be restored through a rehabilitation process. Score = 2 (5 without mitigation - if forest is affected).

Extent of impact
The impact will occur within the site boundary. It is possible that there may be spillover effects into surrounding areas, due mostly to secondary impacts, such as boundary disturbance, alien invasive species spread, etc. Score = 1 (2 without mitigation - if forest is affected).

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 MEDIUM intensity, since it would result in slight impact on processes. Score = 2 (4 without mitigation - if forest is affected).

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

Confidence
There is a high understanding in the identity and on-site value of the vegetation, as well as the nature and extent of the proposed activity. No measures are therefore required to improve the confidence in the assessed impact.

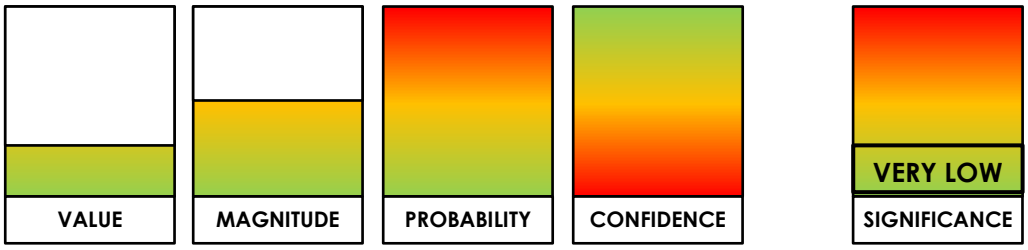
Significance of impact
The significance is a combination of the value of the biodiversity resource, the magnitude of the expected impact and the probability of the impact occurring.

Biodiversity value score: (1 + 1 + 1 + 2)/4 = 1.25 (3.00 without mitigation)
Impact magnitude: (1 + 5 + 2)/3 = 2.67 (3.67 without mitigation
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 (1.25 x 2.67 x 5.00 = 16.7)/25 = 0.7 = **VERY LOW** significance (2.2 **MEDIUM** significance without mitigation).



Possible mitigation measures
Possible mitigation measures that can be applied are as follows:

1. Forest habitats in the steeply-sloping valley parts of the site, have high biodiversity and conservation value, and are designated as sensitive. These areas must not be unnecessarily affected by the proposed development. Upslope of the forested valleys are scrub thicket areas that provide an important ecological buffer to the forested areas. This scrub thicket historically transitioned into fynbos. Where possible, these transitional areas should be retained on site as part of the forest buffer.
2. Compile and implement a fire management plan for fynbos areas. This must take into account the required burning frequency, intensity and timing to promote ecosystem health within fire-prone ecosystems.
3. Access to forested areas during construction must not be permitted by any construction personnel. These areas must be fenced off and no access allowed.
4. Compile and implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control.

Loss of individuals of protected tree species

Resource irreplaceability
The tree species affected is *Rapanaea melanophloeos*, protected under the National Forests Act. A small number were seen on site, of different sizes within Scrub Thicket areas. Score = 1.

Threshold
The potential impact affects a very small proportion of the overall known population of the species, although the proportion affected of those occurring on site is unknown until proper counts are done. Score = 1.

Resource condition
The trees on site are mostly small and in good condition. They regularly emerge in thicket precursor thicket understorey and forest understorey areas. Score = 4.

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 MEDIUM intensity, since it would result in the permanent loss of part of the populations on site, although this is not extensive. Score = 2.

Probability of occurrence
Based on the proposed development plan and the known location of the individuals found on site, the impact has HIGH PROBABILITY. Score = 4.

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.

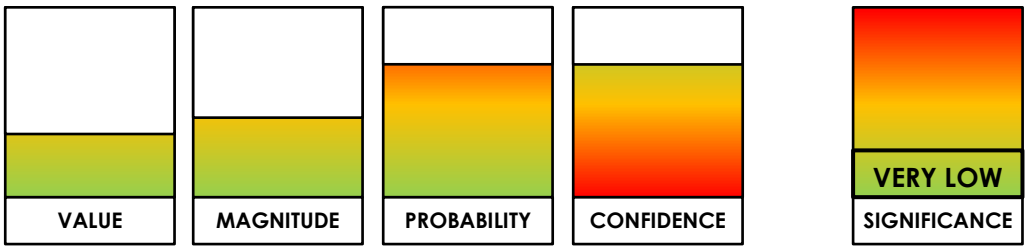
Significance of impact
The significance is a combination of the value of the biodiversity resource, the magnitude of the expected impact and the probability of the impact occurring.

Biodiversity value score: (1 + 1 + 4 + 2)/4 = 2. 00
Impact magnitude: (1 + 5 + 2)/3 = 2.67
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 (2.00 x 2.67 x 4.00 = 21)/25 = 0.85 = **VERY LOW** significance



Possible mitigation measures
Possible mitigation measures that can be applied are as follows:

1. Avoid areas of high concentrations of protected trees.
2. Do not disturb natural woodland where there is a continuous canopy of forest trees, and protect forest margin areas so that forest interiors maintain existing microhabitat conditions and structural integrity.
3. If any trees need to be removed or pruned then a permit is required, according to the National Forests Act.

Loss of habitat for listed threatened species

Resource irreplaceability
There is habitat on site that is suspected habitat for threatened plant and animal species. This includes all natural habitat on site, some of which is within the proposed development footprint and will therefore be affected by the proposed development. Score = 4.

The species that could potentially occur within this habitat are as follows:

- Knysna Warbler (Vulnerable) has a moderate probability of occurring in forest margin areas.
- Crowned Eagle (Near Threatened) - the forests on site may constitute part of the general foraging range but it is unlikely that they are resident on site, or are dependent on it.
- Small antelope (Vulnerable). There is a moderate to high probability of it occurring in the forests on site.
- A total of nine threatened, near threatened or rare plant species have a possibility of occurring on site. In some cases, it is not possible to know unless the fynbos is burnt to initiate post-fire emergence of dormant species.

Threshold
The potential impact affects a small proportion of the overall habitat available for these species and will possibly not directly affect any individuals. Nevertheless, the threatened status of many species is due significantly to overall loss of habitat, which is reflected in the threatened status of the fynbos vegetation type that occurs on site. Additional loss of habitat, however small, continues to drive ecosystems towards new thresholds of loss. Score = 2.

Resource condition
The vegetation on site is in relatively good condition. Score = 4.

Reversibility of impact
Loss of natural habitat on site is IRREVERSIBLE. Score = 5.

Extent of impact
The impact will occur within the site boundary. It is possible that there may be spillover effects into surrounding areas, due mostly to secondary impacts, such as dust deposition, alien invasive species spread, etc. Score = 2.

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 currently assessed as being of LOW magnitude, since it is not expected to affect any of the sensitive habitat resource for potentially affected species. However, the detection of any of the SCC on site would change this score, depending on the distribution and importance of the species concerned. Score = 2.

Probability of occurrence
Based on the proposed development plan and the known location of the habitats found on site, the impact will be IMPROBABLE, although any actual impacts on animal and plant species of concern is LOW PROBABILITY. Score = 2. This score would change if any SCC were detected on site.

Confidence
There is a high understanding in the identity and on-site value of the vegetation, as well as the nature and extent of the proposed activity. No measures are therefore required to improve the confidence in the assessed impact.

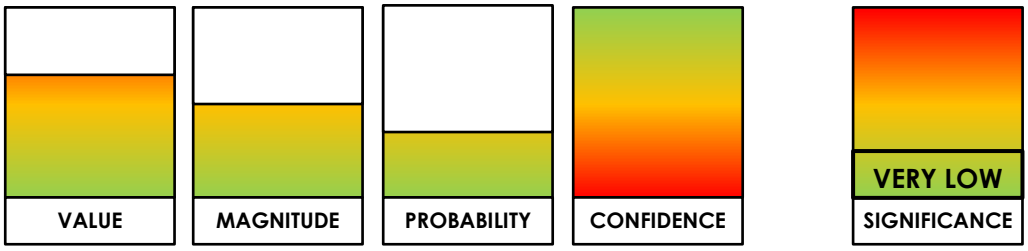
Significance of impact
The significance is a combination of the value of the biodiversity resource, the magnitude of the expected impact and the probability of the impact occurring.

Biodiversity value score: (4 + 2 + 4 + 5)/4 = 3.75
Impact magnitude: (2 + 5 + 2)/3 = 3.00
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 (3.75 x 3.00 x 2.00 = 18.7)/25 = 0.9 = **VERY LOW** significance
Note that the detection on site of any SCC would change this score.



Possible mitigation measures
Possible mitigation measures that can be applied are as follows:

1. Protect natural vegetation adjacent to the proposed development site, as per the first impact.

POSSIBLE OFFSETS

The THE NATIONAL BIODIVERSITY OFFSET GUIDELINE, published under the NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) on 23 June 2023, provides guidelines for when offsets are required.

According to this Guideline, "*a biodiversity offset is required when a proposed listed or specified activity, or activities, is/are likely to have residual negative impacts on biodiversity of* ***medium*** *or* ***high*** *significance. These negative impacts could affect biodiversity patterns (e.g. threatened ecosystems, species or special habitats), ecological processes (e.g. migration patterns, climate change corridors enabling shifts in species distributions over time, or wetland function), ecosystem services (e.g. provision of clean water) or a combination of all three*".

For the current site, residual impacts due to loss of natural vegetation (at a district scale) were evaluated as having VERY LOW significance, which does not trigger the requirement for a biodiversity offset.

CONCLUSION

Desktop information, field data collection and mapping from aerial imagery provides the following verifications of patterns for various themes:

1. The site consists of a combination of forest, mesic thicket, scrub thicket, fynbos and extensive areas of alien trees (existing and recently cleared). The forest, fynbos, scrub thicket, and mesic thicket are in a natural state whereas areas of alien trees are in a highly degraded state. (Note that the legal definition of "natural vegetation" includes the phrase, "...irrespective of the levels of alien invasion", therefore the areas of alien vegetation are legally defined as natural).

2. The proposed development is located primarily within areas of alien trees, but also affects a small area of scrub thicket and a sliver of mesic thicket. However, the edge of the proposed development extens partly down a steep slope, therefore downslope effects on forest and mesic thicket habitats is possible.

3. All natural areas on site occur in areas designated as Other Natural Area, or Ecological Support Area (drainage lines). No Critical Biodiversity Areas are affected or occur on site.

4. The site occurs mostly within South Outeniqua Sandstone Fynbos, which is not listed, and partially within Southern Afrotemperate Forest (not mappede as occurring on site but confirmed to occur there).

5. Following the procedures within the Species Environmental Assessment Guidelines, the Forest and Fynbos have been assessed as having Very High sensitivity / Site Ecological Importance, mesic thicket as having High sensitivity / Site Ecological Importance, Scrub Thicket as having Medium sensitivity / Site Ecological Importance, and areas of Aliens as having Low sensitivity / Site Ecological Importance.

6. No plant species of concern were found on site but based on the available habitat, it is considered possible that any of nine plant species flagged for the site could occur there. It is therefore verified that the site has MEDIUM sensitivity with respect to the Plant Species Theme, within areas of natural habitat.

7. The site is considered to be potential habitat for any of three of the animal species flagged for the site. The woodland habitats (forest, mesic thicket, scrub thicket) is likely habitat for three animal species, the Knysna Warbler (Vulnerable), a small antelope (Vulnerable), and the Crowned Eagle (Near Threatened). It is therefore verified that the Animal Species Theme has MEDIUM sensitivity for the site.

8. An impact assessment determined that the impact of the proposed development has Medium significance for loss of natural vegetation (Very Low, if proposed mitigation is applied - see Recommendations section below), Very Low significance for loss of protected trees, and Very Low significance for animal and plant species of concern (although this would change if any of the species were detected on site).

9. On the basis of the residual Very Low significance for loss of natural vegetation, no offsets are required, according to the NATIONAL BIODIVERSITY OFFSET GUIDELINE, published under the NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) on 23 June 2023.

RECOMMENDATIONS

- Forest habitats in the steeply-sloping valley parts of the site, have high biodiversity and conservation value, and are designated as sensitive. These areas must not be unnecessarily affected by the proposed development. Upslope of the forested valleys are scrub thicket areas that provide an important ecological buffer to the forested areas. This scrub thicket historically transitioned into fynbos. Where possible, these transitional areas should be retained on site as part of the forest buffer.

- An open space management system should be developed to formalize forest protection and the associated buffer areas.

- It is important for the maintenance of biodiversity and ecological patterns in the general landscape that ecological linkages are maintained in the landscape. This includes ecotones between the different major habitat types. The most important ecological corridor and linkage in the landscape associated with the current site is the forested valley system. These areas must be protected from impacts associated with the proposed project.

- Rehabilitation of disturbed areas, as well as previously invaded areas, should be undertaken in a way that promotes establishment of site-appropriate indigenous species.

- An alien invasive management programme should urgently be implemented on site. This will protect all remaining habitats on site, especially those downslope from degraded areas, and could potentially be the biggest contribution to maintaining and protecting biodiversity on site and in surrounding areas.

- A permit is required for any protected trees that may be affected by proposed development. Once a final layout has been determined, a survey of all protected trees within this footprint area is required in order to apply for any necessary permits. Protected trees observed on site included milkwoods (*Sideroxylon inerme*) and boekenhout / Cape beech (*Rapanaea melanophloeos*).

REFERENCES & BIBLIOGRAPHY

Alexander, G. & Marais, J. 2007. A guide to the reptiles of southern Africa. Struik, Cape Town.

Barnes, K.N. (ed.) (2000) The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. Birdlife South Africa, Johannesburg.

Bates, M.F., Branch, W.R., Bauer, A.M., Burger, M., Marais, J., Alexander, G.J. & De Villiers, M.S. 2014. Atlas and Red List of the Reptiles of South Africa. Suricata 1, South African National Biodiversity Institute. ISBN 978-1-919976-84-6.

Branch, W.R. (1988) South African Red Data Book—Reptiles and Amphibians. South African National Scientific Programmes Report No. 151.

Brown, J.H. 1960. New grasshoppers (Acridoidea) from the Great Karroo and S. E. Cape Province. J. Ent. Soc. S. Afr. 23 (1): 126-143.

CapeNature. 2017 WCBSP Bitou [Vector] 2017. Available from the Biodiversity GIS website, downloaded on 03 June 2022

Child M.F., Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert H.T., editors. The 2016 Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.

Du Preez, L. & Carruthers, V. 2009. A complete guide to the frogs of southern Africa. Random House Struik, Cape Town.

Friedmann, Y. & Daly, B. (eds.) 2004. The Red Data Book of the Mammals of South Africa: A Conservation Assessment: CBSG Southern Africa, Conservation Breeding Specialist Group (SSC/IUCN), Endangered Wildlife Trust, South Africa.

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.

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

Groombridge, B. (ed.) 1994. *1994 IUCN Red List of Threatened Animals*. IUCN, Gland, Switzerland.

Henning & Henning.

IUCN (2001). *IUCN Red Data List categories and criteria: Version 3.1*. IUCN Species Survival Commission: Gland, Switzerland.

Marais, J. 2004. A complete guide to the snakes of southern Africa. Struik Publishers, Cape Town.

Mills, G. & Hes, L. 1997. The complete book of southern African mammals. Struik Publishers, Cape Town.

Minter, L.R., Burger, M., Harrison, J.A., Braack, H.H., Bishop, P.J. and Kloepfer, D. (eds.) 2004. Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland. SI/MAB Series #9. Smithsonian Institution, Washington, DC.

Monadjem, A., Taylor, P.J., Cotterill, E.P.D. & Schoeman, M.C. 2010. Bats of southern and central Africa. Wits University Press, Johannesburg.

Mucina, L. And Rutherford, M.C. (editors) 2006. Vegetation map of South Africa, Lesotho and Swaziland: an illustrated guide. *Strelitzia* 19, South African National Biodiversity Institute, Pretoria.

National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report. Synthesis Report. South African National Biodiversity Institute.

Passmore, N.I. & Carruthers, V.C. (1995) South African Frogs; a complete guide. Southern Book Publishers and Witwatersrand University Press. Johannesburg.

Rebelo, A.G., Boucher, C., Helme, N., Mucina, L., Rutherford, M.C., Smit, W.J., Powrie, L.W., Ellis, F., Lambrechts, J.J., Scott, L., Radloff, F.G.T., Johnson, S.D., Richardson, D.M., Ward, R.A., Procheş, S.M., Oliver, E.G.H., Manning, J.C., Jürgens, N., McDonald, D.J., Janssen, J.A.M., Walton, B.A., Le Roux, A., Skowno, A.L., Todd, S.W. & Hoare, D.B. 2006. Fynbos Biome. In: Mucina, L. & Rutherford, M.C. (eds), The vegetation of South Africa, Lesotho and Swaziland: 52-219. SANBI, Pretoria.

South African National Biodiversity Institute (SANBI). 2020. Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora

Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. Version 3.1. 2022.
Skowno AL, Matlala M, Slingsby J, Kirkwood D, Raimondo DC, von Staden L, Holness SD, Lotter M, Pence G, Daniels F, Driver A, Desmet PG, Dayaram A (2019). Terrestrial ecosystem threat status assessment 2018 - comparison with 2011 assessment for provincial agencies. National Biodiversity Assessment 2018 Technical Report. South African National Biodiversity Institute, Pretoria.
Taylor, M.R., Peacock, F. & Wanless, R.M. (eds.) 2015. The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. Birdlife South Africa, Johannesburg.
Tolley, K. & Burger, M. 2007. Chameleons of southern Africa. Struik Publishers, Cape Town.
Van Wyk, A.E. And Smith, G.F. (Eds) 2001. Regions of Floristic Endemism in Southern Africa: A review with emphasis on succulents, pp. 1-199. Umdaus Press, Pretoria.
Venter J, Seydack A, Ehlers-Smith Y, Uys R, Child MF. 2016. A conservation assessment of *Philantomba monticola*. In Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.
Williams, M.C. 2020. Genus Tsitana. In Afrotropical Butterflies. Online encyclopaedia published by LepSoc Africa, available at https://www.lepsocafrica.org/?p=publications&s=atb.
Woodhall, Steve (2005). Field Guide to Butterflies of South Africa. Cape Town, South Africa: Struik.

APPENDICES:

Appendix 1: Plant species recorded on site.

Acacia cyclops* (Invader category 1b)
Acacia mearnsii* (Invader category 1b)
Acacia melanoxylon* (Invader category 1b)
Acokanthera oppositifolia
Albuca bracteata
Aloe arborescens
Arctopus echinatus
Arctotheca prostrata
Aspalathus asparagoides
Asparagus macowanii
Asparagus rubicundus
Asplenium lunulatum
Asplenium rutifolium
Babiana sambucina
Bobartia aphylla
Burchellia bubalina
Calamagrostis epigejos
Carissa bispinosa
Cassine peragua
Catharanthus roseus* (Invader category 1b)
Centella asiatica
Chaenostoma sp.
Colpoon compressum
Crassula orbicularis
Crinum macowanii
Cynanchum viminale
Dianthus albens
Dietes iridioides
Diospyros dichrophylla
Diospyros whyteana
Ehrharta erecta
Elaeodendron croceum
Eragrostis curvula
Erica discolor
Erica sparsa
Euclea crispa
Ficinia indica
Ficinia nigrescens
Gerbera cordata
Gymnosporia nemorosa
Hakea sericea* (Invader category 1b)
Halleria lucida
Helichrysum anomalum
Helichrysum petiolare
Hermannia flammea
Hermannia salviifolia
Hibiscus aethiopicus
Hypoestes forskaolii
Hypoxis sobolifera
Indigofera poliotes

Lantana camara* (Invader category 1b)
Lauridia tetragona
Lichtensteinia interrupta
Lobelia tomentosa
Megathyrsus maximus
Melica racemosa
Metalasia muricata
Metalasia pungens
Metalasia trivialis
Monsonia emarginata
Montinia caryophyllacea
Morella humilis
Osteospermum moniliferum
Oxalis imbricata
Panicum sp
Pappea capensis
Paraserianthes lophantha* (Invader category 1b)
Paspalum urvillei*
Passerina corymbosa
Pelargonium grossularioides
Peperomia tetraphylla
Phlegmariurus gnidioides
Phylica axillaris
Physalis peruviana*
Phytolacca octandra* (Invader category 1b)
Polygala myrtifolia
Pteris dentata
Pterocelastrus tricuspidatus
Rapanea melanophloeos (PROTECTED TREE)
Restio tetragonus
Rhoicissus digitata
Rhoicissus tomentosa
Scabiosa columbaria
Scadoxus puniceus
Schizaea pectinata
Schoenoxiphium sp
Scutia myrtina
Searsia lucida
Searsia pallens
Selago canescens
Selago corymbosa
Senecio angulatus
Senecio ilicifolius
Senna septemtrionalis* (Invader category 1b)
Seriphium plumosum
Sideroxylon inerme (PROTECTED TREE)
Solanum mauritianum* (Invader category 1b)
Sporobolus africanus
Streptocarpus rexii
Tarchonanthus littoralis
Tetraria cuspidata
Themeda triandra
Trichocladus crinitus
Trisetopsis imberbis
Viscum rotundifolium

Appendix 2: Protected Trees of South Africa

In terms of section 15(1) of the National Forests Act, 1998, no person may cut, disturb, damage or destroy any protected tree; or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree, except under a licence or exemption granted by the Minister of Agriculture, Forestry and Fisheries. The list of Protected Tree Species under the National Forest Act, 1998 (Act No. 84 of 1998) is attached here as Schedule A. The most recent version of this list was published in the Government Gazette No. 41887 on 7 September 2018, designated as GN No. 536 of 2018, and contains 47 species distributed across South Africa.

SCHEDULE A

Botanical name	**English common names**	**Other common names** **Afrikaans (A), Sepedi (P), Sesotho (S), Setswana (T), Tshivenda (V), isiXhosa (X), isiZulu (Z), Xitsonga (XT)**	**National tree number**
Acacia erioloba	Camel thorn	Kameeldoring (A)/Mogohlo (NS)/Mogoʻtlhoʻ (T)/	168
Acacia haematoxylon	Grey camel thorn	Vaalkameeldoring (A)/Mokholo (T))	169
Adansonia digitata	Baobab	Kremetart (A)/Seboi (NS)/Mowana (T)/Ximuwu (XT	467
Afzelia quanzensis	Pod mahogany	Peulmahonie (A)/Mutokota (V)/Inkehli (Z)	207
Balanites subsp. *maughamii*	Torchwood	Groendoring (A)/Ugobandlovu (Z)	251
Barringtonia racemosa	Powder-puff tree	Poeierkwasboom (A)/Iboqo (Z)	524
Boscia albitrunca	Shepherd's tree	Witgat (A)/Mohloʻpi (NS)/Motlhoʻpi (T)/ Muvhombwe (V)/Umgqomogqomo (X)/Umvithi (Z)	122
Brachystegia spiciformis	Msasa	Msasa (A)	198.1
Breonadia salicina	Matumi	Mingerhout (A)/Mohlomeʻ (NS)/Mutu-lume (V)/Umfomfo (Z)	684
Bruguiera gymnorrhiza	Black mangrove	Swartwortelboom (A)/isiKhangati (X)/IsiHlobane (Z)	527
Cassipourea swaziensis	Swazi onionwood	Swazi-uiehout (A)	531.1
Catha edulis	Bushman's tea	Boesmanstee (A)/Mohlatse (NS)/Igqwaka (X)/Umhlwazi (Z)	404
Ceriops tagal	Indian mangrove	Indiese wortelboom (A)/isinkaha (Z)	525

Cleistanthus schlechteri var. *schlechteri*	False tamboti	Bastertambotie (A)/Umzithi (Z)	320
Colubrina nicholsonii	Pondo weeping thorn	Pondo-treurdoring (A)	453.8
Combretum imberbe	Leadwood	Hardekool (A)/Mohwelere-tsʼhipi (NS)/Motswiri (T)/Impondondlovu (Z)	539
Curtisia dentata	Assegai	Assegaai (A)/Umgxina (X)/Umagunda (Z)	570
Elaeodendron transvaalensis	Bushveld saffron	Bosveld-saffraan (A)/Monomane (T)/Ingwavuma (Z)	416
Erythrophysa transvaalensis	Bushveld red balloon	Bosveld-rooiklapperbos (A)/Mofalatsane (T)	436.2
Euclea pseudebenus	Ebony guarri	Ebbeboom-ghwarrie (A)	598
Ficus trichopoda	Swamp fig	Moerasvy (A)/Umvubu (Z)	54
Leucadendron argenteum	Silver tree	Silwerboom (A)	77
Lumnitzera racemosa var. *racemosa*	Tonga mangrove	Tonga-wortelboom (A)/isiKhaha-esibomvu (Z)	552
Lydenburgia abbottii	Pondo bushman's tea	Pondo-boesmanstee (A)	407
Lydenburgia cassinoides	Sekhukhuni bushman's tea	Sekhukhuni-boesmanstee (A)	406
Mimusops caffra	Coastal red milkwood	Kusrooimelkhout (A)/Umthunzi (X)/Umkhakhayi (Z)	583
Newtonia hildebrandtii var. *hildebrandtii*	Lebombo wattle	Lebombo-wattel (A)/Umfomothi (Z)	191
Ocotea bullata	Stinkwood	Stinkhout (A)/Umhlungulu (X)/Umnukane (Z)	118
Ozoroa namaquensis	Gariep resin tree	Gariep-harpuisboom (A)	373.2
Philenoptera violacea	Apple-leaf	Appelblaar (A)/Mphata (NS)/Mohata (T)/isiHomohomo (Z)	238
Pittosporum viridiflorum	Cheesewood	Kasuur (A)/Kgalagangwe (NS)/Umkhwenkwe (X)/Umfusamvu (Z)	139
Podocarpus elongatus	Breede River yellowwood	Breëriviergeelhout (A)	15
Podocarpus falcatus (Afrocarpus falcatus)	Outeniqua yellowwood	Outniekwageelhout (A)/Mogoʼbagoʼba (NS)/Umkhoba (X)/Umsonti (Z)	16
Podocarpus henkelii	Henkel's yellowwood	Henkel se geelhout (A)/Umsonti (X)/Umsonti (Z)	17
Podocarpus latifolius	Real yellowwood	Regte-geelhout (A)/Mogoʼbagoʼba (NS)/Umcheya (X)/Umkhoba (Z)	18
Protea comptonii	Saddleback sugarbush	Barberton-suikerbos (A)	88

Protea curvata	Serpentine sugarbush	Serpentynsuikerbos (A)	88.1
Prunus africana	Red stinkwood	Rooistinkhout (A)/Umkhakhase (X)/Umdumezulu (Z)	147
Pterocarpus angolensis	Wild teak	Kiaat (A)/Moroto (NS)/Mokwa (T)/Mutondo (V)/Umvangazi (Z)	236
Rhizophora mucronata	Red mangrove	Rooiwortelboom (A)/isiKhangathi (X)/Umhlume (Z)	526
Sclerocarya birrea subsp. *caffra*	Marula	Maroela (A)/Morula (NS)/Morula (T)/Umganu (Z) /Nkanyi (XT)	360
Securidaca longepedunculata	Violet tree	Krinkhout (A)/Mmaba (T)	303
Sideroxylon inerme subsp. *inerme*	White milkwood	Witmelkhout (A)/Ximafana (X)/Umakhwelafingqane (Z)	579
Tephrosia pondoensis	Pondo poison pea	Pondo-gifertjie (A)	226.1
Warburgia salutaris	Pepper-bark tree	Peperbasboom (A)/Molaka (NS)/Mulanga (V)/isiBaha (Z)	488
Widdringtonia cedarbergensis	Clanwilliam cedar	Clanwilliamseder (A)	19
Widdringtonia schwarzii	Willowmore cedar	Baviaanskloofseder (A)	21
Berchemia zeyheri *(RHAMNACEAE) LC*	Red ivory Pink ivory	Rooi-ivoor (A) / Rooihout (A) / Monee (S) / umNeyi (SW) / umNini (Z, X) / Xiniyani (TS) / Moye (T) / Munia-niane (V)	450
Diospyros mespiliformis *(EBENACEAE) LC*	Jackal berry	Jakkalsbessie (A) / Musuma (V) / Muntoma (TS) / Mgula (TS)	606
Schinziophyton rautanenii	Manketti / Mongongo	Mankettiboom (A) / Monghongho (T) / Makongwa (T)	337
Umtiza listeriana	Umtiza	Umtiza (X) / Omtisa (A)	205

Appendix 3: Flora protected under the Cape Nature and Environmental Conservation Ordinance 19 of 1974

SCHEDULE 3: Endangered Flora
As per the Cape Nature and Environmental Conservation Ordinance 19 of 1974

Family: APOCYNACEAE	Common name / Additional notes
Pachypodium namaquanum	Halfmens (currently listed as LC)
Family: GESNERIACEAE	
Charadrophila capensis	Cape Gloxinia (currently listed as Rare)
Family: LILIACEAE	
Aloe pillansii	Now called *Aloidendron pillansii*, currently listed as Endangered
Aloe buhrii	Currently listed as Vulnerable
Aloe erinacea	Now called *Aloe melanacantha*, currently listed as Least Concern
Family: PROTEACEAE	
Mimetes capitulates	Currently listed as Endangered
Mimetes hottentoticus	Currently listed as Critically Endangered
Mimetes stokoei	Currently listed as Critically Endangered
Orothamnus zeyheri	Currently listed as Vulnerable
Protea odorata	Currently listed as Critically Endangered
Family: STANGERIACEAE	
Stangeria eriopus	Bobbejaankos (currently listed as Vulnerable)
Family: ZAMIACEAE	
Encephalartos spp.	Cycads, all species

SCHEDULE 4: PROTECTED SPECIES
As per the Cape Nature and Environmental Conservation Ordinance 19 of 1974

Family:AMARYLLIDACEAE	All species
Family: APOCYNACEAE	All species except those listed in Schedule 3
Family: AQUIFOLIACEAE	All species
Ilex mitis	
Family: ARACEAE	
Zantedeschia elliottiana	Yellow arum lily (currently DDT)
Family: ASCLEPIADACEAE (now Apocynaceae)	All species
Family: BORAGICNACEAE	
Echiostachys spicatus	
Family: BRUNIACEAE	All species
Family: COMPOSITAE (now Asteraceae)	
Senecio colyphyllous (coleophyllous?)	
Cotula duckitteae	
Family: CRASSULACEAE	
Crassula columnaris	
Crassula perfoliata	
Crassula pyramidalis	
Kalanchoe thyrsiflora	
Rochea coccinea (now Crassula cochinea)	
Family: CUNONIACEAE	
Cunonia capensis	
Platylophus trifoliatus	

Family: DIOSCOREACEAE	
Testudinaria sylvatica (now Dioscorea sylvatica)	
Testudinaria elephantipes (now Dioscorea elephantipes)	
Family: ERICACEAE	All species
Family: EUPHORBIACEAE	
Euphorbia bupleurifolia	
Euphorbia fasciculata	
Euphorbia globosa	
Euphorbia horrida	
Euphorbia meloformis	
Euphorbia obesa	
Euphorbia schoenlandii	
Euphorbia symmetrica	
Euphorbia valida	
Family: GEISSOLOM(AT)ACEAE	All species
Family: GESNERIACEAE	
Streptocarpus	All species
Family: GRAMINAE (now Poaceae)	
Arundinaria tessellata (Thamnocalamus tessellatus)	
Secale africanum (now Secale strictum subsp. africanum)	
Family: GRUBBIACEAE	All species
Family: IRIDACEAE	All species
Family: LEGUMINOSAE (now Fabaceae)	
Erythrina acanthocarpa	
Erythrina humeana	
Liparia comantha	
Liparia sphaerica	
Liparia splendens	
Podalyria calyptrata	
Priestleya vestita	
Priestleya tomentosa	
Family: LILIACEAE (now split into a number of families)	
All species of the genus ALOE except those specified in Schedule 3 and the species *Aloe ferox*	
Gasteria beckeri	
Gloriosa superba	
All species of the genus Haworthia	
All species of the genus Kniphofia	
All species of the genus Lachenalia	
Littonia modesta	
Sandersonia aurantiaca	
All species of the genus Velthemia	
Agapanthus walshii	
Daubenya aurea	
Family: MELIACEAE	
Nymania capensis	
Family: MESEMBRYANTHEMACEAE (now Aizoaceae)	All species
Family: MUSACEAE (now Strelitziaceae)	

Strelitzia	All species
Family: NYMPHAECEAE	
Nymphaea capensis (now N. nouchali)	
Family: ORCHIDACEAE	All species
Family: OXALIDACEAE	
Oxalis nutans (no such species)	
Family: PENAEACEAE	All species
Family: POLYGALACEAE	
Muraltia minuta	
Family: POLYPODIACEAE	
Adiantium (now Family Pteridaceae)	All species
Hemitelia capensis (now Alsophila capensis, Family Cyathaceae)	
Polystichum adiantiforme (now Rumohra adiantiformis, Family Dryopteridaceae)	
Family: PORTULACACEAE	
Anacampseros (now Family Anacampserotaceae)	All species
Family: PROTEACEAE	
All species	
Family: RANUNCULACEAE	
Anemone capensis (now A.tenuifolia)	
Family: RESTIONACEAE	
Chondropetalum	
Acockii pillans (no such species)	
Elegia fenestrata	
Restio acockii	
Restio micans	
Restio sabulosus	
Family: RETZIACEAE (now Stilbaceae)	
Retzia capensis	
Family: RHAMNACEAE	
Phylica pubescens	
Family: RORIDULACEAE	All species
Family: RUTACEAE	All species
Family: SCROPHULARIACEAE	
Diascia	All species
Harveya	All species
Nemesia strumosa	
Halleria	All species
Family: THYMELAEACEAE	
Lachnaea aurea	