# 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 91 of Farm 304 Matjes Fontein, Keurboomsstrand, Plettenberg Bay in the Western Cape Province

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# Plant Species, Animal Species and Terrestrial Biodiversity Assessment Report for Portion 91 of Farm 304 Matjes Fontein, Keurboomsstrand, Plettenberg Bay in the Western Cape Province

24 June 2025

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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 the specialist:

| Specialist | Qualification and accreditation |
|---|---|
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## Declaration of independence:

BioCensus (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 BioCensus (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:

BioCensus (Pty) Ltd undertakes 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 BioCensus (Pty) Ltd by the client and in addition to information obtained during the course of this study, BioCensus (Pty) Ltd presents the results and conclusion within the associated document to the best of the author's professional judgement and in accordance with best practice.

_____ 24 June 2025

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 91 of Farm 304 Matjes Fontein, Keurboomsstrand, Plettenberg Bay in the Western Cape Province. It is between the mouth of the Keurbooms River and the settlement of Keurboomstrand. The site is adjacent to the main access road to Keurboomstrand and spans the area from that road to the DR1888, which does a loop from the N2 back to the N2. Refer to **Figure 1** below for the general location.

The site is accessed from the Keurboomstrand access road (the P0394 road). There is an existing development on the southern side of the road (between the site and the sea (**Figure 2**). The eastern and the western boundaries of the site are cadastral boundaries. The entire wooded area visible in **Figure 2** and **Figure 3** (the northern half of the site) is a steep south-facing ridge that stretches away in both directions from the site. The southern part of the site is a flat area with lawns in previously cultivated areas that is currently used for equestrian activities.

The scope of this report is the southern part of the property, which is the only part is planned to be developed. The entire site is 14.72 ha.

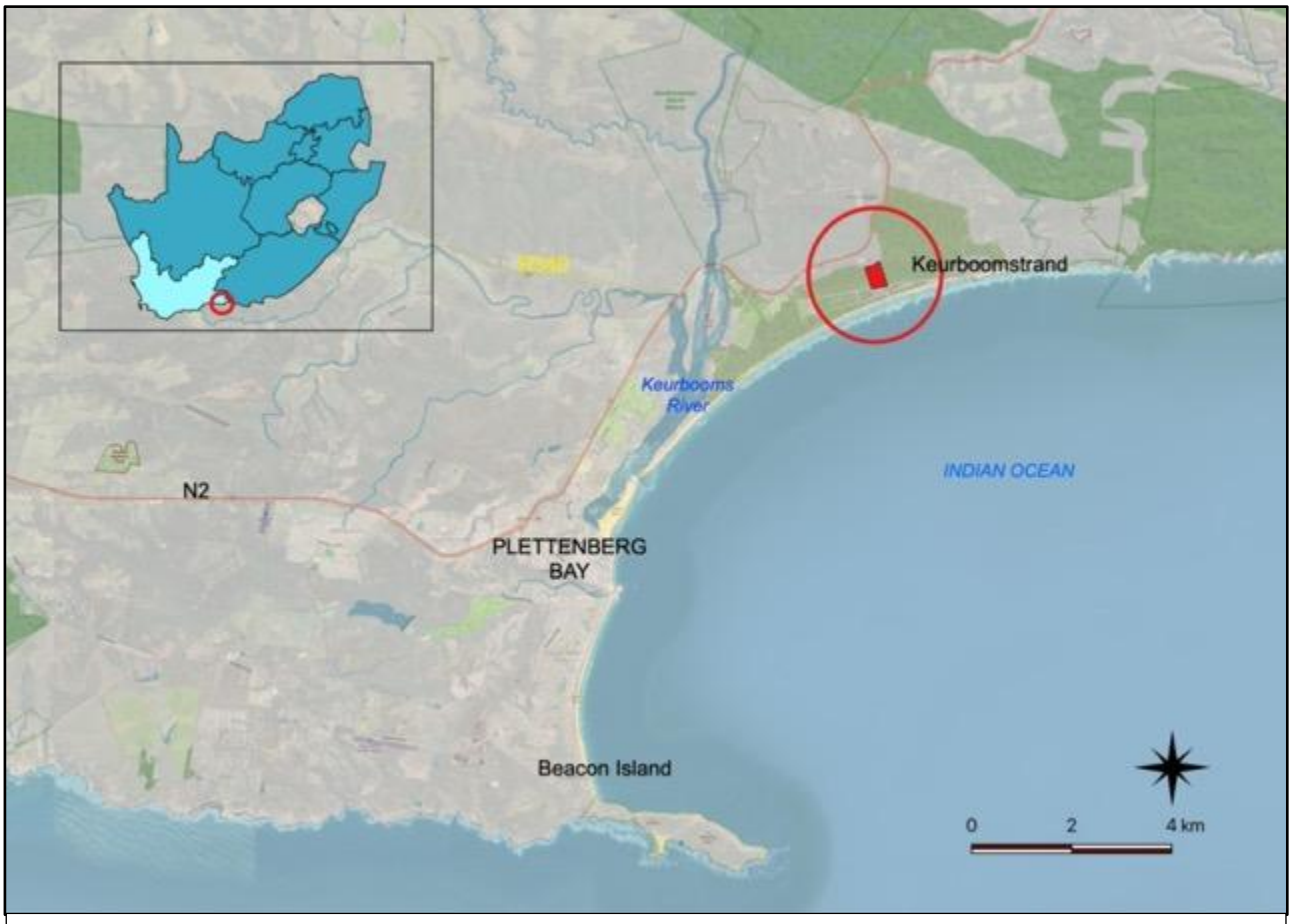


**Figure 1: Location of the site (within red circle).**


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

**Figure 3: Airborne view of the site looking from east to west.**

# Identified Theme Sensitivities

A sensitivity screening report from the DEA Online Screening Tool was requested in the application category: Transformation of land | Indigenous vegetation. The DEA Screening Tool report for the area, dated 20/06/2025, 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 |
| Medium | Amphibia-Afrixalus knysnae |
| Medium | Aves-Circus maurus |
| Medium | Aves-Stephanoaetus coronatus |
| Medium | Aves-Neotis denhami |
| Medium | Aves-Bradypterus sylvaticus |
| Medium | Mammalia-Chlorotalpa duthieae |
| Medium | Sensitive species 8 |
| Medium | Invertebrate-Sarophorus punctatus |
| Medium | Invertebrate-Aneuryphymus montanus |

### *Plant Species theme*

Sensitivity features are indicates as follows:

| Sensitivity | Feature(s) |
|---|---|
| Medium | Faurea macnaughtonii |
| Medium | Ocotea bullata |
| Medium | Lampranthus pauciflorus |
| Medium | Ruschia duthiae |
| Medium | Lebeckia gracilis |
| Medium | Amauropelta knysnaensis |
| Medium | Leucospermum glabrum |
| Medium | Selago burchellii |
| Medium | Selago rotundifolia |
| Medium | Sensitive species 419 |
| Medium | Erica chloroloma |
| Medium | Erica glandulosa subsp. fourcadei |
| Medium | Hermannia lavandulifolia |
| Medium | Sensitive species 657 |
| Medium | Sensitive species 1038 |
| Medium | Sensitive species 1032 |
| Medium | Acmadenia alternifolia |
| Medium | Muraltia knysnaensis |
| Medium | Erica glumiflora |
| Medium | Sensitive species 500 |

| | |
|---|---|
| Medium | Sensitive species 763 |

### *Terrestrial Biodiversity theme*

Sensitivity features are indicates as follows:

| Sensitivity | Feature(s) |
|---|---|
| Very High | CBA: Terrestrial |
| Very High | CBA2: Terrestrial |
| Very High | FEPA Subcatchment |
| Very High | SWSA (sw)_Tsitsikamma |
| Very High | SANParks PAES (2025) |
| Very High | EN_Garden Route Shale Fynbos |

# PROPOSED DEVELOPMENT

The proposed development is described below, including layout options.

## Development alternatives

Two layouts are assessed here, the preferred SDP (**Figure 4**) and Alternative SDP1 (**Figure 6**) and Alternative SDP2 (**Figure 6**).

The proposal is the development of 60 group housing stands with average erf sizes of ±500m². Open space and landscaped streets are incorporated into the design to enhance the quality of the neighbourhood.


**Figure 4: Proposed preferred SDP.**

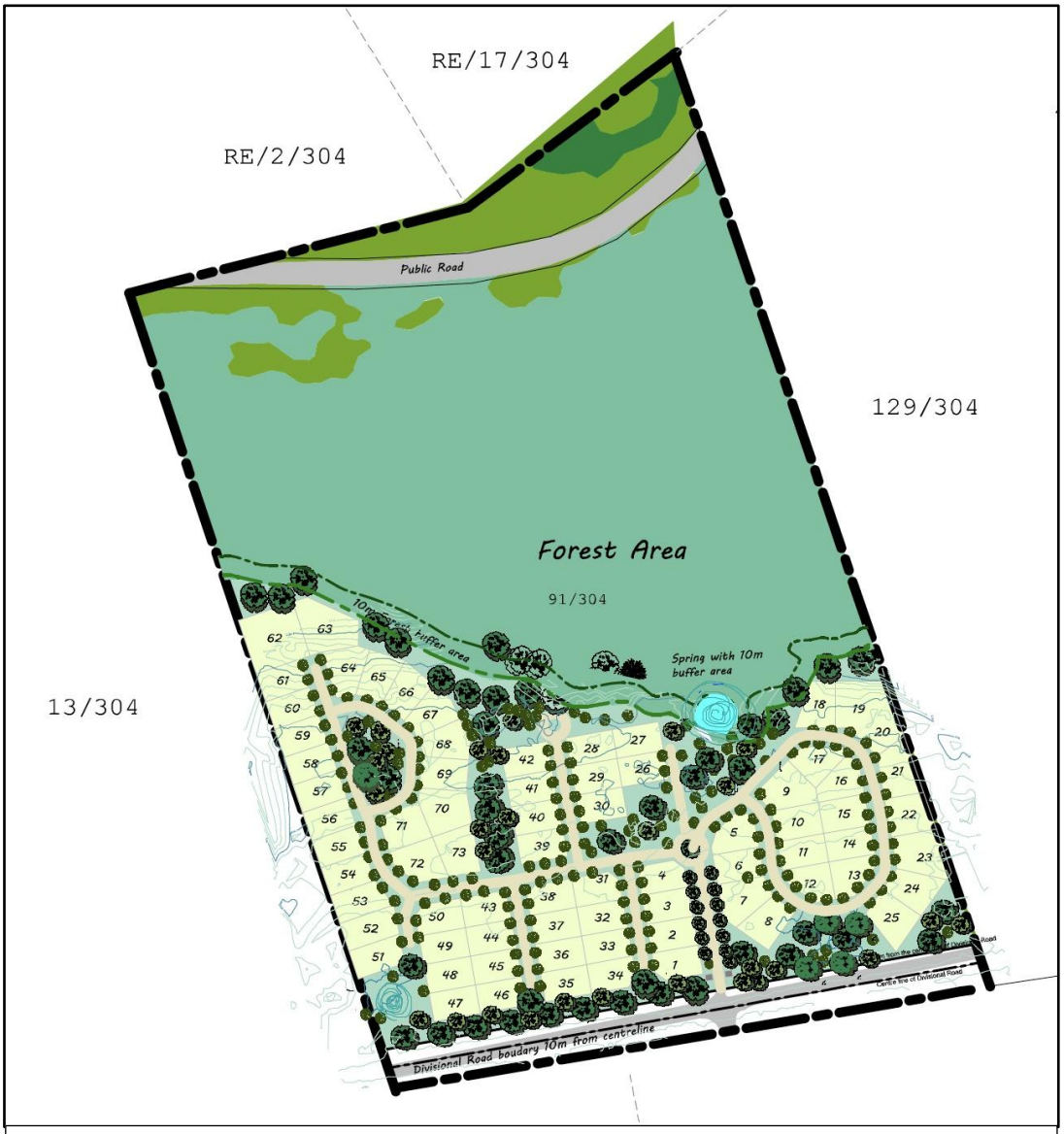


**Figure 5: Proposed Alternative SDP1.**

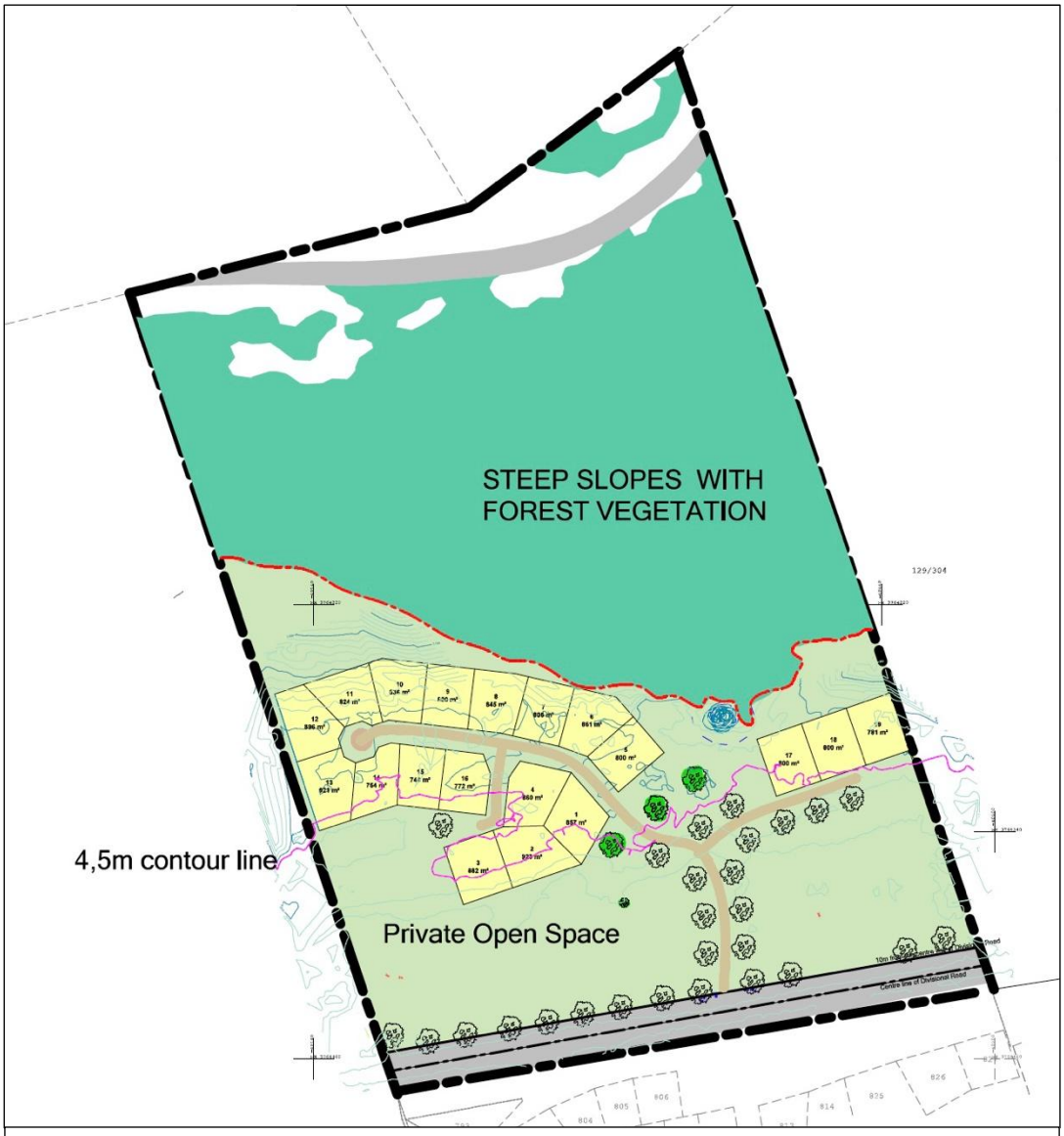


**Figure 6: Proposed Alternative SDP2.**

# Project Area of Influence (PAOI)

Anticipated impacts will mostly occur during the construction phase. 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 4** and **Figure 6**).

# 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 9 September 2022. The site is within the Fynbos Biome with an all-year rainfall season with a slight dip in early winter (**Figure 7**). A more accurate indication of rainfall seasonality, which drives most ecological processes, is shown in **Figure 8**, which shows that Plettenberg Bay has peak rainfall from August to November, with another smaller peak in March to April. The timing of the survey in September is therefore optimal in terms of assessing the flora and vegetation of the site. The overall condition of the vegetation was possible to be determined with a high degree of confidence.

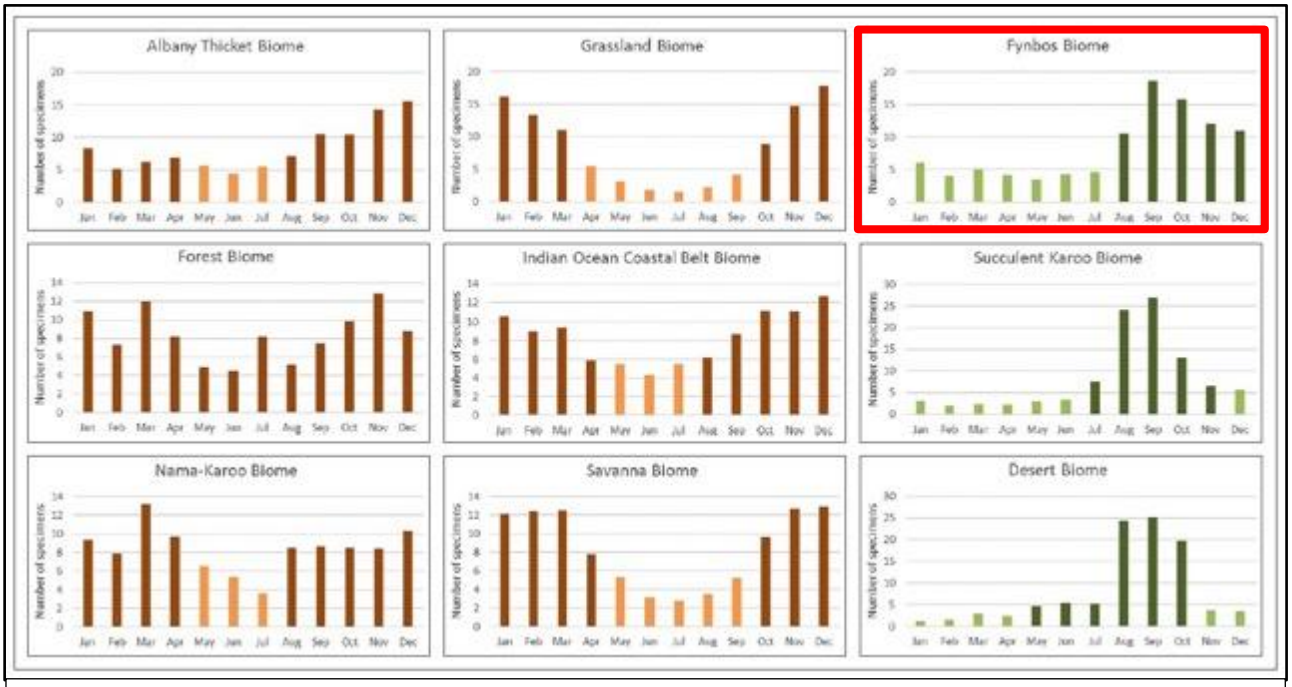


**Figure 7: Recommended survey periods for different biomes (Species Environmental Assessment Guidelines). The site is within the Fynbos Biome.**

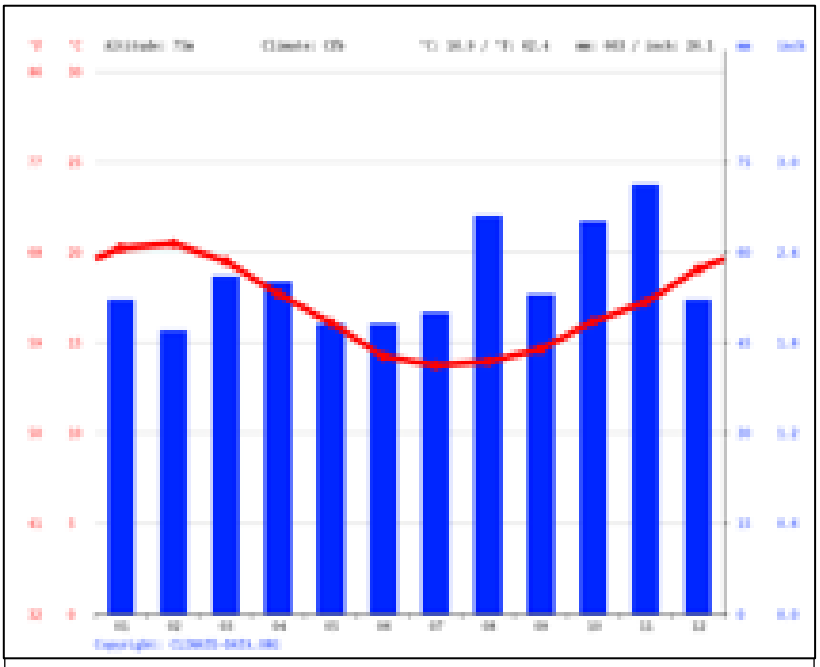

**Figure 8: Mean monthly rainfall for Plettenberg Bay.**

# Field survey approach

During the field survey of habitats on site, the entire southern section of the site was assessed on foot. The forested section was mostly omitted, because no infrastructure is proposed to be located there. However, the forest margin along the southern side of the forest was included in the field survey. Although the forest on site was not directly observed for this assessment, the author has undertaken assessments and other research on several surrounding properties in the same ecosystem (**Figure 9**) and the knowledge from that research was applied to the present assessment.


**Figure 9: On-site and nearby observations by the author of this report.**

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. Digital photographs were taken of features and habitats on site, as well as of all plant and animal 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.

# Sources of information

### *Regional Vegetation*

- Vegetation types classified by Mucina and Rutherford (2006), regularly updated by SANBI, are from the South African National Biodiversity Institute (SANBI) BGIS website (2018 Vegetation Map - Biodiversity BGIS (sanbi.org).
- 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 was 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, and have recently been gazetted.

### *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)).

### *Plant species*

- Plant species that could potentially occur in the general area were obtained from the South African National Biodiversity Institute (SANBI) available on the Biodiversity Advisor website (https://biodiversityadvisor.sanbi.org/).
- 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 and habitat information of threatened plant species were obtained from SANBI and 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.
- 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 distribution information on the SANBI Biodiversity Advisor website (https://biodiversityadvisor.sanbi.org/).

### *Animal species*

- 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.

### *Aerial imagery*

- Recent satellite imagery (courtesy of Google Earth Pro). Google Earth Pro also provides historical imagery for a period up to 15 years ago, which aided in the determination of certain vegetation types and land use historically and currently present on site.

# Limitations

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

- 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) |

| CRITERIA | SCORE 1 | SCORE 2 | SCORE 3 | SCORE 4 | SCORE 5 |
|---|---|---|---|---|---|
| **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 |
| **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 |

| CRITERIA | SCORE 1 | SCORE 2 | SCORE 3 | SCORE 4 | SCORE 5 |
|---|---|---|---|---|---|
| **Significance (S)** is determined by combining the above criteria in the following formula: | $S = [(E + D + M)/3 \times (R + I + T + C)/4]/5$<br>$Significance = (Extent + Duration + Magnitude)/3 \times (Reversibility + Irreplaceability + Threshold + Condition)/4$ | | | | |
| **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** |

# BACKGROUND AND DESKTOP INFORMATION

## Broad vegetation patterns

The entire site is mapped as occurring within one regional vegetation type, namely Garden Route Shale Fynbos (**Figure 10**). The vegetation that occurs on site does not match the mapped units shown in the latest national vegetation map. Mesic Thicket that is verified as occurring on site and which is clearly visible on aerial photographs is shown in the vegetation map as Garden Route Shale Fynbos, but should be shown as a (presently) unmapped thicket unit. Studies by the author on this and other nearby sites indicate that this entire south-facing slope (from Keurboomstrand to the N2) should be mapped as Mesic Thicket (or forest). Fynbos is only present on the exposed summits of slopes where the gradient decreases and which are more vulnerable to natural fires. This is acknowledged in the Keurbooms and Environs Local Area Spatial Plan (KELASP), where "Forest" is shown as the main vegetation type occurring through the centrl part of the site (see more detail in a later section of this report).

The southern parts of the site on the flatter lowlands is also more likely to have originally contained some form of coastal thicket (not fynbos), but this is difficult to verify due to historical cultivation of these areas - the evidence for this statement is based on vegetation recovery at other nearby sites

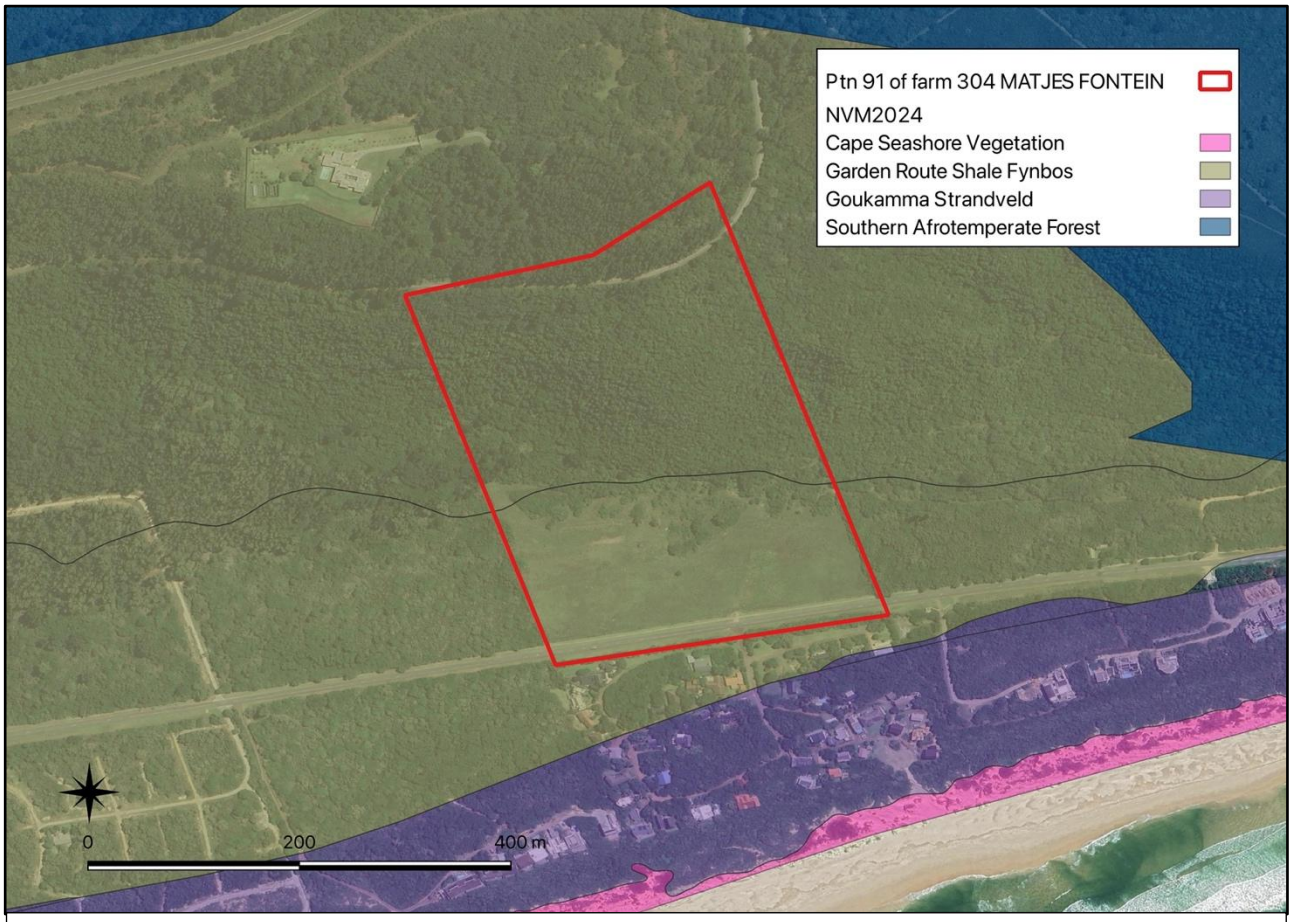


**Figure 10: Regional vegetation types of the site and surrounding areas.**

within this topographical position of the slope, where mixed thicket emerges, rather than secondary fynbos.

The national vegetation map also shows Southern Afrotemperate Forest as occurring nearby, but this is also contested and should be mapped mostly as Mesic Thicket. The description for Southern Afrotemperate Forest is provided below and it is clear from the published description that this not an accurate description of the vegetation occurring on site (described as dominated by yellowwoods). However, a description provided in Cowling et al. (2023) provides an accurate description of the milkwood-dominated "forest" on site, and is called Mesic Thicket. Currently, this Mesic Thicket is mapped as included within a newly described vegetation unit called Goukamma Strandveld, described below.

## *Garden Route Shale 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.

### *Goukamma Strandveld*

**Distribution**

This vegetation type occurs in the Western Cape Province in Sedgefield Bay, wedged between the Knysna Heads to the east and Wilderness to the west covering 39 km$^2$.

**Vegetation & Landscape Features**

Parabolic dunes occur along the coastal margin, with inland ridges supporting Knysna Sand Fynbos. Mesic Dune Thicket patches are common in the Goukamma Strandveld, and in fire-protected and locally wet areas, they grow into forests. Altitude ranging between 1 – 196 metres (median 49 m).

**Geology & Soils**

The vegetation is overlaying the Klein Brak Formation rocks cemented beach deposits, Waenhuiskrans aeolianite sand on oxidised, neutral sands. The Klein Brak Formation rocks, which are primarily quartz-rich, shelly sandstones, border the dune cordon between Arniston and De Hoop Nature Reserve.

**Climate**

Like that of the St Francis Strandveld but with a lower annual rainfall 500–700 mmyr$^{-1}$. Warm temperate, subhumid to semi-arid and sub-Mediterranean. The temperature regime is equable: mean midsummer temperatures are 20−22 °C, and midwinter temperatures 16−18 °C.

**Important Taxa**

(d=dominant, e=South African endemic, et=possibly endemic to a vegetation type)

| Growth form | Species |
|---|---|
| Tall Shrub | *Passerina corymbosa* (d), *Erica glumiflora*(d), *Metalasia muricata* (d), *Imperata cylindrica* (d), *Restio eleocharis* (d), *Struthiola argentea* (d), *Cliffortia falcata* (d), *Chironia decumbens* (d), *Erica glandulosa* ssp. *fourcadii* (d), *Disparago kraussii* (d), *Cliffortia linearifolia* (d), *Lachnaea diosmoides* (d). |
| Herb | *Carpobrotus edulis* |

# Other descriptions of vegetation patterns in the area

Cowling et al. (2023) described the vegetation of the Holocene coastal dunes of the Cape south coast and distinguished the unit now called Goukamma Strandveld. This has been officially separated from Goukamma Dune Thicket in VegMap2024. Goukamma Strandveld excludes all areas inland that occur on older Pleistocene sediments, which remain within Goukamma Dune Thicket. Cowling et al. (2023) emphasize that Holocene sands are physically and chemically different from Pleistocene sands. The vegetation of the southern Cape coast is highly responsive to these differences, with alkaline Holocene sand supporting a floristically distinct vegetation with a different structure to, and sharing few species with the Sand Fynbos of the older sediments (Cowling, 1990).

The vegetation unit described by Cowling et al. (2023), Goukamma Strandveld, includes numerous patches of **Goukamma Mesic Dune Thicket** that occurs in sites with high levels of soil moisture. (Cowling et al. 2023) describe Goukamma Mesic Dune Thicket vegetation as dominated by species with multi-stemmed, laterally spreading architecture (e.g., *Sideroxylon inerme* and *Pterocelastrus tricuspidatus*), but single-stemmed, vertically-growing species are indicative, for example *Zanthoxylum capense*, *Apodytes dimidiata*, *Celtis africana*, *Clausena anisata*, *Afrocanthium mundianum* and *Acokanthera oppositifolia*. Canopy height is approximately 4–6 m. Mesic Dune Thicket usually has a well-developed herbaceous understorey comprising of species

such as *Brachiaria chusqueoides*, *Hypoestes aristata*, *Amaranthus thunbergii*, *Droguetia iners* and *Stipa dregeana*. The liana and vine floras are rich with the most common and widespread species being *Asparagus scandens*, *Capparis sepiaria*, *Dioscorea mundii*, *Secamone alpini*, *Behnia reticulata* and *Kedrostis nana*. This description is typical of the vegetation found on site in the areas mapped as "Forest".

Studies at Goukamma Nature Reserve (van der Merwe 1976, Hoare 1994) identified several areas containing Mesic Dune Thicket that more closely matches the vegetation occurring on the current site than as Fynbos. Currently, the vegetation of the Garden Route requires review and alignment with recent scientific understanding and description. The description of the site as containing only Garden Route Shale Fynbos is considered to be incorrect.

### *Vegetation map of the Garden Route Initiative*

In May 2008 a vegetation map of the Garden Route was produced as part of the process of compiling a conservation plan for the area (Vlok et al. 2008). In terms of interpreting the mapped units, the authors state the following in the introduction to the report:

1. The vegetation was mapped as untransformed units, as it was perceived to be before European settlement in the region. This proved to be a great challenge as vast areas have been altered to such an extent that only a few remnant patches of vegetation still remain in certain areas.
2. The vegetation...was classified and mapped at a scale of 1:50 000. This vegetation map is not suitable for small-scale (< 1:50 000) studies or managerial plans.
3. The vegetation units...and their boundaries are not compatible with those of Mucina and Rutherford (2006), as their map is intended to function at a much larger scale (1: 1 000 000).


**Figure 11: Vegetation types of the site and surrounding areas according to Vlok et al. (2008).**

Furthermore, the map is unpublished and based on expert interpretation of satellite imagery. No floristic field data was collected in support of the map, no data analysis was undertaken to determine floristic units, and no peer-review process happened to verify the mapped units. This is not an uncommon issue - it is a criticism that also applies to the Mucina and Rutherford (2006) vegetation map of the area - and is the reason why, to date, the vegetation of the Garden Route is inadequately described and mapped. Nevertheless, the attempt by Vlok et al. (2008) is commended for providing a description that didn't yet exist.

For the current site, the Vlok et al. (2008) map indicates the presence of the following units on site and nearby (**Figure 11**):

1. Covie Coastal Proteoid Fynbos.
2. Keurbooms Thicket Forest.
3. Sedgefield Coastal Grassland.
4. Wilderness Forest Thicket (not on site).
5. Hartenbos Primary Dune (not on site).
6. Garden Route Wetlands (not on site).

**Covie Coastal Proteoid Fynbos** is mapped as a small area in the north-eastern corner of the site, above the road near the top of the slope. It is described in Vlok et al. (2008) as being located close to the coast, and with the Fynbos being more stunted than Mountain Proteoid Fynbos. Typical indicator species include: *Cliffortia stricta, Felicia echinata, Metalasia pungens, Metalasia muricata* and *Relhania calycina* ssp. *lanceolata*. This corresponds approximately to the species composition of fynbos observed on a site about 200 m to the east of the north-eastern corner of the current site, although given the high diversity of fynbos, this is a simplification of possible patterns. Due to the current transformed and degraded condition of the indicated area on site, it is difficult to verify the presence of Covie Coastal Proteoid Fynbos.

**Keurbooms Thicket Forest** is mapped as coinciding with areas mapped for the current assessment as "Forest". There is therefore concurrence. It is described in Vlok et al. (2008) as occurring on steep slopes and being restricted to more nutrient rich soils that are often derived from shale. The outer edges consist of impenetrable stands of thorny shrubs and trees, such as *Azima tetracantha*, *Gymnosporia buxifolia* and *Scutia myrtina*, of which the canopy is not much above the ground. Towards the inner parts the tree canopy does lift above the ground with tall trees such as *Afrocarpus falcatus*, *Calodendrum capense*, *Olinia ventosa* and *Sideroxylon inerme* present that are often adorned with climbers such as *Rhoicissus tomentosa*. This habitat is thus intermediate in structure and the species present in the Coastal Forests and the Dune Thicket vegetation.

**Sedgefield Coastal Grassland** is mapped as occurring on the entire low-lying area of the site. It is described in Vlok et al. (2008) as occurring on deep sandy soils that are periodically inundated. They are mostly associated with the outer perimeters of the Wetlands habitat (local lakes and estuaries). The vegetation is dominated by sprawling grasses such as *Cynodon dactylon* and *Stenotaphrum secundatum*. In the past they were probably the "grazing lawns" of Hippo and largely maintained by them, but in the absence of these animals they are now largely overgrown by herbs (especially *Geranium incanum*) and shrubs (especially *Passerina vulgaris*). Few fires occur here, but when they do, a few geophyte species such as *Ixia orientalis* and *Romulea* species can be locally abundant. Fire independent geophytes such as *Brunsvigia orientalis*, is also plentiful. Data collected by the author of the current assessment close to the The Dunes Resort support the existence of this unit in this valley, but due to past cultivation and present alien invasion and secondary thicket development what the extent and boundaries of such a unit may be on site.

It must be noted that there is agreement between the studies of Vlok et al. (2008), the vegetation map included in the KELASP (see section below), and the patterns observed for the current study in that the main vegetation on site is Forest/Thicket, rather than Fynbos, and therefore that the SANBI VegMap regional description of the site as containing Garden Route Shale Fynbos is incorrect.

# Conservation status of broad vegetation types

The conservation status in according to scientific literature (Driver et al., 2005; Mucina et al., 2006) is shown in the table below.

The table also shows the threat status 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.

| **Vegetation Type** | **Conservation status** | | |
|---|---|---|---|
| | **Driver *et al*. 2005 ; Mucina *et al*., 2006** | **2018 NBA (Skowno et al. 2019)** | **Government Notice No 2747 of 18 November 2022** |
| Garden Route Shale Fynbos | Endangered | Vulnerable | 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 vegettion occurs on site or not.

Also, although it is unlikely that fynbos occurs or ever occurred on site, the ecosystem status is a legal status based on mapped areas.

**It is therefore verified that the site occurs 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 characteristics of the on-site vegetation, as described in the on-site habitat assessment below, determine whether vegetation 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. Also, the characteristics of the on-site vegetation indicate that some form of Forest/Thicket is the main vegetation occurring on site, not Fynbos.**

# 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 WCBSP2024 map shows that the entire central part of the site (corresponding to mesic thicket) is within a CBA1 area (**Figure 12**). This CBA1 area continues beyond the boundaries of the site. The reason for the CBA1 area is for the protection of Garden Route Shale Fynbos. This indicates that the vegetation on site is considered to be critical for the conservation of this biodiversity pattern in the Province as well as for maintaining ecological patterns in the landscape that support this vegetation type. However, it is argued above that woodland is the natural vegetation occurring in this area and that fynbos only occurs in specific fire-prone and exposed sites at the summit of hillslopes (which do not occur on this property).

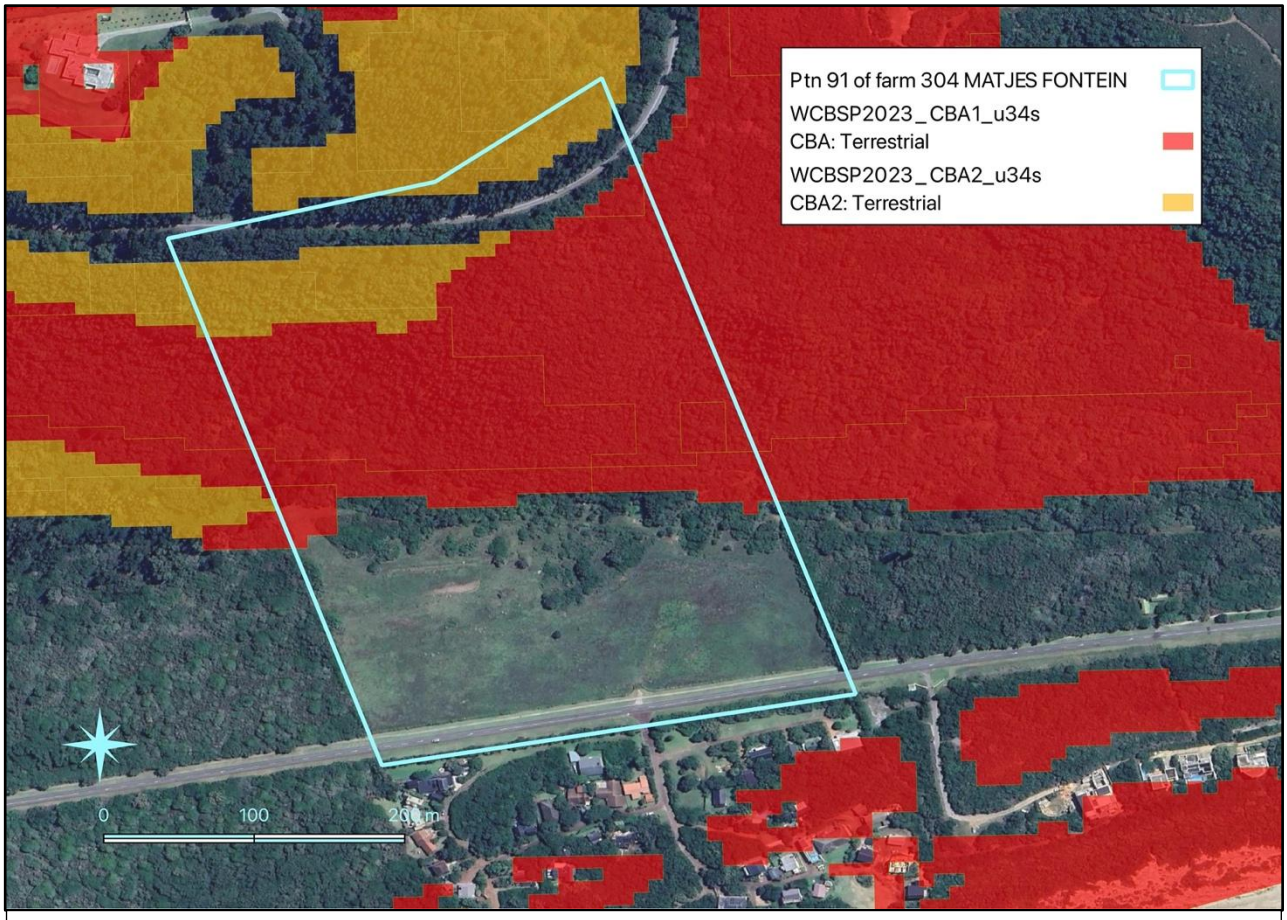


**Figure 12: Western Cape Biodiversity Spatial Plan of the site and surrounding areas.**

There is a small part of the site above the forest that is within a CBA2 area. These are also designated for the protection of Garden Route Shale Fynbos.

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.

The forested areas on site are not fynbos and have never been fynbos, but are still natural and have been determined to be sensitive independently of the listed status of the vegetation type.

**This desktop description verifies that significant parts of the site are included in conservation zones and that an on-site assessment is required to verify the sensitivity of the site with respect to this attribute.**

# Keurbooms and Environs Local Area Spatial Plan

The Keurbooms and Environs Local Area Spatial Plan (KELASP) is a Local Area Spatial Plan (LASP) for Keurbooms and its surrounding Environment, which will aid the Municipality in ensuring that the area is protected / conserved and managed / developed in a coherent and sustainable manner. It has been compiled in terms of Municipal Systems Act (Act 32 of 2000) which will afford it formal legal status as a Policy Guideline document to be implemented in conjunction with the broader Bitou Spatial Development Framework (SDF) as well as Integrated Development Plan (IDP).

The KELASP provides land development objectives that take into account existing development and biophysical constraints. Spatial development categories have been provided with general conditions to guide activities that may occur within each category, as set out and summarised in the table below:

| KEY SPC DESCRIPTION | POLICIES |
|---|---|
| **CORE1**<br>Formally Protected Conservation Areas | • No conventional urban development<br>• Formally protected areas, including those under SANParks and CapeNature control, should continue to enjoy the highest levels of protection.<br>• Further continuous corridors between the mountains and the sea, such as that between Nature's Valley on the coast and Garden Route National Park in the Tsitsikamma Mountains, should be promoted.<br>• The municipality should engage with the conservation authorities to ensure that economic growth and employment opportunities from these areas are maximised. |
| **CORE 2**<br>River Corridors and Wetlands | • River corridors and wetlands, including ephemeral pans, must be protected from urban, agricultural, and mining activities to a distance of at least 30 m from their banks unless closer setbacks have been determined by a geohydrologist and freshwater ecologist. |
| **BUFFER 1**<br>Endangered vegetation | • Conservation of endangered vegetation areas shall be encouraged through the promotion of conservancies and stewardship projects with limited eco-tourism development rights and/or donations to formal conservation agencies. |
| **BUFFER 2**<br>Extensive Agriculture / Livestock Grazing | • No development beyond 1 unit per 3 hectares.<br>• Development should be clustered.<br>• No further subdivisions below minimum farm size - Dept of Agriculture.<br>• Rotational grazing nd other veld management best practices shall be promoted so as to improve biodiversity and stocking rates. |
| **INTENSIVE AGRICULTURE**<br>Irrigation and Dry Land Crop and Pasture Farming | • No development beyond 1 unit per 3 hectares.<br>• Development should be clustered (no further subdivisions below minimum farm size - Dept of Agriculture). |

| | |
|---|---|
| | • All existing and potential land suitable for intensive agriculture shall be protected from conversion to other uses including conservation.<br>• Agriculture water demand management must be practices and intensive agriculture water supplies shall be protected and not diverted to other uses.<br>• Investigate methods to bring the agricultural land currently lying fallow back into production if possible. |
| **URBAN SETTLEMENT**<br>All land used for Urban purposes in Towns, Villages and Hamlets | • Increase gross average densities to 25du/ha in settlements requiring public transport.<br>• Increase gross average densities to 15du/ha in small rural settlements that do not require public transport.<br>• Urban development shall be promoted within urban settlements according to the settlement planning principles provided for in the broader Bitou SDF. |
| **URBAN EDGE** | • Outer boundary of urban settlement aligned to protect natural and agricultural resources and to promote more compact settlements.<br>• Urban settlement should primarily be located and encouraged within the Urban Edge.<br>• No urban development shall be permitted outside of the urban edge or identified Development Nodes.<br>• The Urban Edge / Development Nodes should enclose sufficient land to accommodate the settlemen't growth for the next 10-20 years. |

The "no-go" development areas in KELASP are determined based on various bio-physical constraints, including the following:

- below the 1:50 and 1:100 year floodlines;
- on any slope with gradient steeper than 1:4;
- below the 4,5 m coastal setback line;
- within the 100m high water mark setback; and
- within the Tshokwane Wetland system.

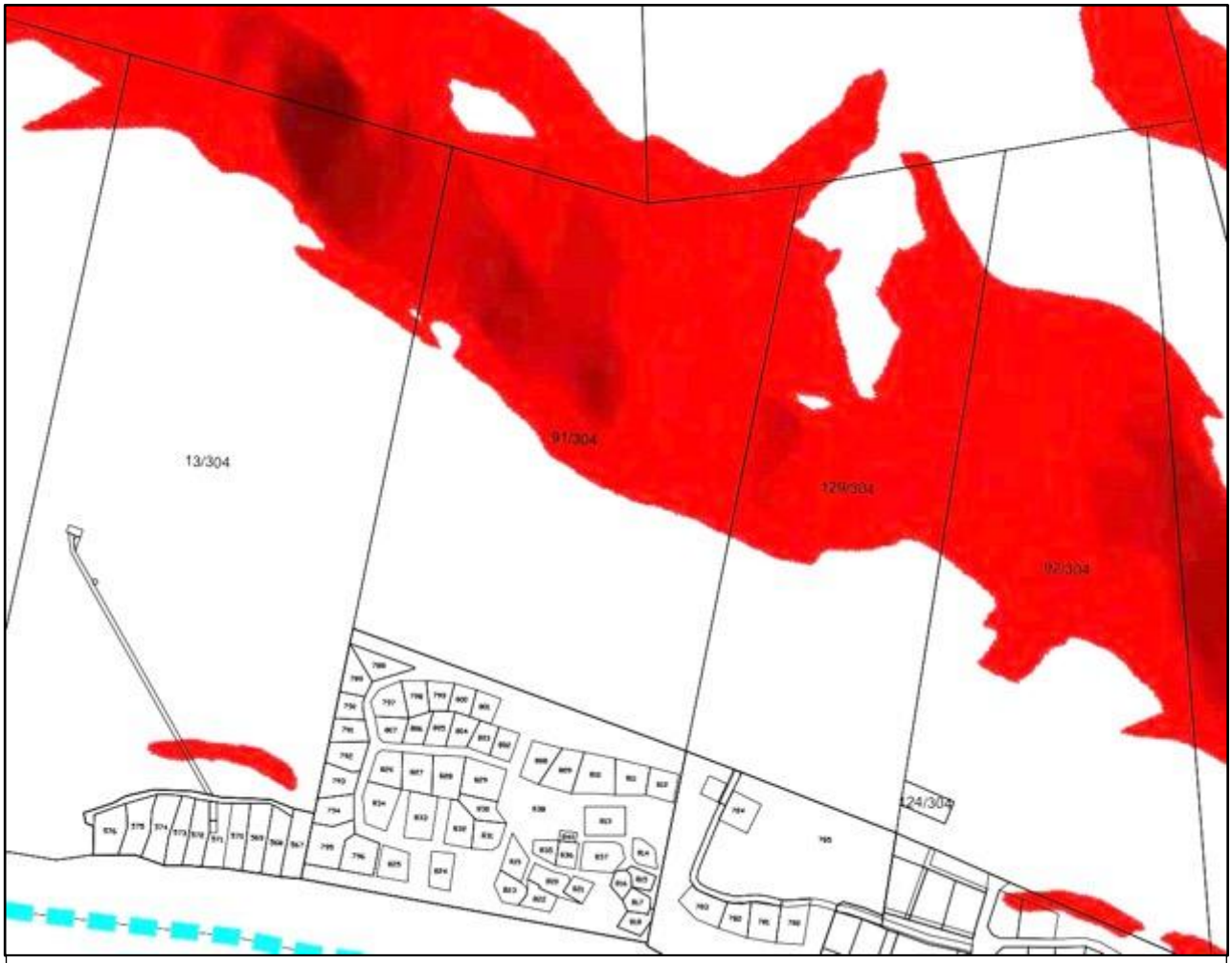


**Figure 13: Slope Analysis from KELASP - slopes steeper than 1:4.**

"No-go" areas also include any of the following Habitat Mapping and Sensitivity Analysis units:

Map Unit 3: Fynbos
Map Unit 4: Forest
Map Unit 5: Dune Thicket/Dune Fynbos Mosaic
Map Unit 6: Coastal fore dune and seashore
Map Unit 7: Wetlands (in general in addition to specific delineation of Tshokwane Wetland)
Map Unit 8: Fynbos invaded with aliens

The site includes significant areas that are steeper than a gradient of 1:4 indicated in KELASP (**Figure 13**). A comparison with the proposed development shows that these are excluded from the development footprint.

The site is outside the 1:50 and 1:100 year floodlines indicated in KELASP, and is also outside of the Tshokwane Wetland system, as well as outside the 100 m high water mark setback (**Figure 14**).

No-go maaping units from KELASP that occur on site are ***Map Unit 4: Forest*** and ***Map Unit 8: Fynbos invaded with aliens*** (Figure 12. A comparison with the proposed development shows that ***Map Unit 4: Forest*** is excluded from the development footprint, but that ***Map Unit 8: Fynbos invaded with aliens***

is partly included within the proposed development footprint, but not within the Alternative 1 footprint.

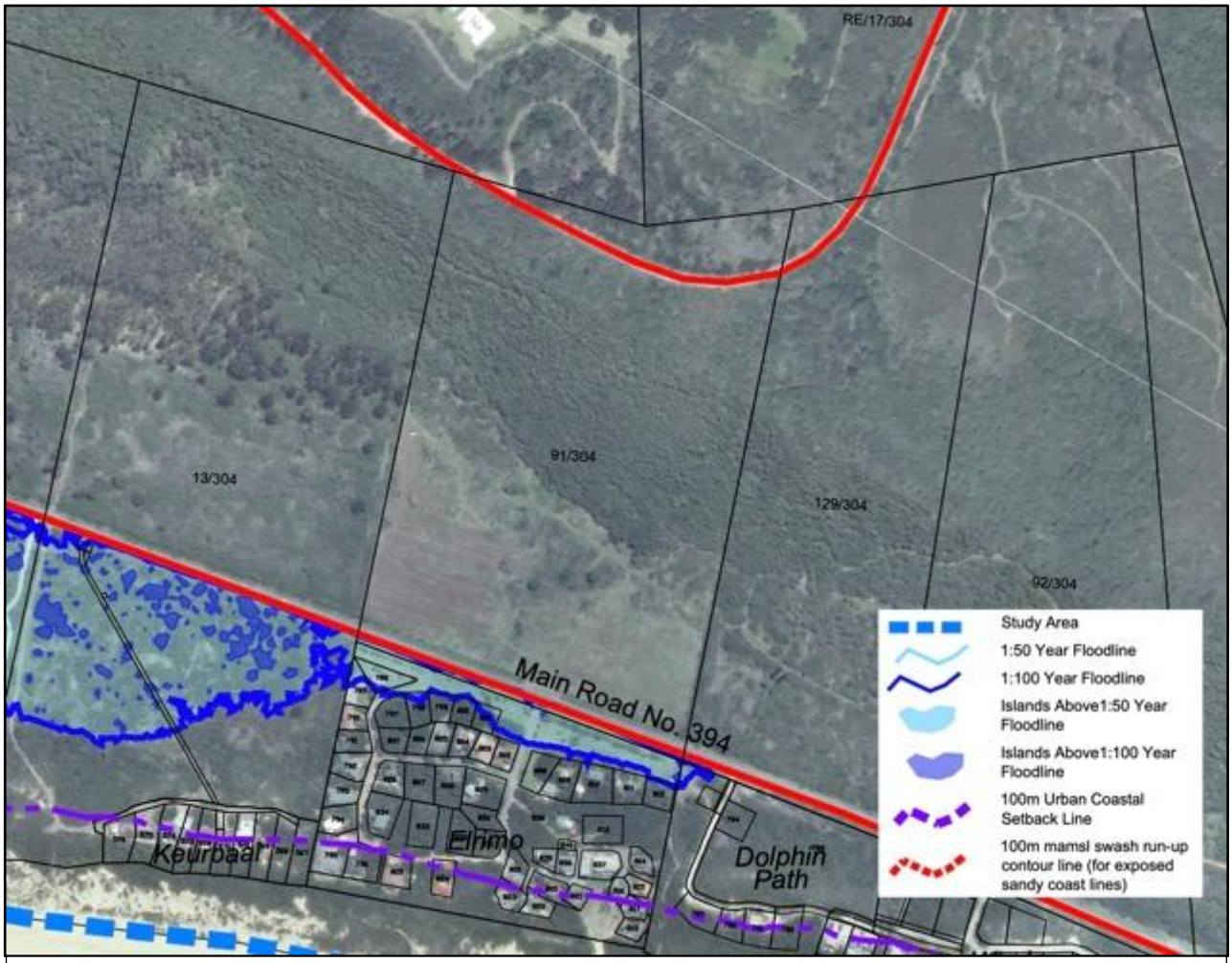


**Figure 14: Floodlines and wetlands from KELASP.**


**Figure 15: Habitat Units from KELASP.**

# Historical disturbance

An aerial photograph from 1962 shows that the entire valley between the coastal dunes and the inland steep slope was cultivated at that time. This cultivation is also visible on 1936 and 1942 aerial photographs (not shown).

In 1962, the road running across the north of the site was in existence and constituted the main road linking Plettenberg Bay towards the east.

An interesting feature on the 1962 aerial photograph is a road running through the site at the base of the slope (just south of halfway through the site), which was the only access road into Keurboomstrand at that time. An aerial photograph from 1974 shows that this road was still present, but the current road running along the southern boundary of the site had been built by then. By 1989, the road through the middle of the site was overgrown, and by 2006 it is no longer visible. The only remaining evidence of this original road is the gate on the eastern boundary to the neighbouring property and remnants of the road between there and Keurboomstrand (visible in **Figure 16**).

The importance of the historical aerial photographs is that they show that the area on the flats on site was cleared of natural vegetation in the early 1900s (possibly earlier), and that it has never grown back, unlike on neighbouring properties, where secondary (thicket) vegetation has developed.

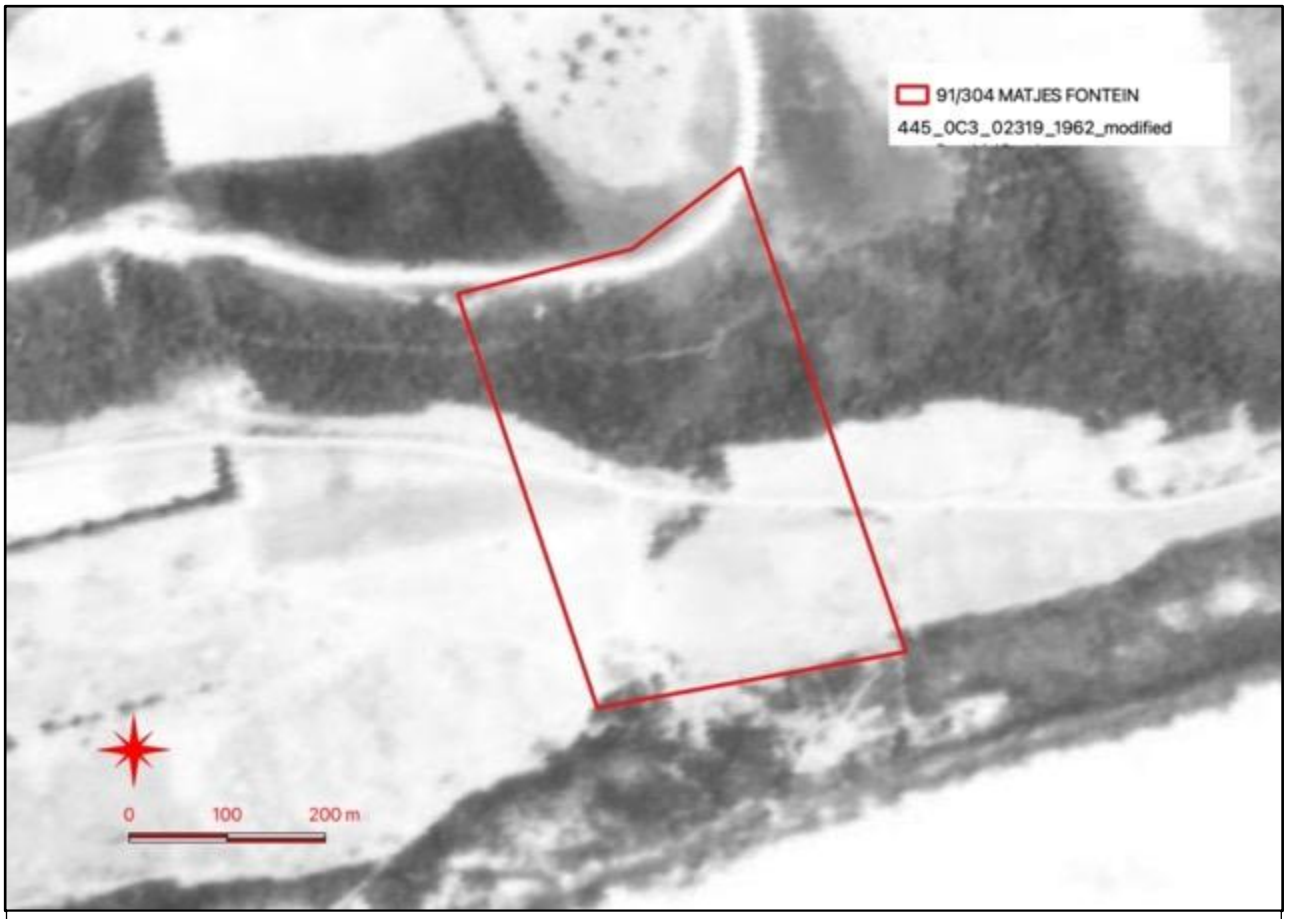


**Figure 16: Aerial photograph from 1962.**

# OUTCOME OF THE ASSESSMENT

## 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 three main habitats occurring on site, shown in **Figure 17**. These are mapped as **Forest, Secondary vegetation** and **Pastures**. There are also **transformed areas** associated with roads, localised patches of **alien trees**, and residual individual **milkwood trees** (*Sideroxylon inerme*). 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 northern half of the site contain indigenous forest that should probably be classified and mapped as Goukamma Mesic Dune Thicket. It has a closed canopy, open understorey and relatively tall structure, therefore does not qualify to be mapped as thicket. No detailed vegetation survey was undertaken within this area because it had already been decided that these forested areas would be excluded from any development. Based on observations of peripheral species, it resembles mesic thicket/forest in other coastal parts of the Garden Route. The forest is dominated by milkwoods (*Sideroxylon inerme*) therefore does not fit the description for Southern Afromontane Forest (dominated by yellowoods). The entire area mapped here as "Forest" is within CBA1 areas.


**Figure 17: Map of habitats on site.**

### *Secondary vegetation*

Between the forest and the pastures is an irregularly-shaped band of vegetation that contains a mixture of shrubs and weeds that indicates that it is various stages of post-disturbance development. Historical aerial photographs show that this entire area was once cultivated, but has gone through various iterations of being cleared and then recovering somewhat.

Tall woody shrubs and small trees found here include the following: *Buddleja saligna*, *Capparis sepiaria*, *Clausena anisata*, *Dovyalis rhamnoides*, *Grewia occidentalis*, *Gymnosporia buxifolia*, *Pterocelastrus tricuspidatus*, *Putterlickia pyracantha*, *Scutia myrtina*, *Searsia crenata*, *Searsia lucida*, *Rhoicissus digitata*, and *Mystroxylon aethiopicum*, as well as *Lauridia tetragona* and *Trimeria grandifolia*, but these last two are probably forest margin species detected along the forest margin. Lower shrubs included *Acalypha* sp, *Euryops virgineus, Nidorella ivifolia, Helichrysum cymosum, Helichrysum petiolare, Helichrysum teretifolium, Osteospermum moniliferum, Otholobium stachyerum*, *Passerina corymbosa, Podalyria myrtillifolia*, and *Polygala myrtifolia*, many of which are typical colonisers of cleared plantation areas. Herbaceous species included a mixture of understorey species, such as *Anemia caffrorum, Asparagus asparagoides, Dietes cf bicolor, Isoglossa sp, Rubia petiolaris*, and *Stachys aethiopica*, and weedy species, such as *Cerastium glomeratum, Felicia amoena, Pelargonium elongatum, Rubus pinnatus* and *Vicia sativa*.

Alien invasive and exotic species detected in this area included *Acacia cyclops, Paraserianthes lophantha, Pinus* sp., and *Yucca aloifolia*.

Almost the entire area mapped here as "Secondary vegetation" is within mapped CBA1 areas, and the designation is attributed to "Keurbooms", which is interpreted as meaning no-go areas in the Keurbooms and Environs Local Area Spatial Plan (KELASP).

### *Pastures*

The pastures occur in the entire southern part of the site in areas that were historically cultivated. The landscape here is flat. They are currently being used as pasture for horses and are therefore grazed relatively short.

The pasture areas were dominated largely by the grasses, *Stenotaphrum secundatum* and *Cenchrus clandestinus*, along with a large number of weeds and species that are tolerant of disturbance, including *Abutilon sonneratianum, Arctotheca prostrata, Carpobrotus deliciosus, Cerastium glomeratum, Chenopodium sp., Euphorbia helioscopia, Felicia amoena, Medicago sp., Moraea sp Hebenstretia integrifolia, Lepidium africanum, Lycium ferocissimum, Lysimachia arvensis, Massonia depressa, Mesembryanthemum aitonis, Rumex hypogaeus, Salvia aurea, Senecio inaequidens, Solanum linnaeanum*, and *Brunsvigia orientalis*.

The entire bottom part of the site is mapped in the Garden Route Initiative map (Vlok et al. 2008) as Sedgefield Coastal Grassland, but due to historial cultivation, it is unknown whether this is accurate or not. Observations closer to The Dunes Resort indicate that such habitat is more narrow and restricted in distribution than indicated in the GRI map. The value of the area currently resides in the hydrological functioning of these areas and not on the properties of the terrestrial ecosystem patterns, since these have been lost to historical cultivation.

### *Milkwood trees*

There are a small number of scattered milkwood trees (*Sideroxylon inerme*) that, based on their size, are possibly remnants of the original vegetation that occurred there. It was common practice to leave large trees as shade within agricultural areas. Alternatively, they became established after the cessation of active cultivation, but this would not have given them time to grow to their current stature. Three large and one small tree were counted on site, in the area between the secondary vegetation and the pastures. The milkwoods are protected trees and removal would require a permit.

**Figure 19: View from south to north across the site, with pastures in the foreground, forest on the slopes and exotic trees on the skyline.**

**Figure 18: Equestrian infrastructure within pasture area.**

**Figure 21: Secondary vegetation with mixture of shrubs and herbaceous species.**

**Figure 20: Pasture area grazed short.**

**Figure 23: Large remnant milkwood tree.**

**Figure 22: Areas near forest margin.**

# Plant species recorded on site

A total of 69 plant species were recorded on site within the proposed development footprint and along the margins of the forest (see Appendix 1), of which three are declared weeds and/or alien invader plants, three are naturalized exotic species, and the remainder are indigenous species, some of which are weedy species commonly found in disturbed places or are species that commonly colonise areas of disturbance.

The alien invasive species are as follows:

- *Acacia cyclops** (NEMBA Category 1b)
- *Pinus* sp* (NEMBA Category 2)
- *Paraserianthes lophantha** (Invader category 1b)

# 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). These are mostly fynbos species, or forest species. There are two species that could occur within forest habitats on site. These are *Ocotea bullata* (Endangered) that has a high probability of occurring on site, and *Faurea macnaughtonii* (Rare) that has a moderate possibility of occurring there. A full list of the flagged species is provided in the table below.

**There are therefore two 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).

**Plant species of concern flagged for the site:**

| Taxon | IUCN status* | Distribution | Habitat | Probability of occurrence |
|---|---|---|---|---|
| Acmadenia alternifolia | 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 | Coastal headlands and steep slopes, exposed positions on dry cliffs near the coast from Knysna to Plettenberg Bay. | **LOW** Distribution records suggest it could occur in the area, but no siuitable habitat on site. |
| Amauropelta knysnaensis | VU | George District | Southern Afrotemperate Forest, damp places in coastal forest. Near streams and in seepage zones, sometimes away from streams. | **LOW** No streams on site. |
| Erica chloroloma | 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 |
| Erica glandulosa subsp. fourcadei | 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 |
| Erica glumiflora | 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. |
| Faurea macnaughtonii | Rare | This species is widespread across eastern South Africa, from the Wolkberg in Limpopo Province southwards to the Amathole Mountains | This species occurs deep inside mature forest, from near sea level up to 2000 m. Dispersal is limited, with | **MEDIUM** Possibly suitable habitat on site. **NOT FOUND** |

| Taxon | IUCN status* | Distribution | Habitat | Probability of occurrence |
|---|---|---|---|---|
| | | in the Eastern Cape. An isolated subpopulation occurs in the southern Cape forests around Knysna. It also occurs in eSwatini (Swaziland). | seeds typically falling from the canopy to the forest floor, and therefore this species is prone to fragmentation. | |
| Hermannia lavandulifolia | 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. |
| Lampranthus pauciflorus | EN | Found in the Western Cape from Cape Infanta to Plettenberg Bay. Four known locations remain after most of this species' habitat has been transformed for coastal development. Habitat loss continues, especially around Plettenberg Bay, Mossel Bay and Knysna. | On rocky coastal slopes and clay hills. Major habitats are Groot Brak Dune Strandveld, Blombos Strandveld, Overberg Dune Strandveld, Potberg Sandstone Fynbos, Garden Route Granite Fynbos, Albertinia Sand Fynbos, Knysna Sand Fynbos, Hartenbos Strandveld, Goukamma Dune Thicket. | **LOW** Known locations are along the coastline. No suitable habitat on site. |
| Lebeckia gracilis | EN | Port Elizabeth to Bredasdorp. Two main areas of occurrence are in the Lakes District between Knysna and George, and in the Albertinia area. | Coastal fynbos in deep sandy soils below 300 m. | **LOW** Most recent observations are west of Plett. Habitat on site is NOT deep sandy soils. |
| Leucospermum glabrum | EN | Outeniqua and Tsitsikamma mountains. Observed multiple times around | Wet south slopes in Sandstone Fynbos. | **LOW** The key habitat appears to be mesic mountain |

| Taxon | IUCN status* | Distribution | Habitat | Probability of occurrence |
|---|---|---|---|---|
| | | George in the mountains, as well as north of Plett. and around Keurbooms. | | fynbos on the southern flanks of mountains. No remaining natural habitat on site. It is therefore considered unlikely that this species would occur on the lower part of the site. |
| Muraltia knysnaensis | EN | Coastal lowlands between Mossel Bay and Keeurbooms River. | Coastal fynbos on dry flats and hills. | **LOW** No suitable habitat on site. |
| Ocotea bullata | EN | Widespread in South Africa from the Cape Peninsula to the Limpopo Province. | Grows in most high, cool, evergreen Afromontane forests. | **HIGH** Suitable habitat on site. Recorded numerous times in general area of Plettenberg Bay. |
| Ruschia duthiae | 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** Habitat on site does not match common habitat found in Lakes area. |
| Selago burchellii | 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** No suitable habitat on site. |
| *Selago rotundifolia* | VU | Knysna to Port Elizabeth. | Forest margins or grassy flats near coast, 90-210m. | **LOW,** no suitable habitat on site |
| Sensitive species 419 | VU | George to Humansdorp. Recorded numerous times in Plett area. | Damp sandstone slopes in coastal fynbos. Numerous observations in mountains. | **LOW** Distribution records suggest it could occur in the area, but no |

| Taxon | IUCN status* | Distribution | Habitat | Probability of occurrence |
|---|---|---|---|---|
| | | | | siuitable habitat on site. |
| Sensitive species 500 | EN | Cape Flats to Gqeberha. Previously recorded from near Robberg. | Lowland sandy flats, stabilised dunes and coastal rock promontories. Observations include coastal and mountain habitats. | **LOW** Distribution records suggest it could occur in the area, but no siuitable habitat on site. |
| 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. | **LOW** Distribution records suggest it could occur in the area, but no siuitable habitat on site. |
| Sensitive species 657 | EN | Great Brak River to Port Elizabeth. | Coastline. Coastal habitats. | **LOW**, confined to coastal littoral habitat |
| Sensitive species 1038 | LC | Only known from the vicinity of Nature's Valley. | Semi-exposed places in shrub forest on upper slopes of steep embankments and outcrops in Afro-temperate forest and Tsitsikamma Sandstone Fynbos. | **LOW** Distribution records suggest it could occur in the area, but no suitable habitat on site. |
| Sensitive species 1032 | VU | George to Port Alfred. | On stabilised (fixed) dunes close to the shoreline. 0-150m. | **LOW**, confined to coastal habitat |

# 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.

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 and the proposed project will have no effect on it.

### *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 small pond on site, but it is exposed with no emergent vegetation and, due to being used as a waterhole by horses, the water quality is sub-standard for the frog. Therefore, there is no suitable habitat on site for breeding, although the species could occur there within the forested areas. Good management of this small possible habitat could lead to the site eventually becoming suitable for breeding for the species.

### *Circus maurus (Black harrier)*

Endangered

This site was flagged as having **Medium 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 **Medium 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 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 must be assumed to be present in the general area. The forests on site may not be of tall enough stature for

nesting, but could possibly form part of foraging habitat. On condition forest areas are protected, there will be negligible impact on this species.

### *Neotis denhami (Denham's Bustard)*

Vulnerable

This site was flagged as having **Medium 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. It is unlikely that it occurs on site.

### *Bradypterus sylvaticus (Knysna warbler)*

Vulnerable

This site was flagged as having **Medium 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).

Potentially suitable habitat occurs on site within the forested areas. 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 may possibly be impacted by the proposed project. However, the presence of houses does not seem to limit the species. On condition the habitat is preserved, the proposed project would have little effect on them.

### *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 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, but there is a lack of sandy or loamy soils in which the species is likely to occur. Most of the soils on site within the forest area is relatively stony. There are also 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, which is outside the proposed development and will not be affected.

### *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. In the event that the species occurs on site, the proposed project would probably have no effect on them, in terms of habitat loss, loss of forage, and loss of migration corridors.

### *Sarophorus punctatus (Tunnelling dung beetle)*

Endangered

This site was flagged as having **Medium sensitivity** potential for this species. This is a dung beetle that is one of five species in the Genus Sarophorus. There is little known about its biology, but available information indicates a feeding preference for old dung and carrion remains which imply detritus as preferred food rather than dung (Frolov & Scholtz 2003). The type for the species was collected in Keeurboomstrand in 1976 in natural thicket vegetation (Frolov & Scholtz 2003). More recent observations have been made in Wilderness Heights near George in June 2021 (Mish 2021), inland of Mossel Bay (Koen 2022) and near Herbetsdale (Koen 2022). It is not shown to occur anywhere else in the country (Frolov & Scholtz 2003).

The site has forested areas that are the type locality for the species. All woodland on site is therefore suitable habitat for this species and, based on known information, there is a high probability of this species occurring there. However, the proposed development does not affect this habitat. In the event that the species occurs on site, the proposed project would be unlikely to have an effect on them.

### *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 does not occur on site. It is therefore unlikely that it would occur on site.

### *Summary*

On the basis that it has been recorded from Plettenberg Bay and the site has suitable habitat, the Knysna Warbler (Vulnerable) has a moderate to high probability of 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. The type locality of the Tunnelling Dung Beetle (Endangered) is forest habitats in the Keurboomstrand area. It therefore has to be assumed that there is a high probability of it occurring there. There is a moderate to high probability of the small antelope (Vulnerable) occurring in the forests on 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).

# Ecological drivers and processes

Climate is a primary driver of ecosystem characteritics, with higher rainfall supporting more productive ecosystems. Rainfall season is also important and fynbos is a winter to all-season vegetation, wherea forest is supported by all-year rainfall. The site is in an area with all-year rainfall that is sufficient to support true forest, as well as thicket, depending on local conditions. The maximum rainfall is marginally associated with late winter and early summer, which supports temperate species. Temperatures are not high enough to support tropical vegetation and seasonality favours C3 species over C4 species. These climate conditions determine what biomes occur in the area, reflected in the occurrence of Fynbo, Forest and Thicket in nearby areas.

The substrate and geology of a site is an important determinent of soil properties and topography. The steeply sloping part of the site consists of Enon Era deposits (conglomerate, sandstone, siltstone, clay), whereas the low-lying areas are alluvial deposits. Groundwater flow is likely to be relatively rapid in the alluvial deposits. The extreme southern parts of the site border on recent aeolian sand that forms the fore-dune ecosystems. The proximity of the sea ameliorates climate, and elevates air moisture conditions.but is probably sufficiently spatially removed to minimise the effects of salt-laden air on vegetation characteristics.

Slope angle, aspect, and elevation are considered as the primary factors causing differences in vegetation growth and distribution, ecosystem functioning, and processes. Differences in slope aspect cause differences in air and soil temperature, moisture content and evaporation, which creates different microclimatic conditions that are closely associated with alterations in vegetation structure and composition. South-facing shady slopes on site have dense woodland vegetation with nutrient-rich soil, whereas more sparse vegetation is expected to occur on summits and north-facing sunny slopes.

Cooler slopes with dense vegetation and higher moisture content are resistent to fire, whereas dryer, more exposed areas are susceptible to burning. The summits of slopes are much more likely to experience lightning strikes, an important natural fire-starter.

The overall effect of the deescribed environmental conditions is that the site is in an environment in which low forest or thicket is favoured over other vegettion formations. Fire is not an important driver. The boundary between the steeply-sloping part of the site and the lowlands reflects different substrate conditions as well as different microclimate and moisture status. This means that it is unlikely that the vegetation would be the same in both parts of the site, the sloping area supporting forest and the lowlands some form of coastal thicket that would typically occur on aeolian sand deposits close to the coast.

Within forests, canopy structure (a closed canopy) is important for maintaining the health of the ecosystem, since it maintains a consistent environment under the canopy. Boundary and edge effects are usually ameliorated by forest margin vegetation, which typically contains more pioneer species and is often in a more dynamic state than core forest areas. Where natural disturbances occur, such as due to fire, these are usually terminated within this boundary vegetation and seldom penetrate deeper into forests. This maintains the stability of core forest areas.

Forests contain unique assemblages of plants and animals relative to surrounding areas. The animals (including birds) are important pollinators and seed dispersal agents. Landscape linkages and corridors are ecologically important for migration of animals within these ecosystems.

# Ecological linkages and connectivity

The most important linkage associated with the site is the lateral (east-west) forest linkage along the entire slope between Keurbooms settlement in the east and the Keurbooms River in the west. This is a uniform area of forest that is intact and in relatively good condition (blue-shaed area in **Figure 24**). Maintaining this a single block of vegetation is critically important for the health of the entire system.

The forest on site must be maintained in order to maintain the health of all the similar forest on the slope going to the west. There are strong connections between this system and the more inland forests that joins just before Keurbooms (linkages shown as yellow arrows). This is also approximately where the strongest spatial links are to the coastal dune systems that extend westwards to the mouth of the Keurbooms River.

The main physical barriers in the landscape (purple lines) are the N2 road and the older (DR1888) road on the inland side (including the degraded and invaded areas associated with these), and the Keurbooms road and scattered coastal developments on the southern side. Towards the west, closer to the mouth of the Keurbooms River, are several coastal developments that form strong physical barriers in the landscape. The Keurbooms road is not a severe barrier and is narrow enough and surrounded by sufficient natural habitat to be easily crossed.

The pasture area on site, if rehabilitated to secondary thicket (the most likely successional outcome, based on surrounding dynamics) would result in stronger inland-coastal linkages. Development of the site would create additional barriers, but the effect would only be critical if surrounding sites are also developed. The impact would therefore be part of a cumulative effect that extends existing impacts and preceds future possible impacts. Currently, the barrier is of low significance, but would increase with development of the site.

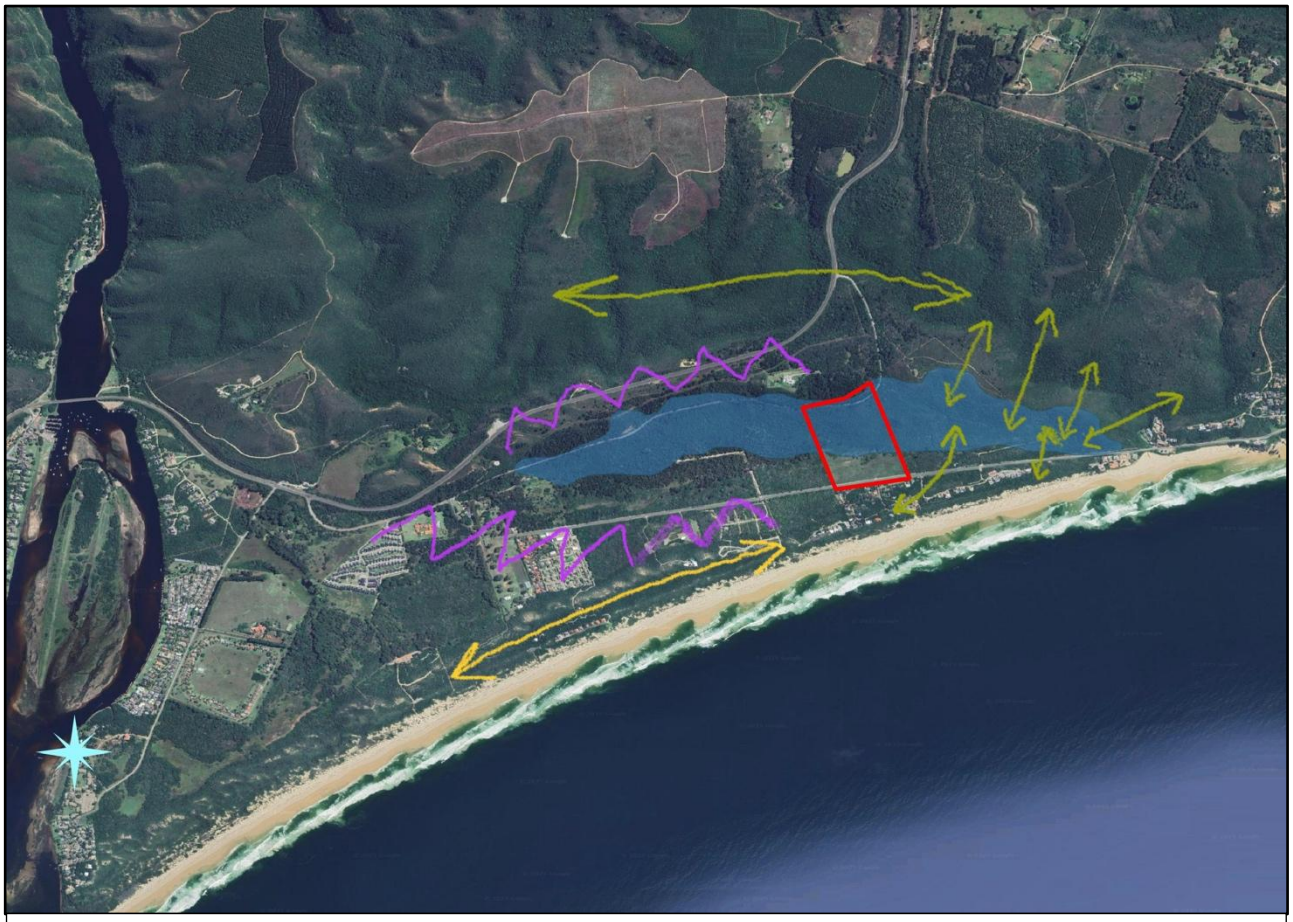

**Figure 24: Ecological linkages and barriers in the landscape.**

# 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.

| **Habitat** | **Conservation importance** | **Functional integrity** | **Receptor resilience** | **Site Ecological Importance (BI)** |
|---|---|---|---|---|
| Forest | High<br>ECOSYSTEM CRITERION: Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type.<br>The forest on site is part of a larger contiguous area of approximately 71 ha that falls within a listed VU ecosystem.<br>SPECIES CRITERION: MEDIUM: Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. Forest is suitable habitat of EN species listed under criterion A (*Ocotea bullata*). | High<br>Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types - 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 = 71 ha. | Very low<br>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<br>(BI = High) |

| | | | | |
|---|---|---|---|---|
| Invaded secondary vegetation | High<br>Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type - site is within listed Endangered ecosystem type. | Medium<br>Several minor and major current negative ecological impacts but moderate rehabilitation potential. | Medium<br>Will recover slowly (more than 10 years) to restore >75% to restore the original species composition and functionality | Medium<br>(BI = Medium) |
| Pastures / lawns | Very low<br>No natural habitat remaining. | Very low<br>Several major current negative ecological impacts. | Very High<br>Habitat that can recover rapidly | Very low<br>(BI = Very low) |
| Transformed (roads) | Very low<br>No natural habitat remaining. | Very low<br>Several major current negative ecological impacts. | Very High<br>Habitat that can recover rapidly | Very low<br>(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.

| 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 includes areas within CBA1 that are also indigenous forest. It is confirmed from the site visit that these areas are in a natural state. They therefore have VERY HIGH 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, which is outside the proposed development footprint and will not be affected by the proposed development. 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.
- Tunnelling Dung Beetle (Endangered). The type locality of the species is forest habitats in the Keurboomstrand area.
- Small antelope (Vulnerable). There is a moderate to high probability of it occurring in the forests on site.
- *Ocotea bullata* (Stinkwood, Endangered) probably occurs in the forests on site.

None of these species are expected to be negatively affected by the proposed development (both options).

A map of combined habitat sensitivity on site for the Plant Species Theme and Animal Species Theme is provided in **Figure 25**, mapped according to the calculations provided through the process of calculating Site Ecological Importance.

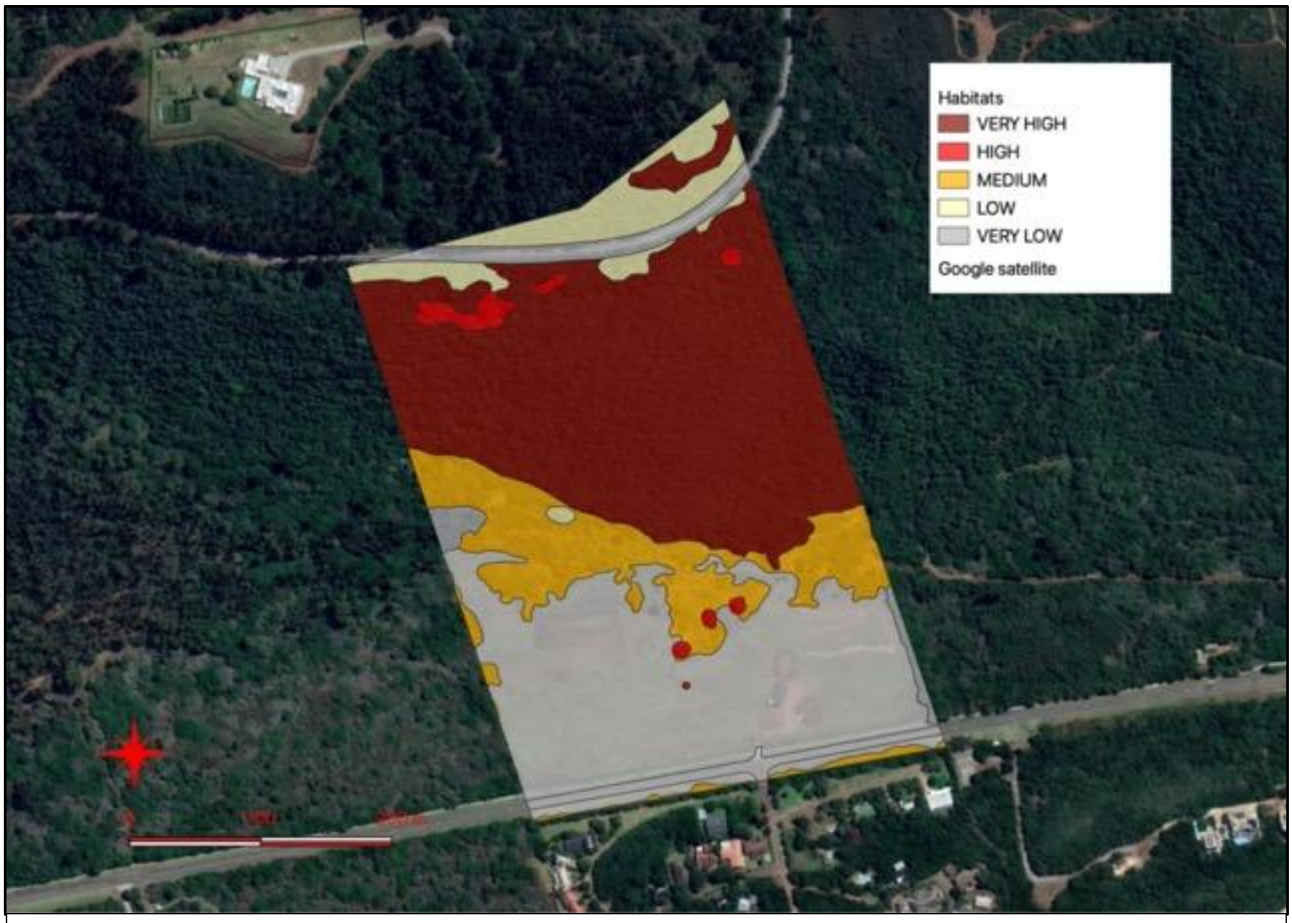


**Figure 25: Site Ecological Importance (SEI) for habitats on site.**

# IMPACT ASSESSMENT

The proposal is to develop housing on site. The footprint of the proposed development is within areas mapped as "lawns/pasture" (Very Low sensitivity), "Secondary Vegetation" (Medium sensitivity) and "Alien Trees" (Very Low or Low sensitivity).

No plant species of concern were found on site, but a small number of free-standing, relatively large milkwood trees (*Sideroxylon inerme*) were found on site that are protected under the National Forests Act. These are shown as being retained within the proposed development (both options).

There are two sensitive animal species that are likely to use that particular habitat / part of the site. They can use it for foraging on rare occasion (e.g. the Bustard and raptor species). The other listed (e.g. the insects) have a low probability of presence while the small antelope may use the transition zones near dense trees and shrubs on rare occasions.

The impacts assessed here are therefore as follows:

1. LOSS OF HABITAT WITHIN CBAs.
2. LOSS OF SECONDARY VEGETATION WITHIN AN ENDANGERED ECOSYSTEM.
3. LOSS OF INDIVIDUALS OF A PROTECTED TREE SPECIES
4. LOSS OF HABITAT FOR LISTED THREATENED ANIMAL SPECIES

## Loss of habitat within CBAs

### *Resource irreplaceability*

The site occurs entirely within CBA1 and CBA2 areas. The secondary vegetation ("pastures") in the southern part of the site does not have the properties consistent with protecting biodiversity patterns, but emaining areas are ecologically functional. A total of 8 of the stands are either partially or fully within CBA1 areas (**Figure 26**).

CBA1 areas have a resource irreplaceability score of 4. Note that the CBAs are designated for the protection of listed Garden Route shale fynbos, but this does not occur within these designated CBA1 areas, only forest.

Score = 4 for areas in an ecologically intact state.

### *Threshold*

The potential impact affects a small proportion of the CBA1 network and does not affect any areas of fynbos within CBA1 areas. Score = 1.

### *Resource condition*

The vegetation on site (within the proposed development footprint within the mapped CBA1 areas) is in relatively poor condition, and consists either of lawns or secondary vegetation with a species composition that is not representative of the natural habitat. Score = 1.

### *Reversibility of impact*

Loss of habitat on site (within the proposed development footprint) is probably fully REVERSIBLE - secondary vegetation can easily be restored to its current state through active rehabilitation in combination with natural succession. Score = 2.

### *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. However, impacts on the CBA network are of Provincial importance in the sense that alternative areas are required to meet biodiversity targets. Score = 4.

### *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 ecological processes on site continuing but in a modified way. Score = 3.

### *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 and the magnitude of the expected impact.


**Figure 26: Preferred SDP versus CBAs.**

Biodiversity value score: (4 + 1 + 1 + 2)/4 = 2.00
Impact magnitude: (4 + 5 + 3)/3 = 4.00
The impact is calculated as (2.00 x 4.00 = 8.0)/5 = 1.6 = **LOW** significance

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

1. None proposed.

## Impacts on ecological drivers

### *Resource irreplaceability*
The most important ecological drivers on site that may be affected by the proposed development are related to maintenance of the forest ecosystem. The forest margins are important for maintaining forest integrity, and the forest canopy needs to be maintained for the health of the forest ecosystem. No development is proposed within the forest, and the secondary forest on the southern margin is also excluded from development. In terms of maintaining the health of the forest, the forest itself is considered here as the resource, which is assessed as being irreplaceable on the basis of the protected status.
Score = 5.

### *Threshold*
The potential impact directly affects a negligible proportion of the forest, but indirectly affects the entire extent of forest towards the west. Score = 4.

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

### *Reversibility of impact*
Loss of forest habitat 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 boundary disturbance, alien invasive species spread, etc. Score = 1.

### *Duration of impact*
Damage of the habitat on site is assessed as being long-term. Score = 4

### *Intensity of impact*
At a local scale, the impact is likely to be of LOW intensity - the most likely impact would be foot or other traffic in the forest after occupation of the development. It would result in ecological processes on site continuing but in a slightly modified way. 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 POSSIBLE. Score = 2.

### *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: (5 + 4 + 4 + 5)/4 = 4.50
Impact magnitude: (1 + 4 + 2)/3 = 2.33
The impact is calculated as (4.50 x 2.33 = 10.5)/5 = 2.1 = **MEDIUM** significance.
Mitigation measures would reduce the intensity and duration of impacts. The significance after mitigation would be (4.50 x 1.67 = 7.5)/5 = 1.5 = **LOW** significance after mitigation.

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

1. Access to forested areas during construction must not be permitted by any construction personnel. These areas must be fenced off and no access allowed.
2. Compile and implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control.
3. Undertake regular monitoring to detect alien invasions early so that they can be controlled, as per the Alien Management Plan.
4. Restrict access to forested areas once the development is complete. An ecological management plan must be compiled and committed to by the future HOA. This should contain measures for protecting the forest from undue traffic and impacts.

## Impacts on ecological corridors

### *Resource irreplaceability*
The main ecological corridors are in an east-west direction. Loss of habitat on site due to the development would block inland-coastal linkages that would connect the forest to the coastal thicket. Currently, these linkages are not very strong, but there is potential for current pasture areas on site to undergo successional development towards secondary thicket, which would enhance ecological connectivity. Score = 2.

### *Threshold*
The potential impact affects a moderate to low proportion of possible ecological connections. Score = 2.

### *Resource condition*
The current ecological connectivity on site is moderately good, but could be very good with rehabilitation of current pasture areas. The difference is the given score here. Score = 2.

### *Reversibility of impact*
Loss of habitat on site (within the proposed development footprint) would be an IRREVERSIBLE loss of connectivity. Score = 5.

### *Extent of impact*
The impact will occur within the site boundary but extends to all the forests on the same slope in which the forest on site occurs. 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 of LOW intensity, since it would result in ecological processes on site continuing but in a slightly modified way. 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 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: (2 + 2 + 2 + 5)/4 = 2.75
Impact magnitude: (2 + 5 + 2)/3 = 3.00
The impact is calculated as (2.75 x 3.00 = 8.3)/5 = 1.7 = **LOW** significance.
With corridors maintained the significance would be (2.75 x 2.33 = 6.4)/5 = 1.3 = **LOW** significance

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

1. Provide open-space corridors through the development, such as provided for in Alternative 2.

## Loss of natural vegetation

### *Resource irreplaceability*
The vegetation type (Garden Route Shale Fynbos) is listed as Endangered. All upland areas of the site on the steep slopes are covered with forest that matches the description for Goukamma /Mesic Dune Thicket (Cowling et al. 2023), which is not threatened, but is separately listed as protected under the National Forests Act. These forested areas are completely excluded from the proposed development (all options) and are not directly affected.

The only remaining non-forest vegetation on site is considered to be secondary. However, on the basis that no legal soil disturbance has occurred during the preceding 10 years, it is legally considered to be natural vegetation that is within an Endangered ecosystem. It is, however, not representative of this vegetation unit and, being secondary, is not considered to be irreplaceable. Score = 1.

### *Threshold*
The potential impact affects a negligible proportion of the vegetation type (Garden Route Shale Fynbos). Score = 1.

### *Resource condition*
The vegetation on site (within the proposed development footprint) is in relatively poor condition, and consists either of lawns or secondary vegetation with a species composition that is not representative of the natural habitat. Score = 2.

### *Reversibility of impact*
Loss of habitat on site (within the proposed development footprint) is probably fully REVERSIBLE - secondary vegetation can easily be restored to its current state through active rehabilitation in combination with natural succession. Score = 2.

### *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.

### *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 ecological processes on site continuing but in a modified way. Score = 3.

### *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 + 2 + 2)/4 = 1.50
Impact magnitude: (1 + 5 + 3)/3 = 3.00
The impact is calculated as (1.50 x 3.00 = 4.5)/5 = 0.9 = **VERY LOW** significance

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

2. Access to forested areas during construction must not be permitted by any construction personnel. These areas must be fenced off and no access allowed.
3. Compile and implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control.
4. Undertake regular monitoring to detect alien invasions early so that they can be controlled, as per the Alien Management Plan.

## Loss of individuals of protected tree species

### *Resource irreplaceability*
The tree species affected is *Sideroxylon inerme*, protected under the National Forests Act. A total of 4 individuals were seen on site, all of them relatively large individuals. The species is widespread but is a key and dominant component of coastal forests in the Garden Route. Score = 2.

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

### *Resource condition*
The trees on site are large and in good condition but probable remnants of original coastal forest. 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 VERY HIGH intensity, since it would result in the permanent loss of the populations on site. Score = 4.

### *Probability of occurrence*
Based on the proposed development plan and the known location of the individuals found on site (intention is to retain trees within the proposed development), the impact has LOW PROBABILITY. Score = 2.

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

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

Biodiversity value score: (2 + 1 + 4 + 2)/4 = 2.25
Impact magnitude: (1 + 5 + 4)/3 = 3.33
The impact is calculated as (2.25 x 3.33 = 7.5)/5 = 1.50 = **LOW** significance

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

1. Retain existing large trees within proposed development.
2. If any trees need to be removed or pruned then a permit is required, according to the National Forests Act.
3. Plant additional milkwoods in the development as part of the final landscaping. These can be planted along with other appropriate coastal forest species, but the proportions and composition should reflect habitat that would have occurred naturally at this site.

## Loss of habitat for listed threatened animal species

### *Resource irreplaceability*
There is habitat on site that is suspected habitat for threatened plant and animal species. This is the forest habitat, which is outside the proposed development footprint and will not be affected by the proposed development. 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.
- Tunnelling Dung Beetle (Endangered). The type locality of the species is forest habitats in the Keurboomstrand area.
- Small antelope (Vulnerable). There is a moderate to high probability of it occurring in the forests on site.

Score = 4.

### *Threshold*
The potential impact affects a negligible proportion of the overall habitat available for these species and will not directly affect any individuals. Score = 1.

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

### *Reversibility of impact*
Loss of forest habitat on site (not planned or expected) 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 of VERY LOW magnitude, since it is not expected to affect any of the sensitive habitat resource for potentially affected species. Score = 1.

### *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 species of concern is LOW PROBABILITY. Score = 2.

### *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 + 1 + 4 + 5)/4 = 3.50
Impact magnitude: (2 + 5 + 1)/3 = 2.67
The impact is calculated as (3.50 x 2.67 = 9.3)/5 = 1.9 = **LOW** significance

### *Possible mitigation measures*

Possible mitigation measures that can be applied are as follows:

1. Protect natural forest vegetation adjacent to the proposed development site.
2. Rehabilitate and improve the small dam on site, including introducing pond margin vegetation typical of mountain ponds in forested areas. This will provide good habitat for various frogs, including potentially *Afrixalus knysnae*.

# 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 pasture / lawns (on the flat lowlands), secondary scrub vegetation, forest woodland (on the steep south-facing slopes), patches of alien trees, and some scattered milkwood trees within the pasture area. The forests are in a natural state whereas other habitats are secondary.

2. The proposed development will be restricted primarily to the lowland areas that were previously cultivated. The forest areas are therefore outside the proposed development footprint.

3. The forest exists in the areas designated as Critical Biodiversity Area 1. The site occurs within Garden Route Shale Fynbos, which is listed as Endangered. The forest habitat on site is not typical of the listed ecosystem within which it occurs.

4. Following the procedures within the Species Environmental Assessment Guidelines, the forests on site have been assessed as having Very High sensitivity / Ecological Importance, secondary vegetation as having Medium sensitivity / Ecological Importance, and remaining areas Low or Very Low sensitivity.

5. On the basis of the presence of natural habitat within a CBA1 area and within a listed ecosystem, it is verified that the site occurs partially within an area of VERY HIGH sensitivity with respect to the Terrestrial Biodivesity Theme. These areas are not affected by the proposed development.

6. No plant species of concern were found on the lowland part of the site and, based on the available habitat (except for the forest, which will not be affected by the proposed development), it is considered unlikely that any of those plant species flagged for the site would occur there. However, it is likely that an Endangered tree species occurs within the forest, and possible that a Rare tree occurs within the forest. It is therefore verified that the site has MEDIUM sensitivity with respect to the Plant Species Theme, but only within areas not affected by the proposed development.

7. The lowland part of the site is not considered to be good habitat for any of the animal species flagged for the site. However, the forest is likely habitat for three animal species, the Knysna Warbler (Vulnerable), a small antelope (Vulnerable), and the Tunnelling Dung Beetle (Endangered). It is therefore verified that the Animal Species Theme has MEDIUM sensitivity for the site, but only within areas not affected by the proposed development.

8. The preferred SDP (60 units) affects a small area mapped in the Keurbooms and Environs Local Area Spatial Plan (KELASP) as "***Map Unit 8: Fynbos invaded with aliens***", which is a restricted zone according to this LASP. The on-site vegetation was found to be secondary with alien plants, but this is legally natural vegetation within an Endangered ecosystem (according to the legal definition of natural vegetation in NEMA). This small patch of habitat is not considered to have biodiversity significance, but constitutes the only restriction, according to the information considered here. On this basis, the Alternative 1 proposal is preferred.

9. An impact assessment determined that the impact of the proposed development has Low significance on CBAs, ecological processes and ecological connectivity, Very Low

significance on vegetation, and Low significance on protected trees and animal species of concern.

# Impact statement

PLANT SPECIES THEME:

1. No flagged, sensitive or listed plant species were found within the proposed development footprint and none are likely to occur on site under current ecological conditions. However, rehabilitation of the site could restore ecological conditions that may favour additional biodiversity not currently observed on site. A Plant Species Compliance Statement was therefore required. The following is therefore stated:
    a. The habitat of the proposed footprint area has low sensitivity with respect to the Plant Species Theme.
    b. The proposed development will not have any impacts on any terrestrial plant SCC.
    c. Although not threatened, bulbs of Brunsvigia orientalis must be rescued prior to construction, as per requirements of Bitou Municipality.

ANIMAL SPECIES THEME:

1. Of the animal species flagged for the site, there are several bird species and one antelope species that may possibly migrate through the site, or else it forms part of the overall foraging resource of these species. It is probable that the Knysna Warbler (Vulnerable) migrates trough the site. A small antelope (Vulnerable), listed as a sensitive species, could also migrate through the site. The site therefore has MEDIUM sensitivity with respect to the Terrestrial Animal Species Theme. None of these were found during the site inspection. An Animal Species Compliance Statement was therefore required. The following is therefore stated:
    a. The habitat of the proposed footprint area has medium sensitivity with respect to the Terrestrial Animal Species Theme.
    b. The proposed development may have impacts of Low significance on terrestrial animal SCC.

TERRESTRIAL BIODIVERSITY THEME:

1. The site occurs partially within CBA1 and CBA2 areas. Natural areas on site also legally fall within a listed ecosystem. The development footprint affects secondary vegetation, including pastures. These have Medium and Low sensitivity respectively. The pasture areas no longer have habitat that is representative of the original ecosystem. Parts of the development footprint (secondary thicket) therefore have VERY HIGH sensitivity with respect to the Terrestrial Biodiversity Theme and parts (pasture) have LOW sensitivity with respect to the Terrestrial Biodiversity Theme. A Terrestrial Biodiversity Assessment was therefore required. The following is therefore stated:
    a. The habitat of the proposed footprint area has Low or Very High sensitivity with respect to the Terrestrial Biodiversity Theme.
    b. An impact assessment determined that the impact of the proposed development has Medium significance on CBAs, and Very Low significance on natural vegetation.

# RECOMMENDATIONS

- Forest habitats on the upland, steeply-sloping part of the site, have high biodiversity and conservation value, and are designated as sensitive. These areas must not be affected by the proposed development. A buffer zone should be retained along the base of the slope to protect the forest margin. For example, steps should be taken to rehabilitate these areas and encourage growth of species, such as *Pterocelastrus tricuspidatus* and *Sideroxylon inerme*, that are mesic and fire-resistant. An open space management system should be developed to formalize such steps for forest protection.

- Rehabilitation of disturbed areas, as well as previously invaded areas, should promote establishment of site-appropriate indigenous species.

- An ongoing alien invasive management programme should take place on site. This will protect riparian habitats downslope from degradation and could potentially be the biggest contribution to maintaining and protecting biodiversity on site and in surrounding areas.

- The bulb species, *Brunsvigia orientalis*, was found on site within the proposed development footprint. Although not threatened, it is recommended that all individuals are rescued prior to commencement of development. Locations of individuals must be determined by a qualified botanist during the flowering period in late summer (around March) and plants rescued at an appropriate time thereafter. Plant rescue and relocation must follow the requirements of the Bitou Municipality.

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# APPENDICES:

## Appendix 1: Plant species recorded on site.

Abutilon sonneratianum
Acacia cyclops* (Invader category 1b)
Anemia caffrorum
Arctotheca prostrata
Asparagus asparagoides
Brunsvigia orientalis
Buddleja saligna
Capparis sepiaria
Carex uhligii
Carpobrotus deliciosus
Cenchrus clandestinus*
Cerastium glomeratum
Clausena anisata
Crassula multicava
Cynanchum obtusifolium
Dovyalis rhamnoides
Euphorbia helioscopia
Euryops virgineus
Felicia amoena
Acalypha
Chenopodium
Cotula
Dietes bicolor
Isoglossa
Medicago
Melolobium
Moraea
Pinus sp. (Invader category 2)
Grewia occidentalis
Gymnosporia buxifolia
Hebenstretia integrifolia
Helichrysum cymosum
Helichrysum petiolare
Helichrysum teretifolium
Lauridia tetragona
Lepidium africanum
Lycium ferocissimum
Lysimachia arvensis
Massonia depressa
Mesembryanthemum aitonis
Mystroxylon aethiopicum
Nidorella ivifolia
Osteospermum moniliferum
Otholobium stachyerum
Paraserianthes lophantha* (Invader category 1b)
Passerina corymbosa
Pelargonium elongatum
Podalyria myrtillifolia
Polygala myrtifolia
Pterocelastrus tricuspidatus

Putterlickia pyracantha
Rhoicissus digitata
Rubia petiolaris
Rubus pinnatus
Rumex hypogaeus
Salvia aurea
Scutia myrtina
Searsia crenata
Searsia lucida
Senecio inaequidens
Sideroxylon inerme (PROTECTED TREE)
Solanum linnaeanum*
Stachys aethiopica
Stenotaphrum secundatum
Trimeria grandifolia
Vicia sativa*
Yucca aloifolia*

**DECLARATION OF THE SPECIALIST**

**Note:** Duplicate this section where there is more than one specialist.

I David Hoare....., as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that:

- In terms of the general requirement to be independent:
  - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity; or
  - am not independent, but another specialist (the "Review Specialist") that meets the general requirements set out in Regulation 13 of the NEMA EIA Regulations has been appointed to review my work (Note: a declaration by the review specialist must be submitted);
- In terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all of the requirements;
- I have disclosed to the applicant, the EAP, the Review EAP (if applicable), the Department and I&APs all material information that has or may have the potential to influence the decision of the Department or the objectivity of any Report, plan or document prepared or to be prepared as part of the application; and
- I am aware ~~that a~~ false declaration is an offence in terms of Regulation 48 of the EIA Regulations.

DHoare

Signature of the ~~EAP~~ Specialist

29 July 2025

Date:

BioCensus (Pty) Ltd

Name of company (if applicable):

**CURRICULUM VITAE**

# Dr. David Barry Hoare

Ph.D., Pr.Sci.Nat. (Ecology, Botany)

**Contact details**
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Private Bag X025, Lynnwood Ridge, 0040
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**Personal information**
**Date of birth:** 04 November 1966, Grahamstown, South Africa
**Citizenship:** Republic of South Africa
**ID no.:** 661104 5024 088

**Education**
PhD (Botany) – Nelson Mandela Metropolitan University, Port Elizabeth
M.Sc (Botany) - University of Pretoria, 1995-1997 with distinction
B.Sc (Hons) (Botany) - Rhodes University, 1994 with distinction
B.Sc (majors: Botany, Zoology) - Rhodes University, 1991-1993
Matric - Graeme College, Grahamstown, 1984

**Main areas of specialisation**
- Plant biodiversity and threatened plant species specialist.
- Flora and fauna surveys.
- Vegetation ecology, survey and mapping.
- Protected plant and tree species surveys, management plans and permits.
- Alien invasive plant identification and control / management plans.
- Remote sensing, analysis and mapping of vegetation.
- Specialist consultant for environmental management projects.

**Membership**
Professional Natural Scientist, South African Council for Natural Scientific Professions, 16 August 2005 – present. Reg. no. 400221/05 (Ecology, Botany)
Member, International Association of Vegetation Scientists (IAVS)
Member, Ecological Society of America (ESA)
Member, International Association for Impact Assessment (IAIA)
Member, Herpetological Association of Africa (HAA)

**Employment history**
1 December 2004 – present, Director, David Hoare Consulting (Pty) Ltd. Consultant, specialist consultant.
1January 2009 – 30 June 2009, Lecturer, University of Pretoria, Botany Dept.
1January 2013 – 30 June 2013, Lecturer, University of Pretoria, Botany Dept.
1 February 1998 – 30 November 2004, Researcher, Agricultural Research Council, Range and Forage Institute, Private Bag X05, Lynn East, 0039. Duties: vegetation ecology, remote sensing image processing.

**Experience as consultant**
Professional consultant since 1995 (28 years of experience). Author of over 800 specialist ecological consulting reports. Wide experience in ecological studies within grassland, savanna, karoo and fynbos, as well as riparian, coastal and wetland vegetation.

**Publication record:**
**Refereed scientific articles (in chronological order):**
**Journal articles:**

**HOARE, D.B.** & BREDENKAMP, G.J. 1999. Grassland communities of the Amatola / Winterberg mountain region of the Eastern Cape, South Africa. *South African Journal of Botany* 64: 44-61.

**HOARE, D.B.**, VICTOR, J.E., LUBKE, R.A. & MUCINA, L., 2000. Vegetation of the coastal fynbos and rocky headlands south of George, South Africa. *Bothalia* 30: 87-96.

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**Book chapters and conference proceedings:**

**HOARE, D.B.** 2002. Biodiversity and performance of grassland ecosystems in communal and commercial farming systems in South Africa. Proceedings of the FAO's Biodiversity and Ecosystem Approach in Agriculture, Forestry and Fisheries Event: 12–13 October, 2002. Food and Agriculture Organisation of the United Nations, Viale delle Terme di Caracalla, Rome, Italy. pp. 10 - 27.

STEENKAMP, Y., VAN WYK, A.E., VICTOR, J.E., **HOARE, D.B.**, DOLD, A.P., SMITH, G.F. & COWLING, R.M. 2005. Maputaland-Pondoland-Albany Hotspot. In: Mittermeier, R.A., Gil, P.R., Hoffmann, M., Pilgrim, J., Brooks, T., Mittermeier, C.G., Lamoreux, J. & Fonseca, G.A.B. da (eds.) *Hotspots revisited.* CEMEX, pp.218–229. ISBN 968-6397-77-9

STEENKAMP, Y., VAN WYK, A.E., VICTOR, J.E., **HOARE, D.B.**, DOLD, A.P., SMITH, G.F. & COWLING, R.M. 2005. Maputaland-Pondoland-Albany Hotspot. http://www.biodiversityhotspots.org/xp/hotspots/maputaland/.

**HOARE, D.B.**, MUCINA, L., RUTHERFORD, M.C., VLOK, J., EUSTON-BROWN, D., PALMER, A.R., POWRIE, L.W., LECHMERE-OERTEL, R.G., PROCHES, S.M., DOLD, T. and WARD, R.A. *Albany Thickets.* in Mucina, L. and Rutherford, M.C. (eds.) 2006. The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19, South African National Biodiversity Institute, Pretoria.

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2006. Nama-Karoo Biome. In: Mucina, L. & Rutherford, M.C. (eds.) The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.

MUCINA, L., SCOTT-SHAW, C.R., RUTHERFORD, M.C., CAMP, K.G.T., MATTHEWS, W.S., POWRIE, L.W. and **HOARE, D.B.** 2006. Indian Ocean Coastal Belt. In: Mucina, L. & Rutherford, M.C. (eds.) The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.

MUCINA, L., RUTHERFORD, & POWRIE, L.W. with contributions by GERBER, J., BEZUIDENHOUT, H., SIEBEN, E.J.J., CILLIERS, S.S., DU PREEZ, P.J., MANNING, J.C., **HOARE, D.B.**, BOUCHER, C., REBELO, A.G., BREDENKAMP, G.J. and SIEBERT, F. 2006. Inland Azonal Vegetation. In: Mucina, L. & Rutherford, M.C. (eds.) The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.

***Conference Presentations:***

HOARE, D.B. & LUBKE, R.A. *Management effects on diversity at Goukamma Nature Reserve, Southern Cape*; Paper presentation, Fynbos Forum, Bienne Donne, July 1994

HOARE, D.B., VICTOR, J.E. & LUBKE, R.A. *Description of the coastal fynbos south of George, southern Cape*; Paper presentation, Fynbos Forum, Bienne Donne, July 1994

HOARE, D.B. & LUBKE, R.A. *Management effects on fynbos diversity at Goukamma Nature Reserve, Southern Cape*; Paper presentation, South African Association of Botanists Annual Congress, Bloemfontein, January 1995

HOARE, D.B. & BOTHA, C.E.J. *Anatomy and ecophysiology of the dunegrass Ehrharta villosa var. maxima*; Poster presentation, South African Association of Botanists Annual Congress, Bloemfontein, January 1995

HOARE, D.B., PALMER, A.R. & BREDENKAMP, G.J. 1996. *Modelling grassland community distributions in the Eastern Cape using annual rainfall and elevation*; Poster presentation, South African Association of Botanists Annual Congress, Stellenbosch, January 1996

HOARE, D.B. *Modelling vegetation on a past climate as a test for palaeonological hypotheses on vegetation distributions*; Paper presentation, Randse Afriakaanse Universiteit postgraduate symposium, 1997

HOARE, D.B., VICTOR, J.E. & BREDENKAMP, G.J. *Historical and ecological links between grassy fynbos and afromontane fynbos in the Eastern Cape*; Paper presentation, South African Association of Botanists Annual Congress, Cape Town, January 1998

LUBKE, R.A., HOARE, D.B., VICTOR, J.E. & KETELAAR, R. *The habitat of the Brenton Blue Butterfly*. Paper presentation, South African Association of Botanists Annual Congress, Cape Town, January 1998

HOARE, D.B. & PANAGOS, M.D. Satellite stratification of vegetation – structure or floristic composition? Poster presentation at the 34th Annual Congress of the Grassland Society of South Africa, Warmbaths, 1-4 February 1999.

HOARE, D.B. & WESSELS, K. Conservation status and threats to grasslands of the northern regions of South Africa, Poster presentation at the South African Association of Botanists Annual Congress, Potchefstroom, January 2000.

HOARE, D.B. Phenological dynamics of Eastern Cape vegetation. Oral paper presentation at the South African Association of Botanists Annual Congress, Grahamstown, January 2002.

HOARE, D.B., MUCINA, L., VAN DER MERWE, J.P.H. & PALMER, A.R. Classification and digital mapping of grasslands of the Eastern Cape Poster presentation at the South African Association of Botanists Annual Congress, Grahamstown, January 2002.

HOARE, D.B. Deriving phenological variables for Eastern Cape vegetation using satellite data Poster presentation at the South African Association of Botanists Annual Congress, Grahamstown, January 2002.

MUCINA, L., RUTHERFORD, M.C., HOARE, D.B. & POWRIE, L.W. 2003. VegMap: The new vegetation map of South Africa, Lesotho and Swaziland. In: Pedrotti, F. (ed.) Abstracts: Water Resources and Vegetation, 46th Symposium of the International Association for Vegetation Science, June 8 to 14 – Napoli, Italy.

HOARE, D.B. 2003. Species diversity patterns in moist temperate grasslands of South Africa. Proceedings of the VIIth International Rangeland Congress, 26 July – 1 August 2003, Durban South Africa. African Journal of Range and Forage Science. 20: 84.

***Unpublished technical reports:***

BRITTON, D., SILBERBAUER, L., ROBERTSON, H., LUBKE, R., HOARE, D., VICTOR, J., EDGE, D. & BALL, J. 1997. The Life-history, ecology and conservation of the Brenton Blue Butterfly (*Orachrysops*

*niobe*) (Trimen)(*Lycaenidea*) at Brenton-on-Sea. Unpublished report for the Endangered Wildlife Trust of Southern Africa, Johannesburg. 38pp.
PALMER, A.R., HOARE, D.B. & HINTSA, M.D., 1999. Using satellite imagery to map veld condition in Mpumalanga: A preliminary report. Report to the National Department of Agriculture (Directorate Resource Conservation). ARC Range and Forage Institute, Grahamstown.
HOARE, D.B. 1999. The classification and mapping of the savanna biome of South Africa: methodology for mapping the vegetation communities of the South African savanna at a scale of 1:250 000. Report to the National Department of Agriculture (Directorate Resource Conservation). ARC Range and Forage Institute, Pretoria.
HOARE, D.B. 1999. The classification and mapping of the savanna biome of South Africa: size and coverage of field data that exists on the database of vegetation data for South African savanna. Report to the National Department of Agriculture (Directorate Resource Conservation). ARC Range and Forage Institute, Pretoria.
THOMPSON, M.W., VAN DEN BERG, H.M., NEWBY, T.S. & HOARE, D.B. 2001. Guideline procedures for national land-cover mapping and change monitoring. Report no. ENV/P/C 2001-006 produced for Department of Water Affairs and Forestry, National Department of Agriculture and Department of Environment Affairs and Tourism. Copyright: Council for Scientific and Industrial Research (CSIR) and Agricultural Research Council (ARC).
HOARE, D.B. 2003. Natural resource survey of node O R Tambo, using remote sensing techniques, Unpublished report and database of field data for ARC Institute for Soil, Climate & Water, ARC Range and Forage Institute, Grahamstown.
HOARE, D.B. 2003. Short-term changes in vegetation of Suikerbosrand Nature Reserve, South Africa, on the basis of resampled vegetation sites. Gauteng Department of Agriculture, Conservation, Environment and Land Affairs, Conservation Division.
HOARE, D.B., VICTOR, J.E. & MARNEWIC, G. 2005. Vegetation and flora of the wetlands of Nylsvley River catchment as component of a project to develop a framework for the sustainable management of wetlands in Limpopo Province.
VLOK, W., COOK, C.L., GREENFIELD, R.G., HOARE, D., VICTOR, J. & VAN VUREN, J.H.J. 2006. A Biophysical Framework for the Sustainable Management of Wetlands in the Limpopo Province with Nylsvley as a reference Model. WRC Report No.: 1258/1/06. Report to the Water Research Commission.
Department of Water Affairs and Forestry (DWAF). 2008. Updated Manual for the Identification and Delineation of Wetlands and Riparian Areas, prepared by M. Rountree, A. L. Batchelor, J. MacKenzie and D. Hoare. Report no. X. Stream Flow Reduction Activities, Department of Water Affairs and Forestry, Pretoria, South Africa.

***Consulting reports:***
Total of over 800 specialist consulting reports for various environmental projects from 1995 – present.

**Referees:**
Prof. Roy Lubke, Associate Professor Emeritus, Botany Department, Rhodes University, Grahamstown Tel: 0461-318 592. E-mail: r.lubke@ru.ac.za
Prof. Richard Cowling, Botany Department, Nelson Mandela Metropolitan University, Tel (042) 298 0259 E-mail: rmc@kingsley.co.za
Michele Pfab, Scientific Co-ordinator: Scientific Authority, Applied Biodiversity Research, South African National Biodiversity Institute, (012) 843 5025, E-mail: M.Pfab@sanbi.org.za

**David Hoare** is an ecologist with twenty-six years' professional consulting experience in botany and terrestrial ecology. He is an experienced field ecologist, having undertaken numerous vegetation surveys throughout South Africa. He is a co-author on several chapters of the original SANBI VegMap book of South Africa, Lesotho and Swaziland, as well as co-author of the Thicket Ecosystem Guidelines. He is also an experienced GIS and vegetation mapping expert, having contributed to mapping of several parts of the country for the original VegMap, and contributed to mapping and interpretation of the original and updated versions of the national landcover map.

David has undertaken over a thousand assessment studies and reports throughout South Africa for mining, utilities, infrastructure and urban development projects, as well as for renewable energy projects. He has expertise in conducting baseline surveys, impact assessments, and biodiversity management plans. His expertise is in plant biodiversity and threatened plant species surveys, fauna surveys, including with camera-trap arrays. protected plant and tree species surveys, management plans and permits, alien invasive plant surveys and management plans, wetland survey and mapping, and remote sensing, analysis and mapping of vegetation.

## Education

PhD Botany, Nelson Mandela Metropolitan University (2009)

MSc Botany (with distinction), University of Pretoria (1997)

BSc (Hons) Botany (with distinction), Rhodes University (1994)

BSc Botany & Zoology (with distinction), Rhodes University (1993)

## Project Experience

David has direct work experience in renewable energy projects, utilities infrastructure, linear infrastructure, including powerlines, roads and pipelines, mining and quarries, including rehabilitation projects, and urban development projects.

## Memberships and Associations

- SACNASP: Professional Natural Scientist (Pr. Sci. Nat.) – Botanical Science, Ecological Science (Reg.No.400221/05)

## Publications

HOARE, D.B. & BREDENKAMP, G.J. 1999. Grassland communities of the Amatola / Winterberg mountain region of the Eastern Cape, South Africa. *South African Journal of Botany* 64: 44-61.

HOARE, D.B., VICTOR, J.E., LUBKE, R.A. & MUCINA, L., 2000. Vegetation of the coastal fynbos and rocky headlands south of George, South Africa. *Bothalia* 30: 87-96.

VICTOR, J.E., HOARE, D.B. & LUBKE, R.A., 2000. Checklist of plant species of the coastal fynbos and rocky headlands south of George, South Africa. *Bothalia* 30: 97-101.

MUCINA, L, BREDENKAMP, G.J., HOARE, D.B & MCDONALD, D.J. 2000. A National Vegetation Database for South Africa *South African Journal of Science* 96: 1-2.

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LUBKE, R.A., HOARE, D.B., VICTOR, J.E. & KETELAAR, R. 2003. The vegetation of the habitat of the Brenton blue butterfly, Orachrysops niobe (Trimen), in the Western Cape, South Africa. *South African Journal of Science* 99: 201–206.

HOARE, D.B & FROST, P. 2004. Phenological classification of natural vegetation in southern Africa using AVHRR vegetation index data. *Applied Vegetation Science* 7: 19-28.

FOX, S.C., HOFFMANN, M.T. and HOARE, D. 2005. The phenological pattern of vegetation in Namaqualand, South Africa and its climatic correlates using NOAA-AVHRR NDVI data. South African Geographic Journal, 87: 85–94.

PFAB, M.F., COMPAAN, P.C., WHITTINGTON-JONES, C.A., ENGELBRECHT, I., DUMALISILE, L., MILLS, L., WEST, S.D., MULLER, P., MASTERSON, G.P.R., NEVHUTALU, L.S., HOLNESS, S.D., HOARE, D.B. 2017. The Gauteng Conservation Plan: Planning for biodiversity in a rapidly urbanising province. Bothalia, Vol. 47:1. a2182. https://doi.org/10.4102/abc.v47i1.2182.

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MUCINA, L., RUTHERFORD, & POWRIE, L.W. with contributions by GERBER, J., BEZUIDENHOUT, H., SIEBEN, E.J.J., CILLIERS, S.S., DU PREEZ, P.J., MANNING, J.C., HOARE, D.B., BOUCHER, C., REBELO, A.G., BREDENKAMP, G.J. and SIEBERT, F. 2006. *Inland Azonal Vegetation.* In: Mucina, L. & Rutherford, M.C. (eds.) The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.