

Terrestrial and Aquatic Biodiversity, and Plant Species and Animal Species Assessment Report

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

Portion 152 of farm 216 Uitzigt, Brenton On Lake, Knysna, Western
Cape.



David Hoare Consulting (Pty) Ltd



David Hoare
Consulting (Pty) Ltd

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

41 Soetdoring Avenue
Lynnwood Manor
Pretoria

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

Terrestrial and Aquatic Biodiversity, and Plant and Animal Species Assessment Report for portion 152 of farm 216 Uitzigt, Brenton On Lake, Knysna, Western Cape

22 May 2024

TABLE OF CONTENTS

TABLE OF CONTENTS	2
SPECIALIST DETAILS & DECLARATION	4
DECLARATION OF INDEPENDENCE:.....	4
DISCLOSURE:.....	4
TERMS OF REFERENCE	5
INTRODUCTION	6
SITE LOCATION	6
IDENTIFIED THEME SENSITIVITIES	8
<i>Animal Species theme</i>	9
<i>Plant Species theme</i>	10
<i>Terrestrial Biodiversity theme</i>	12
<i>Aquatic Biodiversity theme</i>	13
ASSESSMENT METHODOLOGY	14
SURVEY TIMING	14
FIELD SURVEY APPROACH	14
IMPACT ASSESSMENT METHODOLOGY	15
SOURCES OF INFORMATION.....	17
<i>Regional Vegetation</i>	17
<i>Threatened Ecosystems</i>	17
<i>Regional plans</i>	17
<i>Aerial imagery</i>	17
<i>Vegetation and plant species</i>	17
<i>Fauna</i>	18
<i>Aquatic biodiversity</i>	18
LIMITATIONS	18
RESULTS	19
REGIONAL VEGETATION PATTERNS	19
<i>Knysna Sand Fynbos</i>	20
CONSERVATION STATUS OF BROAD VEGETATION TYPES	21
BIODIVERSITY CONSERVATION PLANS	21
HISTORICAL DISTURBANCE	22
PLANT SPECIES RECORDED IN THE PROJECT AREA	24
PLANT SPECIES FLAGGED FOR THE STUDY AREA.....	24
ANIMAL SPECIES FLAGGED FOR THE STUDY AREA	28
AQUATIC THEME	30
OUTCOME OF THE ASSESSMENT.....	31
VERIFICATION OF OBSERVATIONS ON SITE	31
HABITATS ON SITE	36
SITE ECOLOGICAL IMPORTANCE.....	37
IMPACT ASSESSMENT	40
IMPACTS ON ESTUARINE HABITATS	40
<i>Resource irreplaceability</i>	40
<i>Threshold</i>	40
<i>Resource condition</i>	41
<i>Reversibility of impact</i>	41
<i>Extent of impact</i>	41

<i>Duration of impact</i>	41
<i>Intensity of impact</i>	41
<i>Probability of occurrence</i>	41
<i>Confidence</i>	41
<i>Significance of impact</i>	41
<i>Possible mitigation measures</i>	41
IMPACTS ON EELGRASS (<i>ZOSTERA CAPENSIS</i>)	42
<i>Resource irreplaceability</i>	42
<i>Threshold</i>	42
<i>Resource condition</i>	42
<i>Reversibility of impact</i>	42
<i>Extent of impact</i>	42
<i>Duration of impact</i>	42
<i>Intensity of impact</i>	42
<i>Probability of occurrence</i>	42
<i>Confidence</i>	42
<i>Significance of impact</i>	43
<i>Possible mitigation measures</i>	43
CONCLUSION	44
RECOMMENDATIONS	45
REFERENCES & BIBLIOGRAPHY	46
APPENDICES:	48
APPENDIX 1: PLANT SPECIES RECORDED ON SITE.	48

SPECIALIST DETAILS & DECLARATION

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

The details of Specialists are as follows:

Specialist	Qualification and accreditation
Dr David Hoare (Pr.Sci.Nat.)	• PhD Botany • SACNASP Reg. no. 400221/05 (Ecology, Botany)

Declaration of independence:

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

Disclosure:

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

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



Dr David Hoare

22 May 2024
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 AND AQUATIC 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 152 of farm 216 Uitzigt, in Brenton On Lake, Knysna, in Western Cape Province (Figure 1). This is on the southern banks of the Knysna Estuary at the location where the railway bridge crosses the estuary. It is a low-lying area that projects into the Knysna Estuary, but is a few metres above the high-water level. The entire property is relatively flat. The farm is accessed from Kaptein W.A. Duthie Avenue. Property boundaries are cadastral boundaries. The north-western side is along the servitude of the railway line. The north-eastern boundaries are the high-water mark of the tidal estuary.

The scope of this report is the entire property, part of which is planned to be developed. The entire site is 11.29 ha.

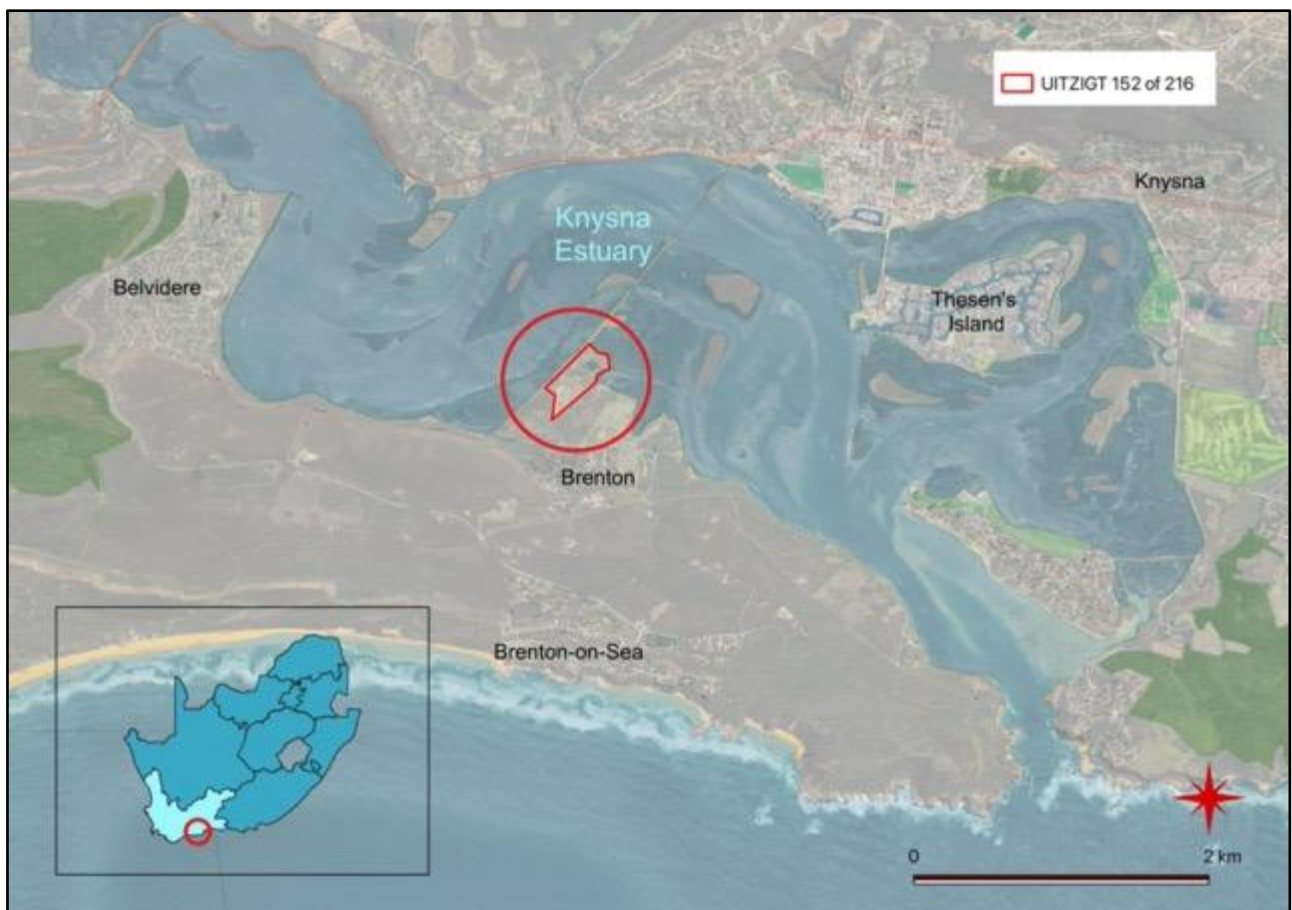


Figure 1: Location of the farm in Brenton near Knysna.

Aerial imagery (Figure 2) shows the boundary of the site. Part of the property includes an excavated pond that is tidal (visible in the northern part of the site in Figure 2). There is existing infrastructure on site, including several buildings, gardens, open lawns and areas that are currently being cleared of aliens. The existing buildings and gardens are in a band through the central part of the site, extending from the railway servitude on the north-western side to the estuarine areas on the south-eastern side. These are characterised by the presence of numerous planted trees, visible as dark green areas in Figure 2. The tidal pond is just north of this area.



Figure 2: Aerial image of the property to be developed.

Identified Theme Sensitivities

A sensitivity screening report from the DEA Online Screening Tool was requested in the following application category:

1. Transformation of land | Indigenous vegetation.

The DEA Screening Tool report for the area, dated 19/05/2024, 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			
Aquatic Biodiversity Theme	X			

Animal Species theme

Areas of sensitivity are shown in Figure 3 and sensitive features are indicated as follows:

Sensitivity	Feature(s)
Medium	Amphibia-Afrixalus knysnae
Medium	Insecta-Aloeides thyra orientis
Medium	Mammalia-Chlorotalpa duthieae
Medium	Sensitive species 8
Medium	Invertebrate-Aneuryphymus montanus

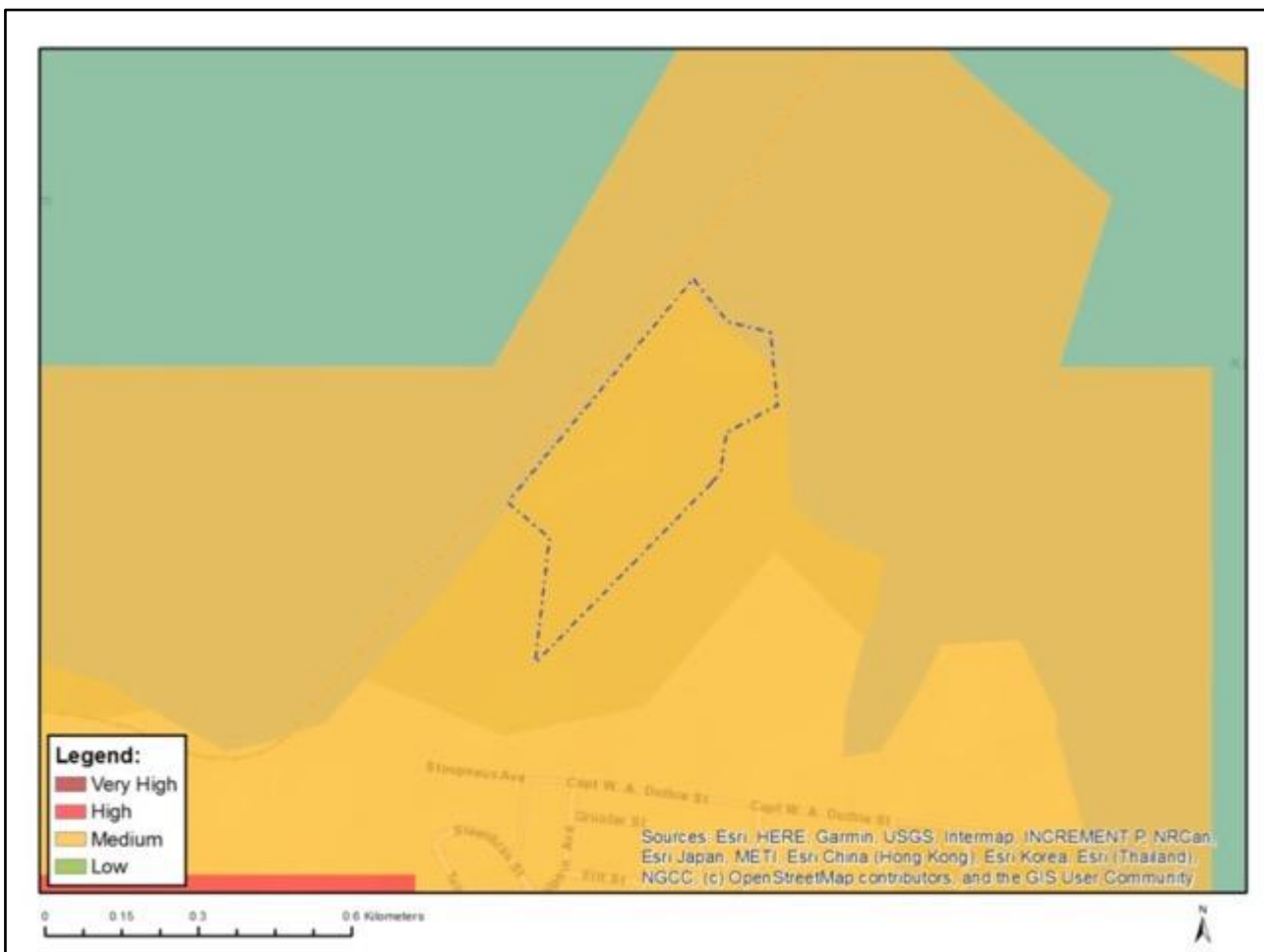


Figure 3: Animal Species theme sensitivity for the site and surrounding areas.

Plant Species theme

Areas of different sensitivity are shown in Figure 4 and sensitive features for the site are indicated as follows:

Sensitivity	Feature(s)
Medium	<i>Erica glandulosa</i> subsp. <i>fourcadei</i>
Medium	Sensitive species 1024
Medium	Sensitive species 1032
Medium	<i>Lampranthus fergusoniae</i>
Medium	<i>Lampranthus pauciflorus</i>
Medium	<i>Ruschia duthiae</i>
Medium	<i>Lebeckia gracilis</i>
Medium	<i>Wahlenbergia polyantha</i>
Medium	<i>Selago burchellii</i>
Medium	<i>Cotula myriophylloides</i>
Medium	<i>Muraltia knysnaensis</i>
Medium	<i>Nanobubon hypogaeum</i>
Medium	Sensitive species 800
Medium	<i>Erica glumiflora</i>
Medium	Sensitive species 500
Medium	Sensitive species 53
Medium	<i>Pterygodium cleistogamum</i>
Medium	<i>Zostera capensis</i>

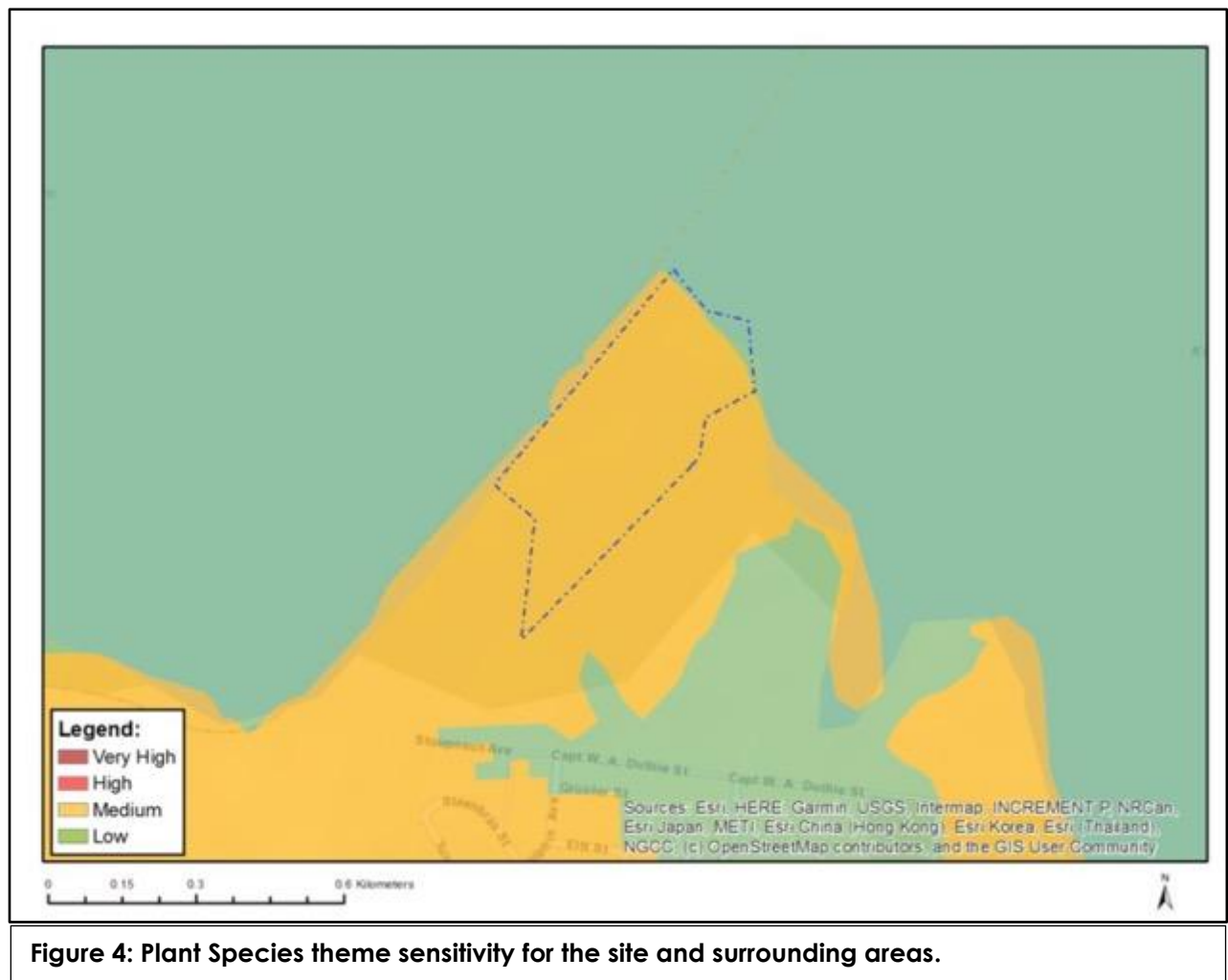


Figure 4: Plant Species theme sensitivity for the site and surrounding areas.

Terrestrial Biodiversity theme

Areas of Very High sensitivity are shown in Figure 5 and sensitive features are indicated as follows:

Sensitivity	Feature(s)
Very High	FEPA Subcatchment
Very High	SWSA (SW) _Outeniqua
Very High	National Protected Area Expansion Strategy (NPAES)
Very High	SANParks (Buffer)_Garden Route National Park
Very High	CR_Knysna Sand Fynbos

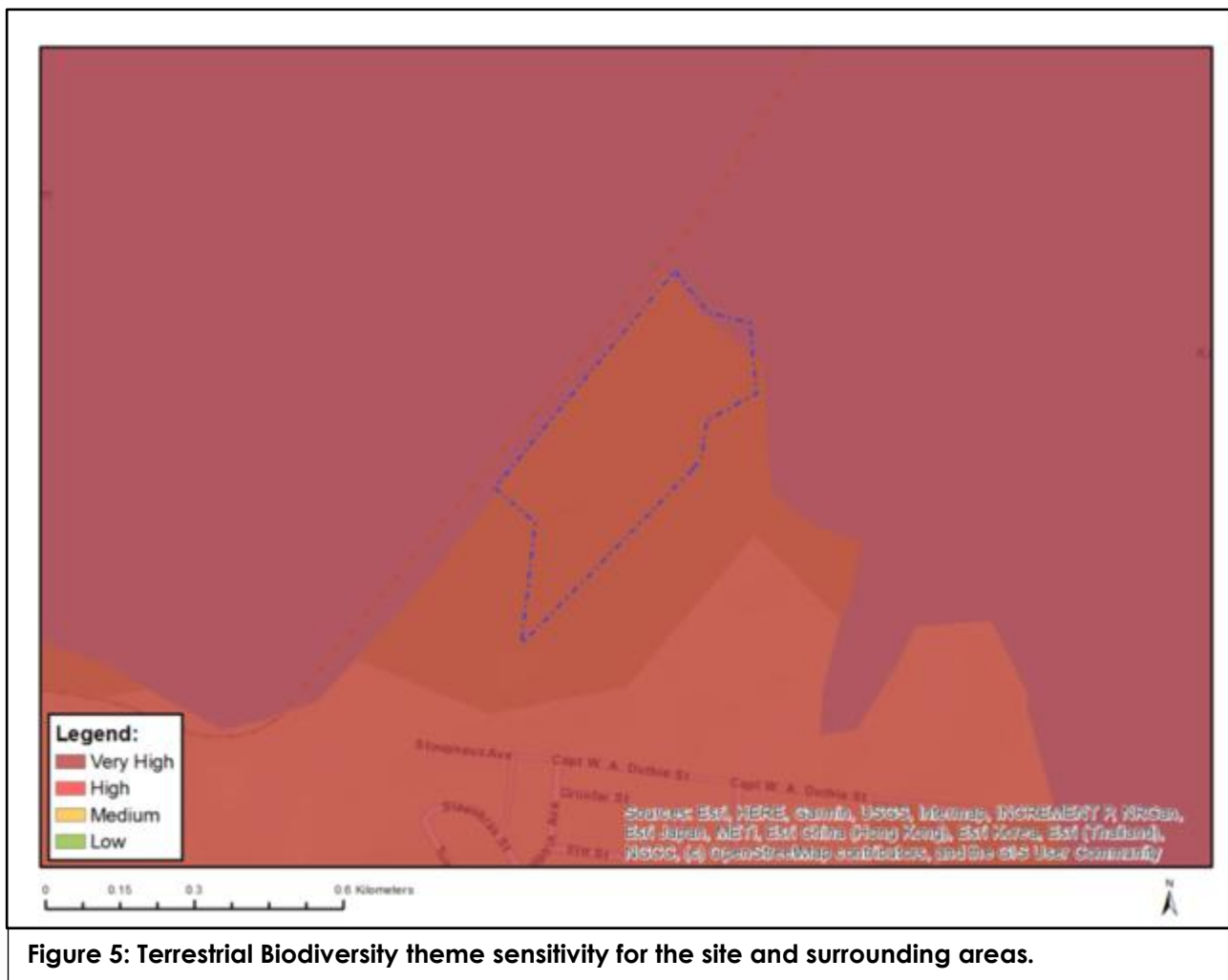


Figure 5: Terrestrial Biodiversity theme sensitivity for the site and surrounding areas.

Aquatic Biodiversity theme

Areas of Very High sensitivity are shown in Figure 6 and sensitive features are indicated as follows:

Sensitivity	Feature(s)
Very High	Estuary_Knysna
Very High	Wetlands_(Estuary)
Very High	SWSA (SW) _Outeniqua
Very High	FEPA Subcatchment

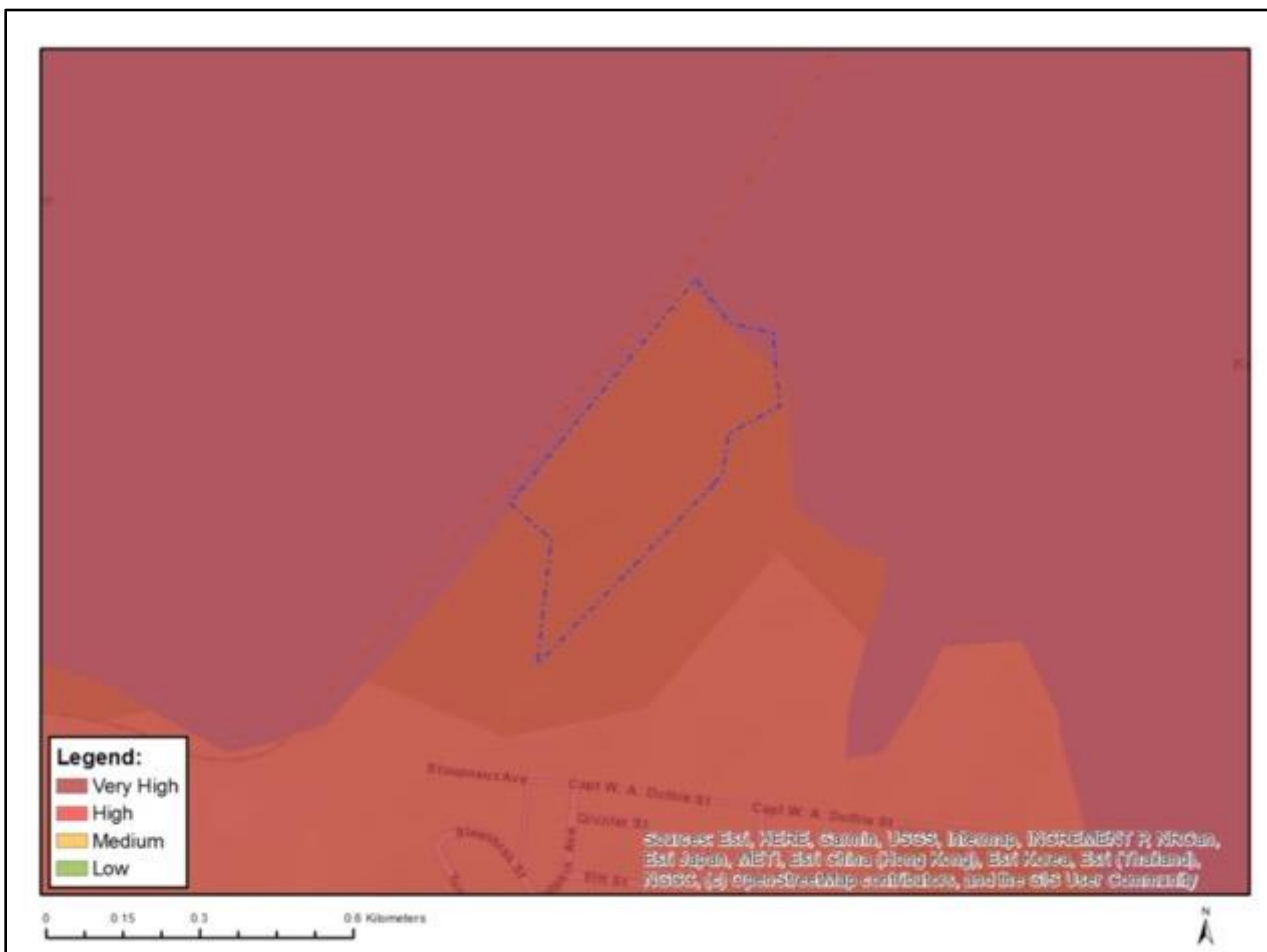
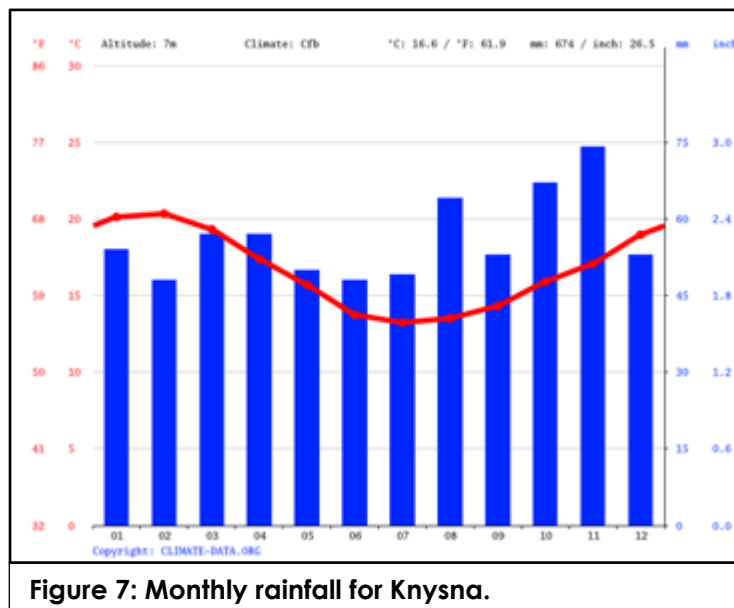


Figure 6: Aquatic Biodiversity theme sensitivity for the site and surrounding areas.

ASSESSMENT METHODOLOGY

Survey timing

The study commenced as a desktop-study followed by site-specific field studies on 26 March and 7 May 2024. The site is within the Fynbos Biome with an all-year rainfall season with a slight dip in early winter. Figure 7 shows that Knysna has peak rainfall from March to April, with another peak in October to November. The timing of the survey in March and May is therefore optimal in terms of assessing the flora and vegetation of the site. It was possible to determine the overall condition of the vegetation with a high degree of confidence.



Field survey approach

During the field survey of the site, select areas were assessed on foot. Field surveys included both meander searches of general areas, and active searching in habitats that were considered to be suitable for specific groups or species. Meander surveys were undertaken with no time restrictions; the objective was to comprehensively examine all natural areas. A hand-held Garmin GPSMap 64s was used to record a track within which observations were made. 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.

Impact assessment methodology

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

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

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

Sources of information

Regional Vegetation

- Broad vegetation types occurring on site were obtained from Mucina and Rutherford (2006), with updates described in Dayaram et al., 2019 and according to the South African National Biodiversity Institute (SANBI) BGIS website (<http://bgis.sanbi.org>), as follows:
 - Mucina, L. and Rutherford, M.C. (editors) 2006. Vegetation map of South Africa, Lesotho and Swaziland: an illustrated guide. Strelitzia 19, South African National Biodiversity Institute, Pretoria.
 - South African National Biodiversity Institute 2018 Final Vegetation Map of South Africa, Lesotho and Swaziland [Vector] 2018. Available from the Biodiversity GIS website, downloaded on 23 September 2021.
- The description of each vegetation type includes a list of plant species that may be expected to occur within the particular vegetation type.

Threatened Ecosystems

- The conservation status of the vegetation types were obtained from Mucina and Rutherford (2006) and the National List of Ecosystems that are Threatened and in need of protection (GN1002 of 2011), published under the National Environmental Management: Biodiversity Act (Act No. 10, 2004). Updates from the National Biodiversity Assessment 2018 were taken into consideration, and have recently been gazetted.

Regional plans

- 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 Hessequa [Vector] 2017, available from the Biodiversity GIS website (biodiversityadvisor.sanbi.org)).
- South Africa Protected Areas Database (SAPAD_OR_2021_Q2) retrieved from the Department of Forestry, Fisheries and the Environment website (https://egis.environment.gov.za/data_egis/data_download/current).

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.

Vegetation and 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/>).

Fauna

- Lists of animal species that have a geographical range that includes the study area were obtained from literature sources (Bates et al., 2014 for reptiles, du Preez & Carruthers 2009 as well as <http://frogmap.adu.org.za> for frogs, Mills & Hes 1997 and Friedmann & 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.

Aquatic biodiversity

- The source of information used to inform management of the land within the zone affected by the Knysna River Estuarine Management Plan is available on the Western Cape Government website:
https://www.westerncape.gov.za/eadp/sites/eadp.westerncape.gov.za/files/atoms/files/Knysna%20EMP_v7_July%202018.pdf
- Relevant national, provincial and municipal datasets (such as the National Freshwater Ecosystem Priority Areas [NFEPA] 2011 database; the Department of Water and Sanitation Research Quality Information Services [DWS RQIS PES/EIS], 2014 database, and the National Biodiversity Assessment (NBA) 2018).
- Additional relevant information was obtained from Claassens, et al. (2020).

Limitations

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

- The assessment is based on two site visits as well as a desktop study of the available information. The time spent on site was adequate for understanding general vegetation patterns across the study area.
- Rare and threatened plant and animal species are, by their nature, usually very difficult to locate and can be easily missed. This is partially overcome by undertaking desktop research of possible species of concern. The Screening Tool output contains modelled distributions of all species that could occur on site, based on current knowledge of all SANBI databases.

RESULTS

Regional vegetation patterns

The property is within one mapped regional terrestrial vegetation type, namely Knysna Sand Fynbos, as well as estuarine habitat (Figure 8). The vegetation type that occurs on site, according to the national map, is briefly described below. This published description provides background information on expected species composition and patterns within each mapped unit, which must be confirmed in the field.

Due to mapping inaccuracies, as well as the gradient nature of many boundaries between vegetation types, there are likely to be floristic and vegetation structural influences from other vegetation types within the site, depending on local ecological conditions. The national vegetation map is not mapped at a fine scale and it is probable that local topography could support other habitat types. In particular, it is expected that Goukamma Dune Thicket could occur along the northern foot-slopes of the Knysna Western Heads, which often extends along the margins of the estuarine habitat (adjacent to the high-water mark). The historical extent of such vegetation is discussed in a section below in this report ("Historical disturbance"). The historical imagery also shows that no fynbos vegetation occurred on site.

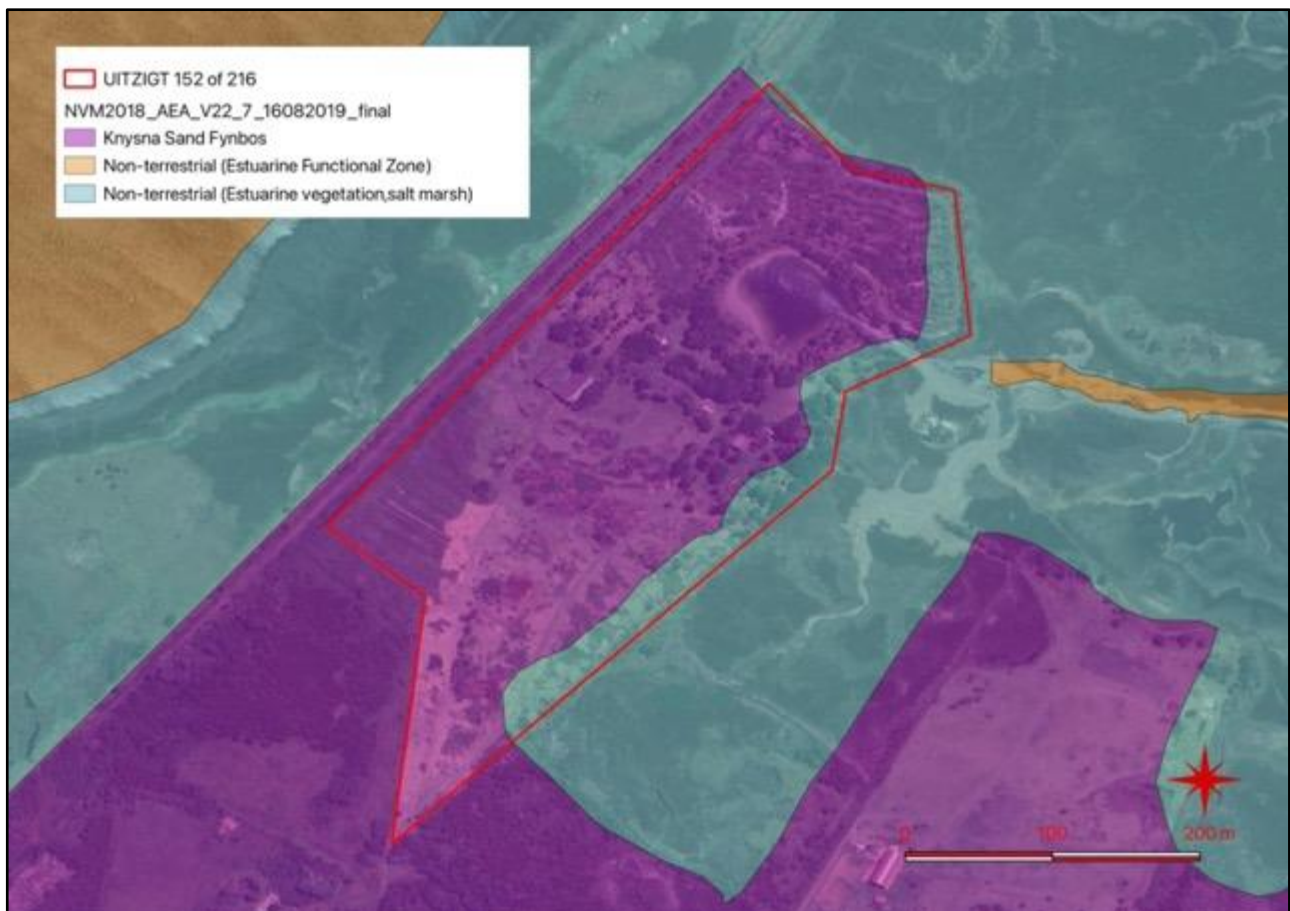


Figure 8: Regional vegetation types of the site and surrounding areas.

Knysna Sand Fynbos

Distribution

Western Cape Province: Garden Route coastal flats from Wilderness, generally to the north of the system of lakes, several patches around the Knysna Lagoon, with more isolated patches eastwards to the Robberg peninsula near Plettenberg Bay. Altitude 40–300 m.

Vegetation & Landscape Features

Undulating hills and moderately undulating plains covered with a dense, moderately tall, microphyllous shrubland, dominated by species more typical of sandstone fynbos.

Geology & Soils

Deep, acid Tertiary sand inland of coastal dunes forming regic sands and soils of Lamotte form. Land types mainly Hb and Ga.

Climate

MAP 670–1 090 mm (mean: 850 mm), with a slight peak in autumn and spring. Mean daily maximum and minimum temperatures 27.3°C and 7.3°C for February and July, respectively. Frost incidence 2 or 3 days per year.

Important Taxa

Small Tree: *Widdringtonia nodiflora*.

Tall Shrubs: *Cliffortia linearifolia*, *Leucadendron eucalyptifolium*, *Metalasia densa*, *Passerina corymbosa*.

Low Shrubs: *Anthospermum aethiopicum*, *Berzelia intermedia*, *Cliffortia drepanoides*, *Clutia rubricaulis*, *Erica diaphana*, *E. glandulosa*, subsp. *fourcadei*, *E. glumiflora*, *E. sessiliflora*, *Helichrysum asperum* var. *asperum*, *Lachnaea diosmoides*, *Leucadendron salignum*, *Leucospermum cuneiforme*, *Lobelia coronopifolia*, *Morella quercifolia*, *Muraltia squarrosa*, *Oedera imbricata*, *Protea cynaroides*, *Stoebe plumosa*, *Tephrosia capensis*.

Herbs: *Geranium incanum*, *Helichrysum felinum*.

Graminoids: *Aristida junciformis* subsp. *galpinii*, *Brachiaria serrata*, *Cynodon dactylon*, *Eragrostis capensis*, *Ficinia bulbosa*, *Heteropogon contortus*, *Ischyrolepis eleocharis*, *Tetraria cuspidata*, *Thamnochortus cinereus*, *Themeda triandra*, *Tristachya leucothrix*.

Aliens: *Acacia melanoxylon*, *A. mearnsii*, *A. longifolia*

Conservation status

Endangered. Patches are statutorily conserved in the proposed Garden Route National Park (about 3%) as well as 2% in several private nature reserves. Almost 70% already transformed (pine and gum plantations, cultivation, Knysna urban sprawl, building of roads).

This vegetation type is found in the Western Cape Province on the southern slopes of the Outeniqua Mountains from the Cloetesberg northeast of Albertinia in the west to the upper reaches of the Keurbooms River where it borders on FFs 20 Tsitsikamma Sandstone Fynbos. It includes sandstone outcrops on the lowlands from the vicinity of the Goukamma River near Knysna in the west and Komkromma Point near Nature's Valley in the east. It occurs from the coast to 1 579 m on Cradock's Berg north of George.

Gentle to steep south-facing slopes, over a 160 km long area, relatively broad with some moderately sloping intra-montane valleys in the west where it is over 10 km wide. The dominant vegetation is a tall, open to medium dense shrubland with medium dense, medium tall shrub understorey—mainly proteoid and restioid fynbos, with extensive ericaceous fynbos on the upper slopes. Some grassy fynbos at lower altitudes, and scrub fynbos in riverine areas. Patches of this unit are not confined to south-facing slopes, but are found on all slopes south of the highest peaks in the range. Thus there are extensive northern slopes in some intra-montane valley systems, the most significant of those found in the Doring River Wilderness Area.

Conservation status of broad vegetation types

The conservation status for each vegetation type is given in the table below. This table 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
	Revised National Ecosystem List (NEM:BA) (2022)
Knysna Sand Fynbos	Critically Endangered

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

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.

Biodiversity Conservation Plans

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

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

The WCBSP map for Knysna shows that the entire site and surrounding areas are within a Protected Area (Figure 9). This indicates that the site is considered to be important for the conservation of biodiversity in the Province.

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



Note that the property is privately owned and that there is no agreement between the landowner and SANParks for the inclusion of their property within the GRNR which is the Protected Area indicated

Historical disturbance

An aerial photograph from 1958 (Figure 10) shows that the site and surrounding areas were in a natural state and part of an extensive salt marsh area. On that date in 1958, the railway line was already in place and can be seen as a thin line through the salt marsh. Also clearly visible are the relatively large thicket areas between the hills and the salt marsh. Based on current remnant patterns, these would have been entirely milkwood-dominated mesic thickets. At that time Brenton did not yet exist, but some of the thicket areas had been cultivated, visible as rectangular cleared patches within the milkwood thicket areas.

A comparison with recent aerial imagery shows that many of the tidal channels and patterns have persisted over time and show similar arrangement in 1958 and in 2023. This means that the system was topographically relatively stable over relatively long periods of time. This is important because it means that patterns from 1958 can be ecologically interpreted as being currently valid.

The small very dark band along the south-western boundary of the site (against the railway line) is an excavated area that appears to have been water-filled on that date. This low area still persists on site today and is dominated by reeds.

The darker area near the centre of the site is probably an area that was slightly raised above the average salt marsh elevation, but not likely to have been significantly elevated. The remainder of the site would have been some variation on the current salt marsh patterns that remain in the areas surrounding the current site. It is clear from this analysis that almost the entire site has been raised by importing significant amounts of material onto the site. This is confirmed by the current existence of soil and other material on site that does not have a marine origin. There are some implications of this:

1. The original vegetation on site was estuarine, not fynbos. The current regional vegetation map showing Knysna Sand Fynbos on site is therefore incorrect. If any areas were historically above the tidal range, they would have contained coastal sand with strandveld similar to that found in other coastal areas of the Garden Route. Examples occur in the Plettenberg Bay area.
2. The habitat that currently occurs on site is entirely man-made.

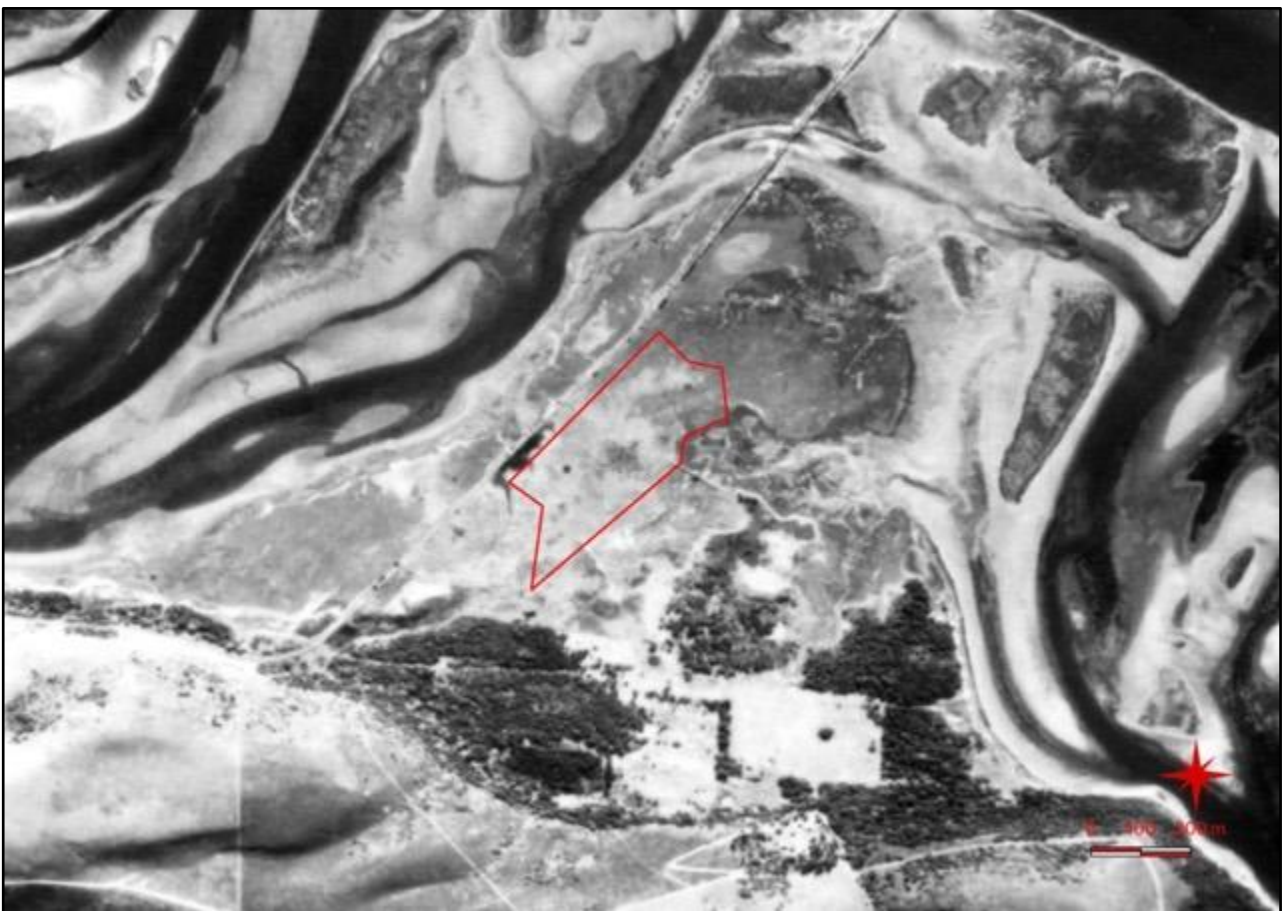


Figure 10: Aerial photograph from 1958.

Plant species recorded in the project area

A total of 48 plant species were recorded on site (see Appendix 1). This list is from areas that are representative of areas affected by the proposed activities. There are also an additional nine species that only occur within the estuarine areas.

Six species on site are alien invasive species, four are naturalised exotic species, and two are horticultural specimens deliberately planted on site. Several other horticultural species occur on site, but these were not recorded as part of this assessment. The high proportion of alien invasive species and weeds indicates historically high levels of disturbance on site.

Of the indigenous species recorded on site, twelve commonly occur as weeds or primary colonisers in disturbed areas - in this case mostly as part of the lawn or garden area, but also in other disturbed areas (indicated as weeds in Appendix 1). This further supports the observation of historically high levels of disturbance on site.

Of the 23 remaining indigenous species, nine are wetland species (blue text in Appendix 1), five are thicket shrub species or other thicket species (orange text in Appendix 1), and two are coastal dune species (*Seriphium dunensis* and *Passerina corymbosa*). The remaining seven species are grasses or herbs that grow in short grassland, such as lawns. **No fynbos species were found on site.**

None of the species found on site are listed plant species of concern (see next section of this report).

None of the species recorded on site are protected under the National Environmental Management: Biodiversity Act No 10 of 2004.

There is one tree species protected under the National Forest Act, 1998 (Act No. 84 of 1998) that was encountered on site, namely *Sideroxylon inerme* (milkwood). There were numerous individuals of this species on site, forming a "hedge" along the estuarine margin of the property. These trees are not naturally occurring as they were physically planted by the previous landowner.

Plant species flagged for the study area

According to the National Web-Based Environmental Screening Tool, 18 plant species of concern are flagged as of concern for the site. A full list of the species with their distribution, habitat and probability of occurrence is provided in the table below.

Taxon	IUCN Status	Distribution	Habitat	Probability of occurrence
<i>Cotula myriophylloides</i>	CR	Cape Peninsula to Plettenberg Bay. Recorded from Piesang's River in salt marsh vegetation.	Submerged in seasonal coastal pools, but also in marshes and on wet sand. Mostly in brackish, but also fresh, still or slowly moving water.	Unlikely, not known from Knysna Estuary, although habitat description includes such habitat.
<i>Erica glandulosa</i> subsp. <i>fourcadei</i>	VU	Mossel Bay to Cape St Francis.	Coastal fynbos. Common in Goukamma Nature Reserve and on coastal cliffs SW of Plettenberg Bay	No suitable habitat – negligible

<i>Erica glumiflora</i>	VU	Wilderness to East London, extending inland to Grahamstown. Recorded from Robberg peninsula.	Sandy coastal flats and dunes in low coastal hills, sandy substrate.	No suitable habitat - negligible
<i>Lampranthus fergusoniae</i>	VU	Pearly Beach to Knysna.	Calcareous soils often associated with limestone dunes.	No suitable habitat - negligible
<i>Lampranthus pauciflorus</i>	EN	Found in the Western Cape from De Hoop Cape Infanta to Keurbooms, Plettenberg Bay	On rocky coastal slopes and clay hills.	No suitable habitat - negligible
<i>Lebeckia gracilis</i>	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.	No suitable habitat - negligible
<i>Muraltia knysnaensis</i>	EN	Coastal lowlands between Mossel Bay and Keurbooms River.	Coastal fynbos on dry flats and hills.	No suitable habitat - negligible
<i>Nanobubon hypogaeum</i>	EN	Mossel Bay to Knysna.	Sandy coastal fynbos.	No suitable habitat - negligible
<i>Pterygodium cleistogamum</i>	VU	Knysna to Grahamstown.	Fynbos, stony slopes in sandstone derived soils, from sea-level to 340 m.	No suitable habitat - negligible
<i>Selago burchellii</i>	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.	No suitable habitat - negligible

<i>Ruschia duthiae</i>	VU	Wilderness to Nature's Valley.	Gentle north-facing sandstone or shale slopes with grassy fynbos. Quite common in the sandy soils of the Lakes District.	No suitable habitat - negligible
<i>Wahlenbergia polyantha</i>	VU	Western Cape, Kleinmond to Knysna.	Coastal sands. Sandy flats.	No suitable habitat - negligible
<i>Zostera capensis</i>	VU globally, EN in South Africa only	It occurs from the Olifants Estuary to Kosi Bay. It also occurs in Kenya, Madagascar, Mozambique and Tanzania.	Intertidal zone of permanently open estuaries in South Africa but can be found in temporarily closed estuaries when conditions are saline.	DEFINITE - recorded in all the intertidal channels adjacent to the site.
<i>Sensitive species 53</i>	VU	Cape Peninsula to Humansdorp.	Sodden marsh environments on peaty soil derived from a combination of blackened organic material and Table Mountain Sandstone derived soils, below 300 m.	No suitable habitat - negligible
<i>Sensitive species 500</i>	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.	No suitable habitat - negligible
<i>Sensitive species 800</i>	VU	Geophyte occurring from Cape Peninsula to Knysna.	Limestone and clay loam soil, fynbos and renosterveld on coastal lowlands.	No suitable habitat - negligible
<i>Sensitive species 1024</i>	EN	Riversdale to Knysna and northern slopes of Langeberg Mountains.	Relatively dry to moist slopes, up to 200 m.	No suitable habitat - negligible
<i>Sensitive species 1032</i>	VU	George to Port Alfred.	On stabilised (fixed) dunes close to the shoreline. 0-150 m.	No suitable habitat - negligible

Impact calculations are based on scale of 1-5, with 0 being absent, 1 being low, and 5 being high, for two factors:

Risk of occurrence on study site of previously uncultivated margins of site

0 = not possible to occur on site

1 = confirmed to not be suitable habitat or distribution for species

2 = very low chance of occurrence due to distribution or habitat

3 = habitat and distribution possibly suitable

4 = not confirmed on site but ideal factors and therefore high possibility

5 = confirmed on site

Impact of loss of population on world population:

0 = no portion of total population affected
1 = negligible to small portion of total population affected (< 1% of global population)
2 = small portion of total population affected (2-5% of global population)
3 = moderate portion of total population affected (5-10% of global population)
4 = large portion of total population affected (10-20% of global population)
5 = Very large portion of total population affected, resulting in increased threat of extinction (> 20% of global population)

Risk of occurrence on previously cultivated areas that have been fallow for > 10 years

0 = No chance of re-establishing, e.g. rare species with specific habitat requirements, or long lived habits e.g. trees
1 = Resprouter shrub, woody underground plants, specific habitats, very unlikely to re-establish on disturbed site in 10 years
2 = Reseeder shrub, bulbs, specific habitat requirements
3 = Perennial herbs, forbs, not wind dispersed
4 = Perennial herbs, forbs, wind-dispersed, without specific habitat requirements
5 = Easily re-establishing species such as wind-dispersed annuals, grasses, not habitat specialists

Study site: mostly previously not in a natural state. Altitude of study site: 0-3 m, aspect mostly flat. Short-lived species that establish easily in disturbed ground would be likely to have occurred in the time between 2002 and 2020.

Total impact score:

0: no impact possible
1-5: Negligible impact
6-10: Low impact
11-15: Moderate impact
16-20: High impact
> 20: Severe impact

Except for one species, there is no suitable habitat present for any species flagged for the study area. The species that is confirmed to occur on site is *Zostera capensis*, found in the tidal channels of the salt marshes adjacent to the site. It is therefore verified that, in terms of terrestrial plant species, the Plant Species Theme has LOW sensitivity for this site on the basis of the following:

1. Suspected habitat for flagged species based either on there being records for this species collected in the past, prior to 2002, or being a natural area included in a habitat suitability model.
2. There are no species that are listed as Threatened on South Africa's National Red List that could have occurred in the study area.

For the aquatic species recorded adjacent to the site, the Plant Species Theme has HIGH sensitivity for this site.

Animal species flagged for the study area

According to the National Web-Based Environmental Screening Tool, eight animal species have been flagged as of concern for the current project. These are described in more detail below, including an assessment of the likelihood of them occurring on site whether disturbed by recent activities or not.

Taxon	IUCN Status	Habitat	Probability of occurrence
Amphibia- <i>Afrixalus knysnae</i>	EN	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. Found in the coastal mosaic of Mountain Fynbos and Afromontane Forest. Examples of habitats in which the species is found, are in glades, clearings and roadside pools at Diepwalle (3323CA), as well as juveniles from "arum blooms on boggy ground near an irrigation dam at Barrington" (3322DD). 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. (Source http://frogmap.adu.org.za/Species_text.php?sp=40)	No suitable habitat – negligible.
Mammalia- <i>Chlorotalpa duthieae</i>	VU	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 Afrotropical 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.	No suitable habitat – negligible.
Insecta- <i>Aloeides thyra orientis</i>	EN	This species is endemic to the southern coastal regions of the Western Cape Province in South Africa, from Witsand to Gouritsmond in the west, to the Breton Peninsula near Knysna in the east. It is found in coastal fynbos on flat sandy ground (either naturally occurring or from anthropogenic disturbances such as footpaths or unsurfaced track) between 40 m to 240 m above sea level. The nominate species larvae feed on <i>Aspalathus acuminata</i> , <i>A. laricifolia</i> and <i>A. cymbiformis</i> (Woodhall 2005), but none of these plant species occur on site or nearby.	No suitable habitat – negligible.
Invertebrate- <i>Aneuryphmus montanus</i>	VU	Associated with fynbos vegetation, although extending geographically towards East London, where it has been collected "amongst partly burnt stands of evergreen Sclerophyll in rocky foothills". It prefers south-facing cool slopes. It is a medium-sized, robust, active geophilous	No suitable habitat – negligible.

		insect which readily flies off when disturbed and is easily distinguished in flight. When observed, occurs in obvious numbers.	
Sensitive species 8	VU	This species is a small antelope 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.	No suitable habitat – negligible.

No animal species of conservation concern are found on the site, and no suitable habitat conditions are present to support the flagged animal species. **It is therefore verified that the Animal Species Theme has LOW sensitivity for the site.**

Aquatic theme

The Knysna estuary has the largest meadows of the *Zostera capensis* in southern Africa, which provides a home to both the endangered Knysna seahorse *Hippocampus capensis* and Critically Endangered false limpet *Siphonaria compressa*. The sensitivity verification for the aquatic theme for Knysna Estuary and Wetlands is therefore confirmed as Very High adjacent to the site. However, the proposed development is low impact and will not encroach on the estuary itself, and therefore **it is verified that the aquatic theme has LOW sensitivity for the site** itself. Recommendations for minimizing the impact on the estuary are provided.

In terms of regional-Scale Aquatic Ecosystems, no other aquatic ecosystems as identified by the NFEPA or NWM5 occur within 500 m (i.e., the regulated zone of a watercourse as defined by the National Water Act (36 of 1998)) of the site.

In terms of local-Scale Aquatic Ecosystems: the field survey confirmed that no **freshwater** aquatic ecosystems occur on the study site or in its immediate vicinity.

OUTCOME OF THE ASSESSMENT

Verification of observations on site

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

5.3.4A verifiable evidence from the specialist's site inspection, including as a minimum:

5.3.4A.1 a map showing the specialist's GPS track in relation to the study area; and

5.3.4A.2 at least 4 spatially representative sample site descriptions from across the study area that include as a minimum:

(a) precise geographical coordinates of the sample site;

(b) at least one in situ photograph (taken on site by the specialist during the site inspection) of the sample site; and

(c) a habitat description of the sample site.

To address these specific requirements, photographs of landscapes on site were taken at various localities to show conditions on site. A map showing the location of these photographs is provided in Figure 11. This also shows the GPS track log of areas walked in the course of undertaking this assessment.



Figure 11: Location of photographs taken on site during the site inspection, as well as the GPS track log of areas traversed during the field assessment of the site.



Photo 1798
34° 03' 10.68" S, 23° 01' 35.22" E

View from near the centre of the site showing the better maintained lawns and gardens on site close to the main buildings. The palm trees and other planted species are a typical feature of this part of the site.



Photo 1803
34° 03' 12.38" S, 23° 01' 34.57" E

View from near the centre of the site showing the state of some of the lawns and gardens on site. The palm trees are a typical feature of the site.



Photo 1810
34° 03' 17.42" S, 23° 01' 27.86 E

View from near the southern end of the site across the lawns towards the centre of the site where the buildings and gardens on site are located.



Photo 1807
34° 03' 17.40" S, 23° 01' 30.75" E

View from near the southern end of the site towards the west over the salt marsh. This part of the natural estuary is moderately disturbed and has become dominated by *Juncus kraussii* (brak rush), typical of disturbed saline wet areas. In the background is Brenton - the hills provide a perspective on the flatness of the site relative to the Western Heads on which Knysna Sand Fynbos occurs.



Photo 1809
34° 03' 17.47" S, 23° 01' 27.90" E

View northwards from near to the southern end of the site. This shows lawns in the foreground and reed beds in the background in a lower area adjacent to the railway tracks.



Photo 1820
34° 03' 07.00" S, 23° 01' 33.33" E

View up the north-western boundary of the site (towards Knysna). The area is mostly open areas with lawn and palm trees.



Photo 1823
34° 03' 04.47" S, 23° 01' 35.48" E

Open areas in the northern part of the site. This consists of a combination of cleared (alien) areas, degraded lawns, palm trees and indigenous thicket shrubs that have self-propagated onto the site.



Photo 1827
34° 03' 05.34" S, 23° 01' 39.79" E

Track along the north-western boundary of the site. On the left of the picture is a hedgerow of mixed thicket, dominated partly by milkwoods (*Sideroxylon inerme*), that separates the site from the salt marsh areas. Some alien invasive clearing activities are visible in the background. Note the milkwoods have all been planted and not naturally occurring.



Photo 1829
34° 03' 08.68" S, 23° 01' 38.66" E

Tidal channel connecting the tidal pond on site to the estuary. The banks are stabilised and eelgrass (*Zostera capensis*) grows in patches on the sandy bed.



Photo 1826
34° 03' 05.19 S, 23° 01' 40.05" E

Uniform area of salt marsh vegetation visible from the north-eastern corner of the site. Note the pathways across the picture, used by fisherman to access the estuary.



Photo 3011
34° 03' 14.21 S, 23° 01' 34.90" E

View towards the saltmarsh from near the south-western side of the site. The foreground shows the berm that rises from the level of the saltmarsh to the property. In the background in the picture is a small artificial island dominated by a combination of *Acacia cyclops* and indigenous thicket species, mostly *Searsia* species.



Photo 3022
34° 03' 10.59" S, 23° 01' 43.27" E

View from within a tidal channel towards the site. This is at low-tide and shows that the channel still has water in it. The green patches in the water are beds of eelgrass (*Zostera capensis*).

Habitats on site

The habitat on site is mostly a degraded area of lawns, gardens, buildings and areas cleared of aliens on a man-made substrate historically imported onto the site. This is within a natural estuarine environment in which most of the surrounding areas are still in a natural state. There is a tidal pond on site that is also man-made, but is ecologically functional and linked to the Knysna Estuary via natural waterways. Parts of the boundary of the site consist of secondary thickets partially dominated by planted milkwoods. These "hedges" are ecologically important as buffer areas between the site and the estuarine environment. The following is a summary list of these habitats:

1. Estuarine salt marsh.
2. Tidal channels (Endangered eelgrass habitat).
3. Artificial tidal pond.
4. Thicket hedges (planted - secondary).
5. Degraded areas (gardens, lawns, buildings, cleared alien areas, other).

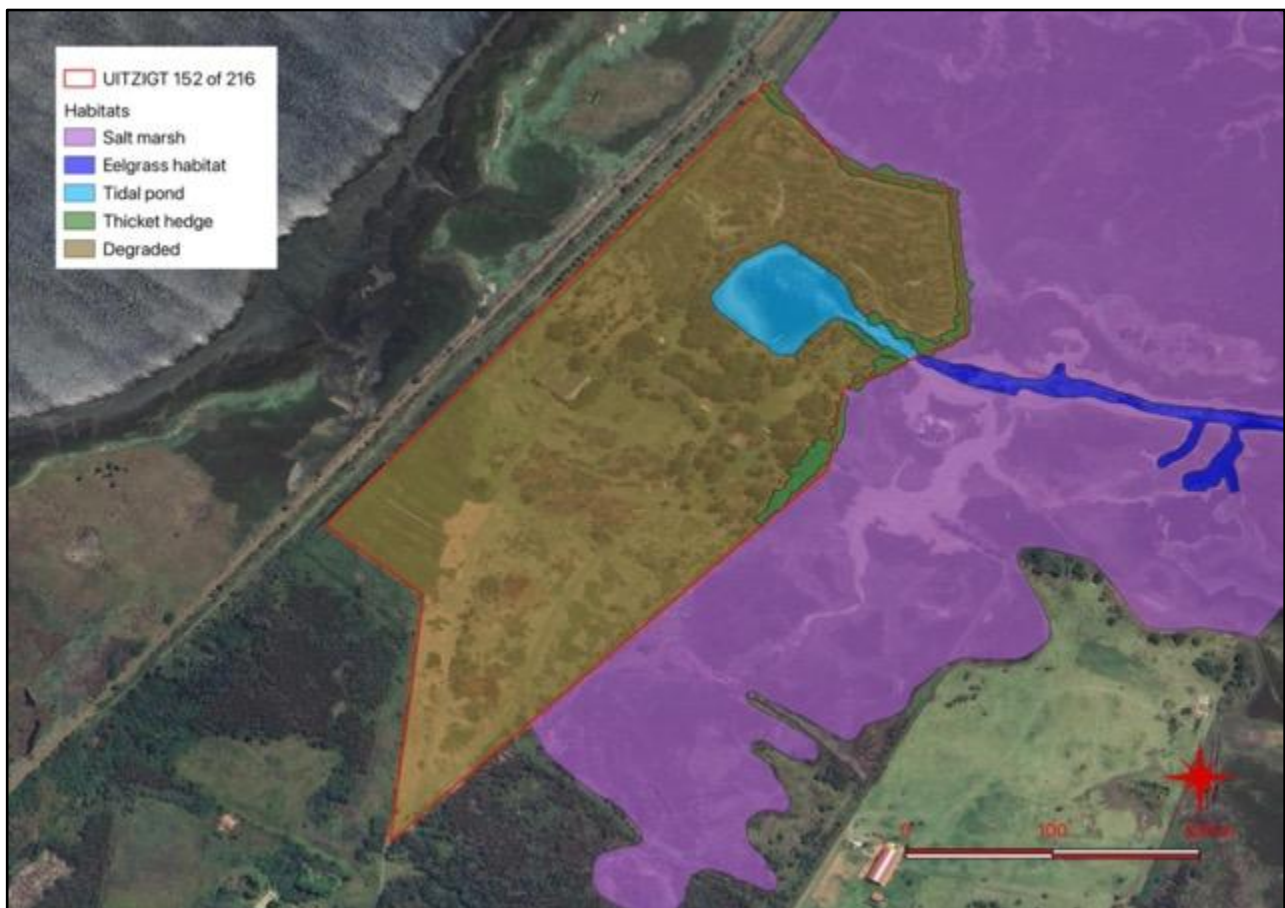


Figure 12: Habitats of the site and surrounding areas.

SITE ECOLOGICAL IMPORTANCE

The Species Environmental Assessment Guidelines require that a Site Ecological Importance (SEI) is calculated for each habitat on site, and provides methodology for making this calculation. The preliminary SEI is assessed here as a combination of the four biodiversity themes (Terrestrial Plant Species theme, Terrestrial Animal Species Theme and Terrestrial Biodiversity Theme and Aquatic Theme).

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

Note that this SEI assessment is preliminary. Also, it should theoretically be calculated for each polygon - the assumption is made here that all areas in a single map class have the same SEI - local factors could affect specific areas.

Site ecological importance of habitats found on site (all four themes combined) is given in the table below.

Habitat	Conservation importance	Functional integrity	Receptor resilience	Site Ecological Importance (BI)
Tidal pond	High Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km ² . IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. <i>Zostera capensis</i> (EN) occurs within the tidal channels.	Medium Although man-made, there is good habitat connectivity with functional ecological corridors. Some minor current negative ecological impacts.	Medium Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality	Medium (BI = Medium)
Thicket hedges	Low No confirmed or highly likely flagged species. No confirmed or highly likely populations of range-restricted species.	Low Good habitat connectivity with potentially functional ecological corridors. Several major current negative ecological impacts.	Medium Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have	Low (BI = Low)

			a moderate likelihood of returning to a site once the disturbance or impact has been removed.	
Cleared, Degraded & transformed, including gardens, roads and houses	Very low No natural habitat remaining.	Very low Several major current negative ecological impacts.	Very high Habitat that can recover rapidly	Very low (BI = Very low)

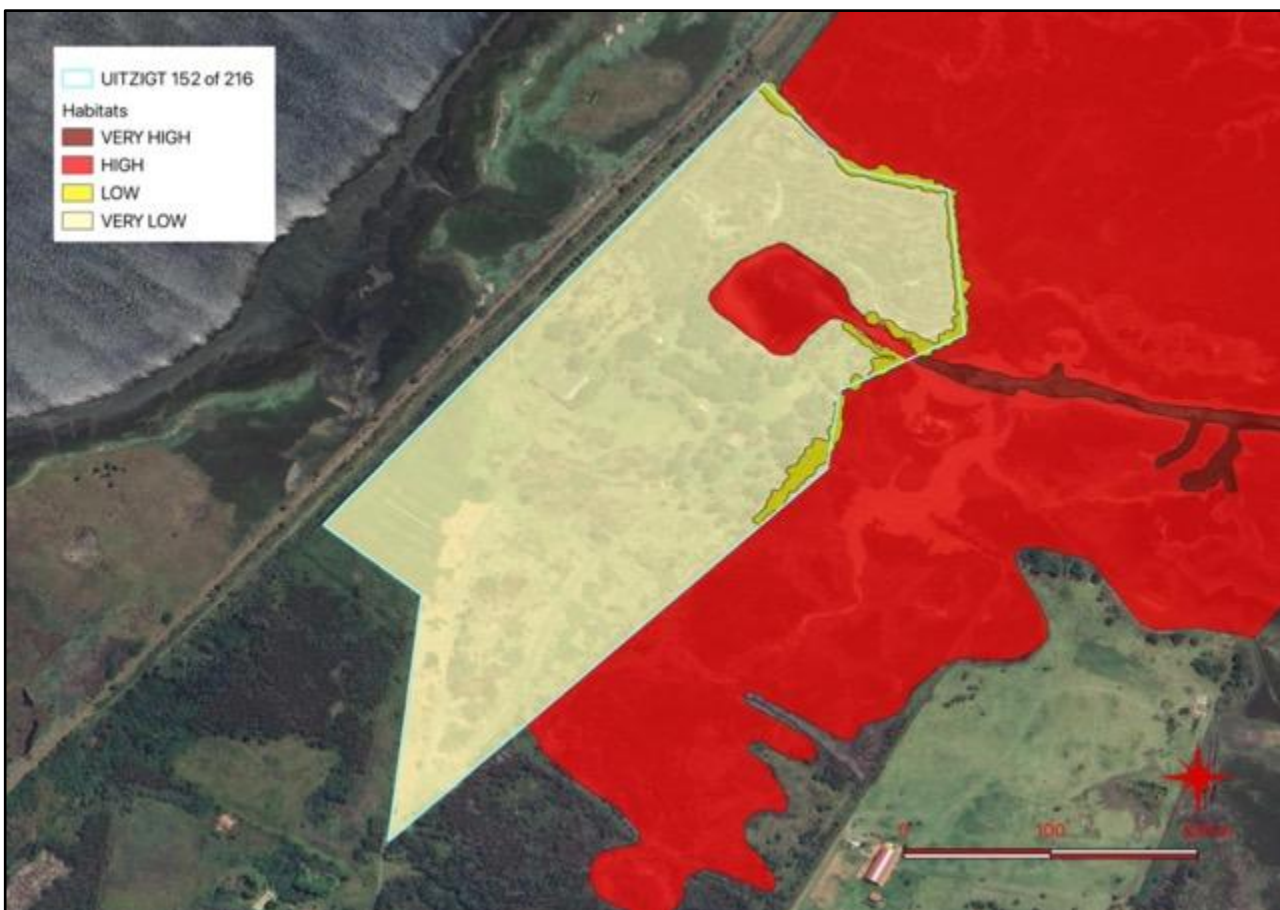


Figure 13: Site Ecological Importance (SEI) of the site and surrounding areas.

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

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.

IMPACT ASSESSMENT

The site is an existing property with formal gardens and lawns. There are areas that were previously degraded by alien vegetation, but these are in the process of being cleared (following an approved alien invasive management plan in terms of NEMBA). There is no fynbos on site, despite the area being mapped as containing Knysna Sand Fynbos. The proposal is to use the existing infrastructure on site for camping and associated activities. This will require maintenance of existing lawns and gardens. No expansion of the site into the salt marsh is proposed or expected.

In terms of the sensitivities flagged for the site, the only confirmed sensitivity under the Plant Species Theme is the existence of eelgrass (*Zostera capensis*) in adjacent salt marsh areas. This species is listed as Endangered in South Africa and Vulnerable internationally, but the salt marsh areas fall outside the property boundaries. No other plant species of concern were found on site, and the habitat on site is not suitable for any other flagged plants of conservation concern.

In terms of the Terrestrial Biodiversity Theme, any sensitivities (from a terrestrial perspective) would be linked to the existence of any remaining areas of flagged ecosystems, in this case, Knysna Sand Fynbos. None was found to occur on site. It has been assessed in a section above in this report that no terrestrial habitat historically occurred on this site and that the regional vegetation map is incorrect in showing Knysna Sand Fynbos as occurring here.

In terms of the legal definition of natural vegetation, any area where the soil has not been legally disturbed in the previous 10 years is considered to be in a natural state. However, none of the substrate on site is natural - it has all been created through infilling with imported material and is essentially a maintained garden area. There is therefore no original soil on site upon which terrestrial vegetation occurs. No impacts on Knysna Sand Fynbos are therefore assessed here.

In terms of both the Terrestrial Biodiversity Theme and the Aquatic Biodiversity Theme, the estuary is an important and sensitive ecosystem which surrounds the property. This is represented by the extensive salt marsh areas adjacent to the site. Any possible impacts on these areas need to be carefully controlled. The possible impact of the proposed activity on these estuarine habitats is therefore also assessed here.

The impacts assessed here are therefore as follows:

1. IMPACTS ON ESTUARINE HABITATS.
2. IMPACTS ON EELGRASS (*ZOSTERA CAPENSIS*).

Impacts on estuarine habitats

Estuarine habitat is all off site and is protected within the Garden Route National Park – no impact may take place on this habitat at all.

Resource irreplaceability

The estuarine habitat is mapped as a protected ecosystem. Score = 5.

Threshold

Any potential impact from the site would be related to edge effects from the property, including trampling, erosion, runoff, spread of alien invasive plants, and similar indirect impacts. It is assumed that no construction impacts will occur within the estuary, which is outside the site. The estuarine environment in the vicinity of the site has already been impacted to some degree, so additional indirect impacts would probably only exacerbate this. Score = 2.

Resource condition

The estuary in the vicinity of the site is in very good condition on the northern side, but moderately impacted on the south-western side, and along the railway line. Score = 4.

Reversibility of impact

The salt marshes in the estuary are sensitive ecosystems that are vulnerable to physical disturbance. Physical impacts can also be long-term to permanent. Impacts are therefore considered to be BARELY REVERSIBLE, and require that ecological conditions are well-managed. Score = 4.

Extent of impact

The impact will occur in areas surrounding the site boundary. It is possible that there will be slight spillover effects into surrounding areas, due to the ecological connectivity between different parts of the estuary. Score = 2.

Duration of impact

Loss of estuarine salt marshes on site and in surrounding areas, if it occurs, is assessed as being long-term to permanent. Score = 5

Intensity of impact

Given the proposed activities on site, it is not expected that any impacts on estuarine areas will occur. However, if any construction-related impacts occur, it could result in some localised impacts on the estuary beyond the site. At worst, it is not expected that this would cause more than a modification of ecological processes. The potential impact is therefore scored as being of MEDIUM intensity, at worst. Score = 2.

Probability of occurrence

The impact is IMPROBABLE, on condition estuarine areas are protected. Score = 1.

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: $(5 + 2 + 4 + 4)/4 = 3.75$

Impact magnitude: $(2 + 5 + 2)/3 = 3.00$

Impact probability: 1.00

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

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

On this basis, the impact is calculated as $(3.75 \times 3.00 \times 1.00 = 7.6)/25 = 0.5 = \text{VERY LOW}$ significance

Possible mitigation measures

Possible mitigation measures that can be applied are as follows:

1. Ensure no impacts on estuarine areas, especially salt marsh areas and tidal channels. This includes any physical impacts, one of which would be trampling of salt marsh vegetation. Indirect impacts from the site need to be managed, including limiting access to salt marsh areas, and controlling alien invasive species on site. No additional earthworks should be permitted that would expand the existing non-tidal parts of the site.

2. Create on-site buffers between activities on site and the estuarine environment. One possibility is to enhance and maintain the thicket hedges on site.
3. Control access by pedestrians and machinery into the estuary to limit possible trampling impacts. This does not mean prohibiting access, only controlling it to minimise impacts.
4. The entry into the surrounding GRNP is controlled in terms of the Estuary Management Plan and must be adhered to at all times. Visitors to this site will not have access to the GRNP other than via a canoe which limits access to the tidal channels.

Impacts on eelgrass (*Zostera capensis*)

Resource irreplaceability

The plant species (*Zostera capensis*) is listed as Endangered in South Africa and Vulnerable internationally. Score = 4.

Threshold

The potential impact affects a small proportion of the population of eelgrass in the Knysna Estuary and is unlikely to affect population structure or processes. Score = 1.

Resource condition

The population of eelgrass adjacent to the site (within proximity to the proposed development footprint) is in good condition. Score = 5.

Reversibility of impact

There are small amounts of eelgrass in the channel of the artificial pond, which indicates that it is capable of colonising new areas, if ecological conditions are suitable. There are also healthy populations in the tidal channels that feed the pond. These tidal channels appear to have been stable for several decades, despite on-site modifications of the landscape. The loss of any populations of eelgrass on site (within the activity footprint) is therefore considered to be PARTLY REVERSIBLE with mitigation, on condition ecological conditions are well-managed. Score = 3.

Extent of impact

The impact will occur within the site boundary and in surrounding areas. It is possible that there will be slight spillover effects into surrounding areas, due to the ecological connectivity between different parts of the estuary. Score = 2.

Duration of impact

Loss of populations of eelgrass on site, if it occurs, is assessed as being long-term. Score = 4

Intensity of impact

Given the proposed activities on site, it is not expected that any impacts on eelgrass will occur. However, if any construction-related impacts occur, it could result in some localised impacts on tidal channels beyond the site, or even within the artificial pool on site. At worst, it is not expected that this would cause more than a modification of ecological and population processes. The potential impact is therefore scored as being of MEDIUM intensity, at worst, but it is more likely that it will be VERY LOW. Score = 1.

Probability of occurrence

The impact is IMPROBABLE, on condition estuarine areas are protected. Score = 1.

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: $(4 + 1 + 5 + 3)/4 = 3.25$

Impact magnitude: $(2 + 4 + 1)/3 = 2.33$

Impact probability: 1.00

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

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

On this basis, the impact is calculated as $(3.25 \times 2.33 \times 1.00 = 7.6)/25 = 0.3 = \text{VERY LOW}$ significance

Possible mitigation measures

Possible mitigation measures that can be applied are as follows:

1. Ensure no impacts on estuarine areas, especially tidal channels. This includes limiting any impacts that would cause erosion or siltation of tidal channels, or effects on water quality, salinity, or average quantity. No on-site floodwater disposal should be directed primarily into the tidal channel.

CONCLUSION

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

1. No natural vegetation occurs on site. The site is an area where material has been imported historically to raise the site above the tidal range. This means that the original vegetation on site (probably salt marsh vegetation) has been historically lost and the substrate no longer has the characteristics for this to return. It is considered highly unlikely that any form of fynbos ever occurred within the boundaries of the property. The historical presence of Knysna Sand Fynbos on site is disputed since ecological conditions for it to occur there never existed.
2. The site falls within a protected area, mapped accordingly in the Western Cape Biodiversity Conservation Plan. – although this is an administrative mapping error, as the property has not been signed into any form of private agreement between the landowner and the SANParks. Private property cannot be part of the GRNP unless a contract has specifically been entered into between the landowner and the SANParks.
3. There are no threatened terrestrial plant species that could possibly occur within the types of habitats that are found on site. However, the estuarine species, *Zostera capensis* (listed as Endangered in South Africa) occurs in tidal channels adjacent to the site and marginally into the artificial pond on site.
4. An impact assessment was undertaken that determined that the impact of the proposed activities on the estuarine environment and on eelgrass, *Zostera capensis*, are likely to be of VERY LOW significance, on condition possible indirect impacts are controlled. Some recommended mitigation measures are suggested to protect surrounding natural estuarine habitats, as well as populations of *Zostera capensis*.

RECOMMENDATIONS

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

1. The salt marsh areas adjacent to the site must be protected. No high-impact activities must be allowed to occur within these areas. They have significance beyond the site and are critically important to the health of the Knysna Estuary as a whole. Any visitors to site must be encouraged to treat these as sensitive areas.
2. The tidal pond should be retained and managed as an ecological resource. It also has recreational value, but this is not inconsistent with management of biodiversity and ecosystem processes in the Knysna Estuary.
3. No modification of the estuarine edges or channels must take place.
4. Quality of water in the estuary must be protected by not allowing sewerage or irrigation run-off into the estuary. Fertilisers must not be used on the property.
5. The planted milkwood hedge along the northern and eastern boundaries of the site should be retained and enhanced. To develop a good thicket microhabitat within this area it will probably be necessary to allow this thicket area to expand into a slightly wider zone. This can be deliberately managed, or else allowed to happen through natural succession of thicket. The objective is to create a self-sustaining canopy with protected (closed) margins. Under the National Forests Act of 1998 (Act No. 84 of 1998) cutting or pruning of milkwoods requires a license, except if less than 25% of the crown is pruned, but not for the topping of such trees, and not for new development or redevelopment.
6. Alien invasive species need to be strictly managed on site. This is currently being successfully achieved and the landowner is encouraged to persist.
7. Any landscaping should make use of site-appropriate indigenous species. For example, a suitable tree species on site is obviously the milkwood, although other species may also be appropriate.

REFERENCES & BIBLIOGRAPHY

- Alexander, G. & Marais, J. 2007. A guide to the reptiles of southern Africa. Struik, Cape Town.
- Bates, M.F., Branch, W.R., Bauer, A.M., Burger, M., Marais, J., Alexander, G.J. & De Villiers, M.S. 2014. Atlas and Red List of the Reptiles of South Africa. Suricata 1, South African National Biodiversity Institute. ISBN 978-1-919976-84-6.
- Branch, W.R. 1988. South African Red Data Book—Reptiles and Amphibians. South African National Scientific Programmes Report No. 151.
- Child M.F., Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert H.T., editors. The 2016 Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.
- Claassens, L, Barnes, RSK, Wasserman, J, Lamberth, SJ, Miranda, AF, van Niekerk, L & Adams, JB. 2020. Knysna Estuary health: ecological status, threats and options for the future. African Journal of Aquatic Science, DOI: 10.2989/16085914.2019.1672518(5)
- Dayaram, A.; Harris, L.R.; Grobler, B.A.; van der Merwe, S.; Rebelo, A.G.; Powrie, L.W.; Vlok, J.H.J.; Desmet, P.G.; Qabaqaba, M.; Hlahane, K.M.; et al. Vegetation map of South Africa, Lesotho and Swaziland 2018: A description of changes since 2006. Bothalia 2019, 49, 1–11.
- Du Preez, L. & Carruthers, V. 2009. A complete guide to the frogs of southern Africa. Random House Struik, Cape Town.
- Fairbanks, D.H.K., Thompson, M.W., Vink, D.E., Newby, T.S., Van Den Berg, H.M & Everard, D.A. 2000. The South African Land-Cover Characteristics Database: a synopsis of the landscape. S.Afr.J.Science 96: 69-82.
- Ferrar, A.A. & Lötter, M.C. 2007. Mpumalanga Biodiversity Conservation Plan Handbook. Mpumalanga Tourism & Parks Agency, Nelspruit
- Fey, M. 2010. With contributions by Jeff Hughes, Jan Lambrechts, Theo Dohse, Anton Milewski and Anthony Mills. Soils of South Africa: their distribution, properties, classification, genesis, use and environmental significance. Cambridge University Press, Cape Town.
- Friedmann, Y. & Daly, B. (eds.) 2004. The Red Data Book of the Mammals of South Africa: A Conservation Assessment: CBSG Southern Africa, Conservation Breeding Specialist Group (SSC/IUCN), Endangered Wildlife Trust, South Africa.
- Germishuizen, G., Meyer, N.L., Steenkamp, Y And Keith, M. (eds.) 2006. A checklist of South African plants. Southern African Botanical Diversity Network Report No. 41, SABONET, Pretoria.
- Groombridge, B. (ed.) 1994. 1994 IUCN Red List of Threatened Animals. IUCN, Gland, Switzerland.
- IUCN 2001. IUCN Red Data List categories and criteria: Version 3.1. IUCN Species Survival Commission: Gland, Switzerland.
- IUCN. 2018. The IUCN Red List of Threatened Species. Version 2018-2. Available at: www.iucnredlist.org. (Accessed: 15 November 2018).
- Marais, J. 2004. A complete guide to the snakes of southern Africa. Struik Publishers, Cape Town.
- Mills, G. & Hes, L. 1997. The complete book of southern African mammals. Struik Publishers, Cape Town.
- Minter, L.R., Burger, M., Harrison, J.A., Braack, H.H., Bishop, P.J. and Kloepfer, D. (eds.) 2004. Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland. SI/MAB Series #9. Smithsonian Institution, Washington, DC.
- Mouton, P. Le Fras, N. 2014. Ouroborus cataphractus (Boie, 1828). In BATES, M.F., BRANCH, W.R., BAUER, A.M., BURGER, M., MARAIS, J., ALEXANDER, G.J. & DE VILLIERS, M.S. 2014. Atlas and Red List of the Reptiles of South Africa. Suricata 1, South African National Biodiversity Institute.
- Mucina, L. And Rutherford, M.C. (editors) 2006. Vegetation map of South Africa, Lesotho and Swaziland: an illustrated guide. Strelitzia 19, South African National Biodiversity Institute, Pretoria.
- Mucina, L., Rutherford, M.C. and Powrie, I.W. (editors) 2005. Vegetation map of South Africa, Lesotho and Swaziland, 1:1 000 000 SCALE SHEET MAPS South African National Biodiversity Institute, Pretoria.
- National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report. Synthesis Report. South African National Biodiversity Institute.

- Passmore, N.I. & Carruthers, V.C. 1995. South African Frogs; a complete guide. Southern Book Publishers and Witwatersrand University Press. Johannesburg.
- Pavón, N.P., Hernández-Trejo, H. and Rico-Gray, V. 2000. Distribution of plant life forms along an altitudinal gradient in the semi-arid valley of Zapotitlán, Mexico. *Journal of Vegetation Science* 11, 39-42.
- Raunkiaer, C. 1934. The life forms of plants and statistical plant geography. Oxford University Press, Oxford.
- Rebelo, A.G., Boucher, C., Helme, N., Mucina, L., Rutherford, M.C., Smit, W.J., Powrie, L.W., Ellis, F., Lambrechts, J.J., Scott, L., Radloff, F.G.T., Johnson, S.D., Richardson, D.M., Ward, R.A., Procheş, S.M., Oliver, E.G.H., Manning, J.C., Jürgens, N., McDonald, D.J., Janssen, J.A.M., Walton, B.A., Le Roux, A., Skowno, A.L., Todd, S.W. & Hoare, D.B. 2006. Fynbos Biome. In: Mucina, L. & Rutherford, M.C. (eds), *The vegetation of South Africa, Lesotho and Swaziland*: 52-219. SANBI, Pretoria.
- Rutherford, M.C. and Westfall, R.H. 1994. Biomes of Southern Africa. An objective characterisation. *Memoirs of the Botanical Survey of South Africa* 63, 1-94.
- Rutherford, M.C., Mucina, L. and Powrie, L.W. 2006. Biomes and Bioregions of Southern Africa. In: L. Mucina and M.C. Rutherford (Eds). *The vegetation of South Africa, Lesotho and Swaziland*. *Strelitzia* 19, pp. 30-51. South African National Biodiversity Institute, Pretoria.
- Skelton, P. 2001. A complete guide to the freshwater fishes of southern Africa. Struik Publishers, Cape Town.
- Skinner, J.D. & Chimimba, C.T. 2005. *The Mammals of the Southern African Sub-region*. Cambridge University Press, ISBN0521844185. 814 pp.
- Skowno AL, Matlala M, Slingsby J, Kirkwood D, Raimondo DC, von Staden L, Holness SD, Lotter M, Pence G, Daniels F, Driver A, Desmet PG, Dayaram A (2019). Terrestrial ecosystem threat status assessment 2018 - comparison with 2011 assessment for provincial agencies. National Biodiversity Assessment 2018 Technical Report. South African National Biodiversity Institute, Pretoria.
- South African National Biodiversity Institute (SANBI). 2020. Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. Version 1.2020.
- Tolley, K. & Burger, M. 2007. *Chameleons of southern Africa*. Struik Publishers, Cape Town.
- Van Wyk, A.E. And Smith, G.F. (Eds) 2001. *Regions of Floristic Endemism in Southern Africa: A review with emphasis on succulents*, pp. 1-199. Umdaus Press, Pretoria.
- Woodhall S.E. (2005). *Field Guide to Butterflies of South Africa.*, Struik, 2005.

APPENDICES:

Appendix 1: Plant species recorded on site.

TERRESTRIAL AREAS:

Acacia melanoxylon (Declared Invader Category 2)
Arundo donax (Declared Invader Category 1b)
Grevillea robusta (Declared Invader Category 3)
Myoporum montanum (Declared Invader Category 3)
Nephrolepis cordifolia (Declared Invader Category 1b)
Phytolacca octandra (Declared Invader Category 1b)

Cenchrus clandestinus* (naturalized exotic)
Cyperus esculentus* (naturalized exotic)
Stenotaphrum secundatum* (naturalized exotic)
Yucca aloifolia* (naturalized exotic)

Ficus rubiginosa* (ex hort)
Lagunaria patersonia* (ex hort)

Agrostis eriantha
Arctotheca prostrata (indigenous weed)
Calamagrostis epigejos
Carpobrotus edulis (indigenous weed)
Chaenostoma cordatum
Conicosia pugioniformis (indigenous weed)
Cynodon dactylon (indigenous weed)
Cyperus textilis
Digitaria eriantha
Ehrharta erecta
Eragrostis curvula (indigenous weed)
Ficinia repens
Gomphocarpus physocarpus (indigenous weed)
Helichrysum foetidum (indigenous weed)
Imperata cylindrica
Juncus kraussii
Lobelia erinus
Melica racemosa
Mentha sp.
Nidorella ivifolia (indigenous weed, usually in wet areas)
Passerina corymbosa
Phragmites australis
Pseudognaphalium luteoalbum (indigenous weed)
Pteridium aquilinum
Scutia myrtina
Searsia glauca
Searsia rehmanniana
Senecio ilicifolius (indigenous weed)
Seriphium dunensis
Sideroxylon inerme (PROTECTED TREE)
Solanum africanum
Spergularia media
Sporobolus africanus (indigenous weed)
Typha capensis

Wahlenbergia procumbens

Withania somnifera (indigenous weed)

ESTUARINE AREAS:

Chenolea diffusa

Halophila ovalis

Limonium scabrum

Plantago carnos

Salicornia perennis

Sporobolus maritimus

Sporobolus virginicus

Triglochin bulbosa

Zostera capensis