TERRESTRIAL BIODIVERSITY ASSESSMENT

PROPOSED DEVELOPMENT OF HOUSING ON ERF 2924, 2925 AND 7594 KNYSNA, KNYSNA MUNICIPALITY, WESTERN CAPE PROVINCE

CAPENSIS

GREG NICOLSON AND ADAM LABUSCHAGNE

MARCH 2024

REPORT PREPARED FOR
ECO ROUTE ENVIRONMENTAL CONSULTANTS

NATIONAL LEGISLATION AND REGULATIONS GOVERNING THIS REPORT

This is a 'specialist report' and is compiled in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended, and the Environmental Impact Assessment Regulations, 2014, as amended.

APPOINTMENT OF SPECIALIST

Capensis Ecological Consulting (Pty) Ltd was appointed by Eco Route Environmental Consultants to provide specialist botanical and terrestrial biodiversity consulting services for a proposed development in Eastford, Knysna, Western Cape.

CONDITIONS RELATING TO THIS REPORT

The content of this report is based on the authors' best scientific and professional knowledge as well as available information. Capensis Ecological Consulting (Pty) Ltd reserves the right to modify the report in any way deemed fit should new, relevant or previously unavailable or undisclosed information become known to the author from on-going research or further work in this field, or pertaining to this investigation.

This report must not be altered or added to without the prior written consent of the authors. This also refers to electronic copies of the report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

DETAILS OF THE SPECIALISTS

Gregory Nicolson MSc (Botany) Pr. Sci. Nat.
Capensis Ecological Consulting
156 Main Road
Muizenberg
7945
Mobile: 072 211 9843
e-mail: greg@capenis.co.za

Expertise

• Qualifications: BSc. Hons. (Environmental Science), MSc (Botany)
• Botanist with 10 years' experience in the field of Botanical Surveys
• Has experience in Botanical exploration in South Africa and Namibia
• Has conducted over 250 botanical assessments for the EIA process.

Adam Labuschagne MSc (Ecology & Evolutionary Biology) Cand. Sci. Nat.
Capensis Ecological Consulting
156 Main Road
Muizenberg
7945
Mobile: 072 830 6500
Email: adam@capensis.co.za

Expertise

• Qualifications B. Sc. (Zoology), MSc (Ecology & Evolutionary Biology).
• Ecologist with experience in faunal and environmental surveying across a variety of terrestrial and freshwater habitats in United Kingdom, Malaysia, and South Africa.

• Experience with remote sensing and spatial ecology.

THE SPECIALIST

We, Gregory Alexander Nicolson and Adam Edward Labuschagne, as the appointed specialists hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that I:

- in terms of the general requirement to be independent:
- other than fair remuneration for work performed/to be performed in terms of this application, have no business, financial, personal or other interest in the activity or application and that there are no circumstances that may compromise my objectivity; or
- in terms of the remainder of the general requirements for a specialist, am fully aware of and meet all of the requirements and that failure to comply with any the requirements may result in disqualification;
- have disclosed/will disclose, to the applicant all material information that have 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;
- have ensured/will ensure that information containing all relevant facts in respect of the application was/will be distributed or was/will be made available to interested and affected parties and the public and that participation by interested and affected parties was/will be facilitated in such a manner that all interested and affected parties were/will be provided with a reasonable opportunity to participate and to provide comments;
- have ensured/will ensure that the comments of all interested and affected parties were/will be considered, recorded and submitted to the Department in respect of the application;
- have ensured/will ensure the inclusion of inputs and recommendations from the specialist reports in respect of the application, where relevant;
- have kept/will keep a register of all interested and affected parties that participate/d in the public participation process; and
- am aware that a false declaration is an offence in terms of regulation 48 of the 2014 NEMA EIA Regulations.
  Note: The terms of reference of the review specialist must be attached.

Signature of the specialists:

Name of company: Capensis Ecological Consulting (Pty) Ltd
Date: 08 April 2024

TABLE OF CONTENTS

1. INTRODUCTION

Capensis Ecological Consulting has been appointed by Eco Route Environmental Consultants to provide specialist botanical and terrestrial biodiversity consulting services for a proposed development on the following erven: ERF 2924, 2925, and 7594. The developments, if approved, would include the following activities:

- ERF 7594 (0.85 ha) would be subdivided into 8 portions, with an access road to ERF 2924 and 2925. Seven of the sub-divisions would be used for housing, with the eighth portion left as open green space.
- ERF 2924 (2.4 ha) would host a single dwelling with footprint of 789 m^2 with an access road and driveway with a footprint of 2329 m^2. The total development footprint including fencing, swimming pool, cut and fill is 10 450 $m^{2.}$
- ERF 2925 (2.4 ha) would host a single dwelling. The exact size of the footprint has not been provided, but it is assumed to be around the same size as Erf 2924.

2. TERMS OF REFERENCE FOR IMPACT ASSESSMENTS

2.1. GENERAL

Terrestrial Biodiversity assessments must follow guidelines set out in the following documents:

- Department of Environmental Affairs and Development Planning (DEA&DP) Guidelines for Involving Biodiversity Specialists in the EIA Process (Brownlie, 2005);
- Ecosystem Guidelines for Environmental Assessment in the Western Cape (Cadman et al., 2016);
- The requirements of CapeNature for providing comments on agricultural, environmental, mine planning and water-use related applications (Turner, 2013); and
- Protocol for the assessment and reporting of environmental impacts on terrestrial biodiversity (Government Gazette 2020).

2.2. SPECIFIC

- Identify and describe biodiversity patterns at community and ecosystem level (main vegetation type, plant communities in the vicinity and threatened/vulnerable ecosystems), at species level (threatened Red List species, presence of alien species) and in terms of significant landscape features;

- Identify ecological drivers and ecological processes, including any likely presence of important faunal species;
- Assess the local and regional importance of the vegetation communities and plant species within the affected areas based on the relevant biodiversity plans, bioregional planning documents and Environmental Management Frameworks.
- Determine the implications that the proposed project has for the relevant fine-scale biodiversity plan (in this case the, 2017 Western Cape Biodiversity Spatial Plan).
- Describe the sensitivity of the site and its environs and map these resources.
- Identify any areas not suitable for construction activities (No-Go Areas) and related buffers that should be observed.
- Describe the direct, indirect and cumulative impacts (both before and after mitigation) and provide an assessment of the significance of the impacts.
- Describe the measures to mitigate any impacts, and an indication of whether or not the measures (if implemented) would change the significance of the impact.
- On the basis of the impact assessment findings provide an authorisation opinion regarding whether or not the proposed activity should proceed.

3. PROTOCOL FOR DETERMINING LEVEL OF REPORTING

Prior to the commencement of the survey, the sensitivity of the site was assessed using the Department of Environmental Affairs (DEA) Screening Tool (https://screening.environment.gov.za/screeningtool/). The results of the screening tool indicate that the site has a “Very High” Terrestrial Biodiversity sensitivity (Figure 1). Should this level of sensitivity be confirmed during the site assessment, a **Terrestrial Biodiversity Impact Assessment** or a **Terrestrial Biodiversity Compliance Statement** is to be submitted as part of the application for Environmental Authorisation (EA). High sensitivity areas have been identified at the site and an Impact assessment is provided. This Terrestrial Biodiversity assessment forms part of this input as required in the Protocol for the assessment and reporting of environmental impacts on terrestrial biodiversity (Government Gazette, 2020a).

The relative plant species theme sensitivity for the site is rated as ‘Medium’. “An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “medium sensitivity” for terrestrial plant species, must submit either a **Plant Species Specialist Assessment Report** or a **Plant Species Compliance Statement**, depending on the outcome of a site inspection undertaken in accordance with paragraph 4” (Government Gazette 2020b).

No plants listed as Species of Conservation Concern (SCC) have been identified at the site or within close proximity to the Study area and therefore a Plant Species Compliance Statement is included in Appendix 3 of this report.

Figure 1. Map of (A) relative terrestrial biodiversity sensitivity theme; (B) relative animal sensitivity theme; and (C) relative plant sensitivity theme sensitivity generated from the DEA Screening Tool (https://screening.environment.gov.za). The Study area is marked by the blue dashed line.

4. METHODOLOGY, LIMITATIONS AND ASSUMPTIONS

The study area was visited on the 20th of March 2024 and surveyed on foot. Sample waypoint positions were obtained using a Garmin GPS map 62. Photographs were taken and georeferenced using an Olympus TG-5 Camera with built-in GPS.

The following sources have been used to inform this study:

- *Site boundaries:* The property boundaries have been downloaded from the Cape Farm Mapper Website (https://gis.elsenburg.com/apps/cfm/).
- *Vegetation Types*: Based on *The Vegetation of South Africa, Lesotho and Swaziland* (VEGMAP)(Mucina & Rutherford, 2006). The South African National Biodiversity

Institute (SANBI) has updated the mapping for the VEGMAP (2018) and these latest shapefiles have been used. The Fine Scale Vegetation Map for the Garden Route (Vlok, Euston-Brown, & Wolf, 2008) has also been referenced.

- *Ecosystem threat status:* Informed by (1) The Revised National List of Ecosystems that are Threatened and in Need of Protection (Government Gazette, 2022)
- *Biodiversity planning*: The Western Cape Biodiversity Spatial Plan (WCBSP) for the Knysna Municipality (CapeNature, 2017) is essential to determine the conservation importance of the affected habitats. Ground-truthing is an essential component in terms of determining the habitat condition.
- *Important Plant species*: The presence or absence of threatened (i.e. species of conservation concern) and ecologically important species informs the ecological condition and sensitivity of the site. The latest conservation status of species is checked on the Red List of South African Plants (Raimondo *et al.* 2009) via the website (www.redlist.sanbi.org). A list of sensitive species generated by the National Web-based Screening Tool (screening.enviornment.gov.za) was used. Certain species cannot be disclosed to the public as per the requirements of the screening tool. Observations from iNaturalist (inaturalist.org) at and in the vicinity of the study area were also noted.
- *Important Animal Species*: A list of sensitive animal species for the site was generated using the National web-based screening tool (screening.enviornment.gov.za). Additional resources to determine the presence of sensitive species include Frog Atlas (http://adu.org.za/frog_atlas.php), Mammal Map (http://mammalmap.adu.org.za/), and Bird Atlas (https://www.birdmap.africa/). Local occurrences of sensitive species on or near the site was checked using iNaturalist.

The site visit was carried out during late summer. The timing of the survey is sub-optimal as many geophytic and annual plant species flower during spring. Some bulbs species were visible, either as their leaves were present or their old flowering parts were still visible. It should be noted however that due to the year-round precipitation experienced in the Garden Route region this limitation is not considered to have had a highly significant effect on sampling efforts.

Limitations regarding the detection of faunal species include excessive road noise near the semi-intact forest habitat along the N2, which made it difficult to hear any audiological cues from sensitive animal species. Additionally, the area had been experiencing a period of drought, causing any semi-permanent or ephemeral aquatic habitats to dry up, thereby reducing available habitat for any amphibian species.

5. STUDY AREA

5.1. LOCALITY

The study area is located in Eastford, a suburb on the western side of Knysna (Figure 2). The N2 National Highway runs along the western edge of the erven, with the Knysna Estuary located to the west of the study area. The area is characterized by low density suburban houses and estates, with large green belt buffers between developments (Figure 3).

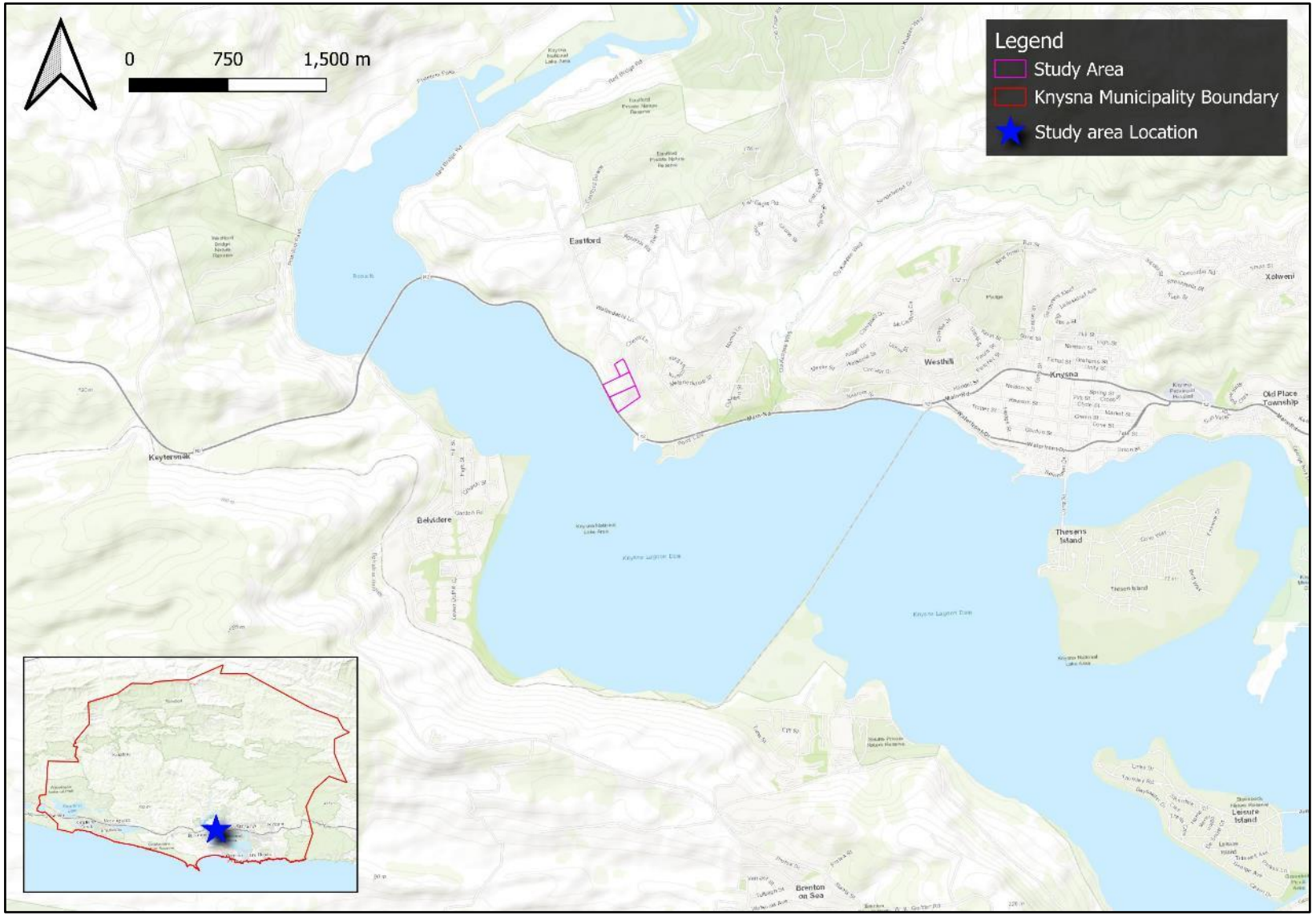

Figure 2. The location of the study area within the context of the Knysna Municipality and closest towns, overlaid on an Open Topo World ™ Map.

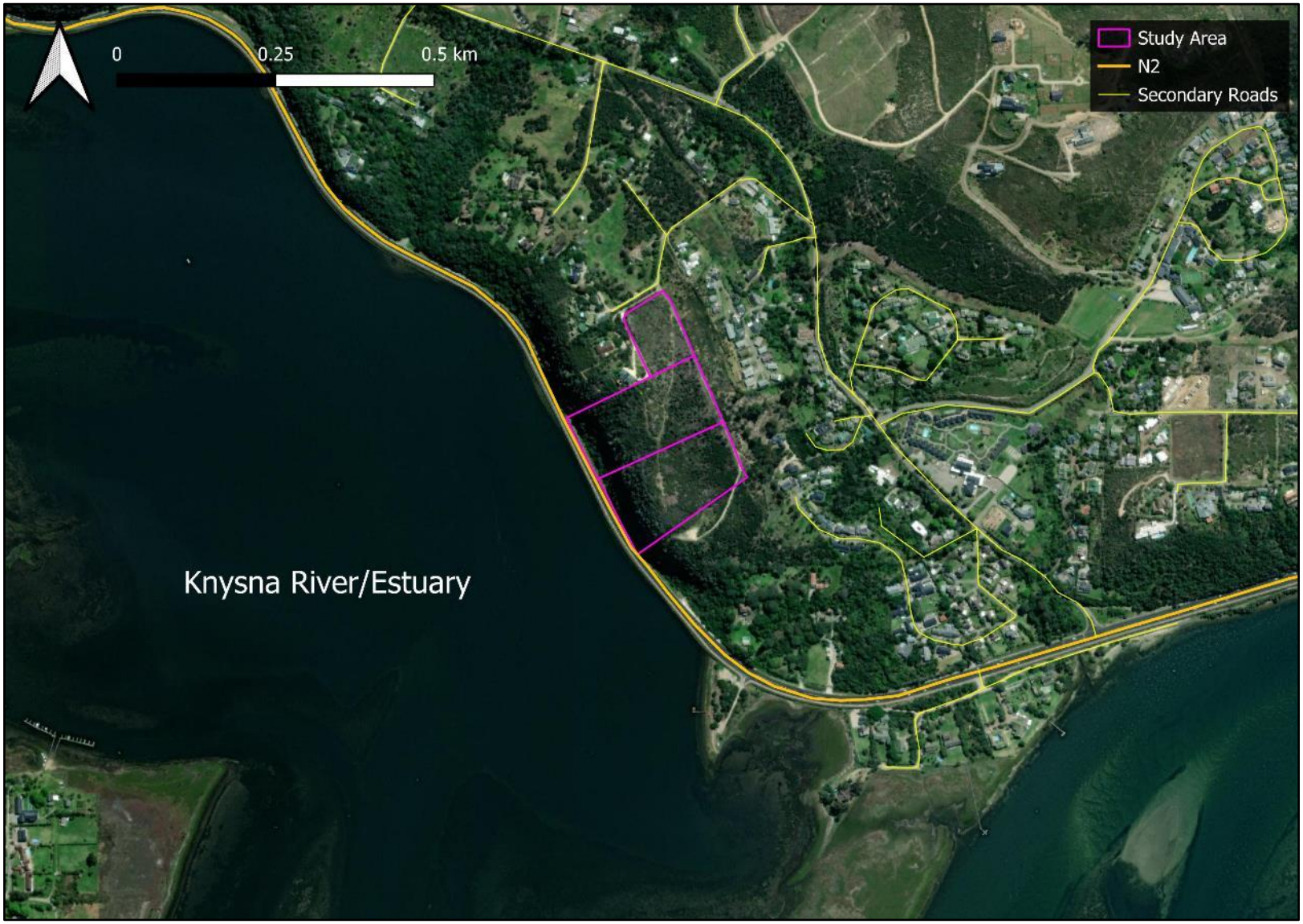

Figure 3. The location of the study area in relation to the closest roads, rivers and towns, overlaid on a ESRI ™ aerial image.

Figure 4. An ESRI ™ satellite image of the study area, including the proposed development footprint. Note that the development footprint is an approximation of the proposed development and does not depict the exact size and location of the proposed development. The access roads, cut and fill areas are not shown in this image.

5.2. LANDSCAPE AND GEOLOGY

The study area is characterized by moderate-sized hills situated next to the Knysna Estuary. The underlying geology is comprised of cretaceous era sediments, namely the Kirkwood Formation, derived from the erosion of the Outeniqua Mountains (Figure 5). The cliffs on the western border of the erven show the alternating layers of Enon conglomerate, and Enon Sandstone and Siltstone that underlay the study area (Figure 6). The substrate at the site is reddish and sandy, derived from the aforementioned Enon conglomerates and sandstone.

Figure 5. Geological Map (Council of Geoscience, Geology classification (1:1M)) of the study area overlaid on an ESRI ™ aerial image.

Figure 6. The cliffs located on the western boundary of the study area showing the alternating conglomerate and sandstones of the Enon formation.

6. OVERVIEW OF VEGETATION AND CONSERVATION PLANS

6.1. NATIONAL VEGETATION TYPE

The National Vegetation Map of South Africa, Lesotho and Swaziland (SANBI, 2018) (VEGMAP) classifies the expected vegetation type in the study area as Garden Route Shale Fynbos (Figure 7). Garden Route Shale Fynbos is described as follows:

> "*Undulating hills and moderately undulating plains on the coastal forelands. Structurally this is a 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 fires – most of the shales are covered in 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)"*

Figure 7. VEGMAP: The study area in relation to the VEGMAP (SANBI, 2018) overlaid on a ESRI ™ aerial image.

6.2 NATIONAL ECOSYSTEM THREAT STATUS

Ecosystem threat status is informed by *The Revised National List of Ecosystems that are Threatened and Need of Protection* (RNLETNP)(Government Gazette, 2022). Species information is not provided in the RNLETNP and is thus taken from The National List of Ecosystems that are Threatened and in Need of Protection (Government Gazette, 2011).

Table 1 provides a summary of (a) the ecosystem status and reasons, (b) the remaining percentage of the ecosystem and the original (national) extent, (c) the proportion of ecosystem target protected, and (d) the national conservation target from the two most relevant information sources.

Table 1. Ecosystem threat status derived from available information sources

	The Revised National List of Ecosystems that are Threatened and in Need of Protection
Garden Route Shale Fynbos	
Ecosystem threat status	ENDANGERED
Reason	B (Rate of loss of natural habitat)
Remaining % of ecosystem	44% of 56474 (ha)
Conservation target	23%
Protected area	5.7 %
Species of Concern	Data deficient
NOTES	More than half this vegetation type's original area has been transformed for cultivation and pine plantation with much of the remaining veld converted to pasture. Remnants are found in areas of steep inclines unsuitable for agriculture.
National Biodiversity Assessment (SANBI, 2018) Ecosystem Threats	Agriculture has been a pressure to this ecosystem, especially pastures, with 13 193 ha (24 %) (2014) of the ecosystem type consisting of croplands and a further 5381 ha (10 %) (2014) of old fields (Rebelo et al. 2006; HBMOD 2018). Furthermore, plantations are also a pressure, covering 6643 ha (12 %) (2014), although the land cover of plantations has decreased by 1752 ha (3 %) (1990-2014) (HBMOD 2018). This ecosystem is further degraded by erosion, overgrazing and invasions by *Hakea sericea* and various species of Acacia (Rebelo et al. 2006).

Ecological drivers

The key ecological drivers in **lowland fynbos** ecosystems according to Cadman et al. (2016) include (1) the natural fire frequency, (2) diversity of habitat and environmental gradients, (3) regional and local natural water drainage patterns and (4) natural grazing and physical soil disturbance.

6.3 GARDEN ROUTE INITIATIVE VEGETATION MAP (2008)

The vegetation within the study area was mapped at a fine scale by Vlok, Euston-Brown, & Wolf (2008) in the C.A.P.E. Fine-scale Mapping Project. According to this map one vegetation unit is found within the study area, namely Groenvlei Coastal Forest (Figure 8). However, the adjacent unit, Knysna Enon Fynbos was found at the site and this unit is also included here.

> ***Groenvlei Coastal Forest:*** *"restricted to deep sandy soils in the lowlands. It is best developed next to extensive water bodies, where fires originate and burn upslope. The tall closed canopy is similar to those of the Afromontane Plateau Forest, with tall Afrocarpus falcatus often emerging above the canopy. It does, however, differ in its floristic component and in having deciduous trees such as Celtis africana often locally abundant. It is most easily recognized as it has trees with a subtropical affiliation such as Calodendrum africana, Ekebergia capensis, Strychnos decussata and even sometimes Olea europaea spp. africana present. No rare plant species are known from this unit, but it is the habitat of the rare Knysna Woodpecker (Campethera notata)."* (Vlok, Euston-Brown, Wolf, 2008).
>
> ***Knysna Enon Fynbos:*** *"The base geology of this habitat, Enon conglomerate, often erodes in such a way that the hills have steep slopes with many small ravines, which afford protection against fires. Patches of Dune Thicket usually occur in these ravines, often along with a few odd individuals of coastal forest tree species such as Calodendrum capense and Celtis africana. Fynbos occurs on moist south-facing slopes, often with an overstorey of proteoid shrubs such as Leucadendron eucalyptifolium and Protea neriifolia and an abundance of ericoid shrubs (such as Agathosma ovata, Erica versicolor, Phylica axillaris, etc.). The north-facing slopes consists mostly of Grassy Fynbos, in which grasses such as Brachiaria serrata, Cynodon dactylon, Digitaria eriantha, Eragrostis capensis, Eragrostis curvula, Eragrostis obtusa, Eustachys paspaloides, Harpochloa falx, Heteropogon contortus, Pentaschistis pallida, Themeda triandra and Tribolium uniolae are usually abundant, with only a few overstorey proteoid shrubs such as Leucadendron salignum present. Many succulents, Such as Aloe arborescens, Bulbine alooides and several Crassula species, are present on bare rocky outcrops. The broken topography thus result three different vegetation units, Thicket, Proteoid Fynbos and Grassy Fynbos to occur in close proximity. Although each of them consists of quite distinct plant communities, we were not able to map them separately at a scale of 1:50 000. Threatened species present include Acmadenia alternifolia, Satyrium muticum and Satyrium princeps. We strongly suspect that two long-lost and probably highly threatened orchid species, Disa newdigateae and Disa forcipata, occur (or occurred) in this unit.*

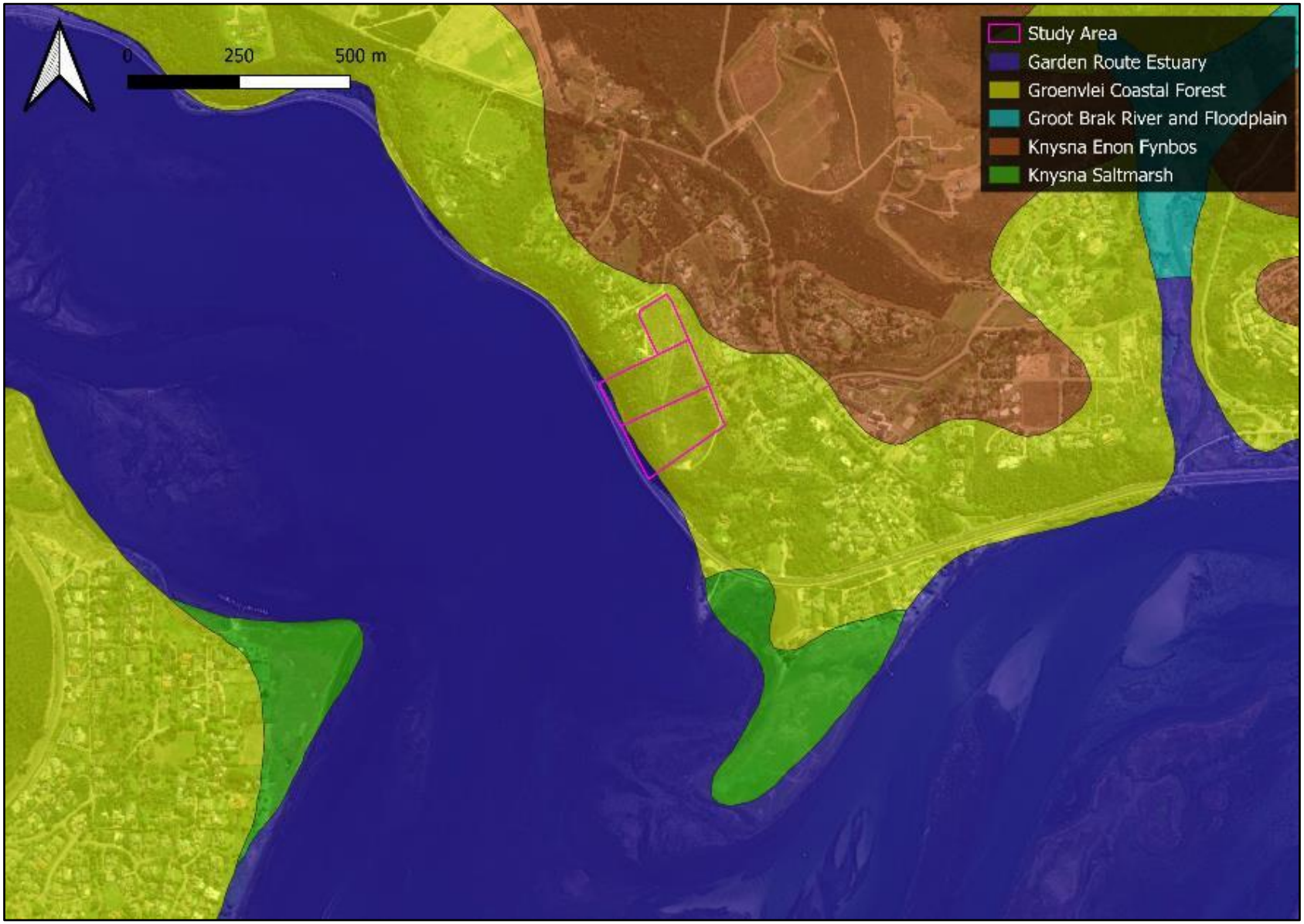

Figure 8. FSP VEGMAP: The study area in relation to the C.A.P.E FSP Vegetation Map for the Garden Route (Vlok, Euston-Brown, & Wolf 2008) overlaid on an ESRI ™ aerial image

6.4 BIODIVERSITY PLANS

The 2017 WCBSP Handbook (Pool-Stanvliet *et al*., 2017) distinguishes between the various conservation planning categories. Critical Biodiversity Areas are habitats with high biodiversity and ecological value. Such areas include those that are likely to be in a natural condition (CBA 1) and those that are potentially degraded or represent secondary vegetation (CBA 2). Ecological Support Areas are not essential for meeting biodiversity targets. However, they play an important role in supporting the functioning of Protected Areas (PA) or CBAs and are often vital for delivering ecosystem services. A distinction is made between ESAs that are still likely to be functional (i.e. in a natural, near-natural or moderately degraded condition; (ESA 1) and Ecological Support Areas that are severely degraded, or have no natural cover remaining, and therefore require restoration (ESA 2). Other Natural Area (ONA) sites are not currently identified as a priority, but retain most of their natural character and perform a range of biodiversity and ecological infrastructure functions. Although not prioritised, they are still an important part of the natural ecosystem. Ground-truthing of the assigned CBA and ESA sites are described in the vegetation and discussion section below. The majority of the study area is classified as CBA 1 (Figure 9), with the western boundary of the study area located in a protected area; The Garden Route National Park.

Figure 9. CONSERVATION PLANNING MAP: The study area in relation to the Western Cape Biodiversity Spatial Plan (CapeNature 2017) overlaid on a ESRI ™ aerial image.

Table 2. The CBA categories from the WCBSP (CapeNature 2017) with the associated subcategory, definition and management objectives that are found on the site

Map category	Subcategory & Features	Definition	Management objective	Reasons
CBA 1	CBA: Terrestrial & Forest	Areas that are required to meet biodiversity targets for species, ecosystems or ecological processes and infrastructure. These include: • All areas required to meet biodiversity pattern (e.g. species, ecosystems) targets; • Critically Endangered (CR) ecosystems (terrestrial, wetland and river types); • All areas required to meet ecological infrastructure targets, which are aimed at ensuring the continued existence and functioning of ecosystems and delivery of essential ecosystem services; and • Critical corridors to maintain landscape connectivity.	Maintain in a natural or near natural state, with no further loss of natural habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.	Eastern Fynbos Renosterveld Shale Fynbos Depression Wetland; Eastern Fynbos Renosterveld Shale Fynbos Flat Wetland; Eastern Fynbos Renosterveld Shale Fynbos Floodplain Wetland; Garden Route Shale Fynbos (EN); Knysna (Core) Estuary; Water source protection- Knysna; Watercourse protection- South Eastern Coastal Belt
PA	Protected Area: Garden Route National Park	Areas that are formally protected by law and recognised in terms of the NEMPAA. This includes gazetted private Nature Reserves and Protected Environments concluded via a stewardship programme.	Must be kept in a natural state, with a management plan focused on maintaining or improving the state of biodiversity. A benchmark for biodiversity.	

6.5 STRATEGIC WATER SOURCE AREAS (SWSAS)

Surface Water

Strategic Water Source Areas (SWSAs) surface water refer to the 10% of South Africa's land area that provides a disproportionate 50% of the country's water runoff. Understanding where these SWSAs are is crucial to planning and management of water resources, including the ecosystems that support water quality and quantity. The 2021 spatial layer for SWSAs for surface water is a fine-scale delineation of the SWSAs, intended to support the integration of SWSAs in a range of catchment- and local-level planning, management, and regulatory processes. In the case of the study area, it is included within the Outeniqua SWSA (Figure 10).

Figure 10. The study area overlaid onto a ESRI hybrid satellite image showing the SWSAs Surface water layer (image produced in Cape Farm Mapper https://gis.elsenburg.com/apps/cfm/).

Ground Water

This GIS layer shows the outlines of the Strategic Water Source Areas for groundwater (SWSA-gw) that have been delineated as part of a Water Research Commission (WRC) project (K5/2431). Groundwater Strategic Water Source Areas (SWSAs) are areas which combine areas with high groundwater availability as well as where this groundwater forms

a nationally important resource. The sub-national Water Source Areas (WSAs) are not nationally strategic as defined in the report but were included to provide a complete coverage.

In the case of the study area, it is excluded from this layer.

Wetlands (NFEPA)

This layer shows Wetland Freshwater Priority Areas (FEPAs), wetland ecosystem types and wetland condition on a national scale. The delineations were based largely on satellite imagery and do not include historic wetlands lost through drainage, ploughing and concreting. Irreversible loss of wetlands is expected to be high in some areas, such as urban centres. In addition, there are many gaps in wetlands as remote sensing does not detect all wetlands. In the case of the study area, the Knysna estuary adjacent to the site has been included in this layer (Figure 11).

Figure 11. The study area overlaid onto a ESRI hybrid satellite image showing the NFEPA Wetland layer (image produced in Cape Farm Mapper https://gis.elsenburg.com/apps/cfm/)

Rivers (FEPA Subcatchments)

FEPAs were identified based on

- 20% biodiversity target for river, wetland and estuarine ecosystem types across the country
- 20% biodiversity target for significant wetland clusters embedded in natural landscapes, within each wetland vegetation group

- Population targets for threatened freshwater fish species indigenous to South Africa
- alignment with all remaining free-flowing rivers
- alignment with priority estuaries identified in the National Biodiversity Assessment 2010
- alignment with existing protected areas and focus areas for protected area expansion

For rivers and fish, whole sub-catchments were identified as FEPAs. For rivers, FEPAs were identified in rivers that are in a good condition (A or B). Where it was not possible to meet biodiversity targets for river ecosystems in such rivers, Phase 2 FEPAs were identified in moderately modified (C) rivers. D rivers were not considered as they usually cannot be rehabilitated back to an AB state. Different categories are shown on the FEPA maps, each with different management implications.

“River FEPA and associated sub-quaternary catchment: River FEPAs achieve biodiversity targets for river ecosystems and threatened fish species, and were identified in rivers that are currently in a good condition (A or B ecological category). Their FEPA status indicates that they should remain in a good condition in order to contribute to national biodiversity goals and support sustainable use of water resources. For river FEPAs the whole sub-quaternary catchment is shown in dark green, although FEPA status applies to the actual river reach within such a sub-quaternary catchment. The shading of the whole sub-quaternary catchment indicates that the surrounding land and smaller stream network need to be managed in a way that maintains the good condition (A or B ecological category) of the river reach. It is important to note that river FEPAs currently in an A or B ecological category may still require some rehabilitation effort, e.g. clearing of invasive alien plants and/or rehabilitation of river banks. From a biodiversity point of view, rehabilitation programmes should therefore focus on securing the ecological structure and functioning of FEPAs before embarking on rehabilitation programmes in Phase 2 FEPAs (or other areas)” (Nel et al. 2011).

In the case of the study area, the Knysna River flows into the adjacent Knysna estuary, and this catchment is mapped as a FEPA subcatchement (Figure 12).

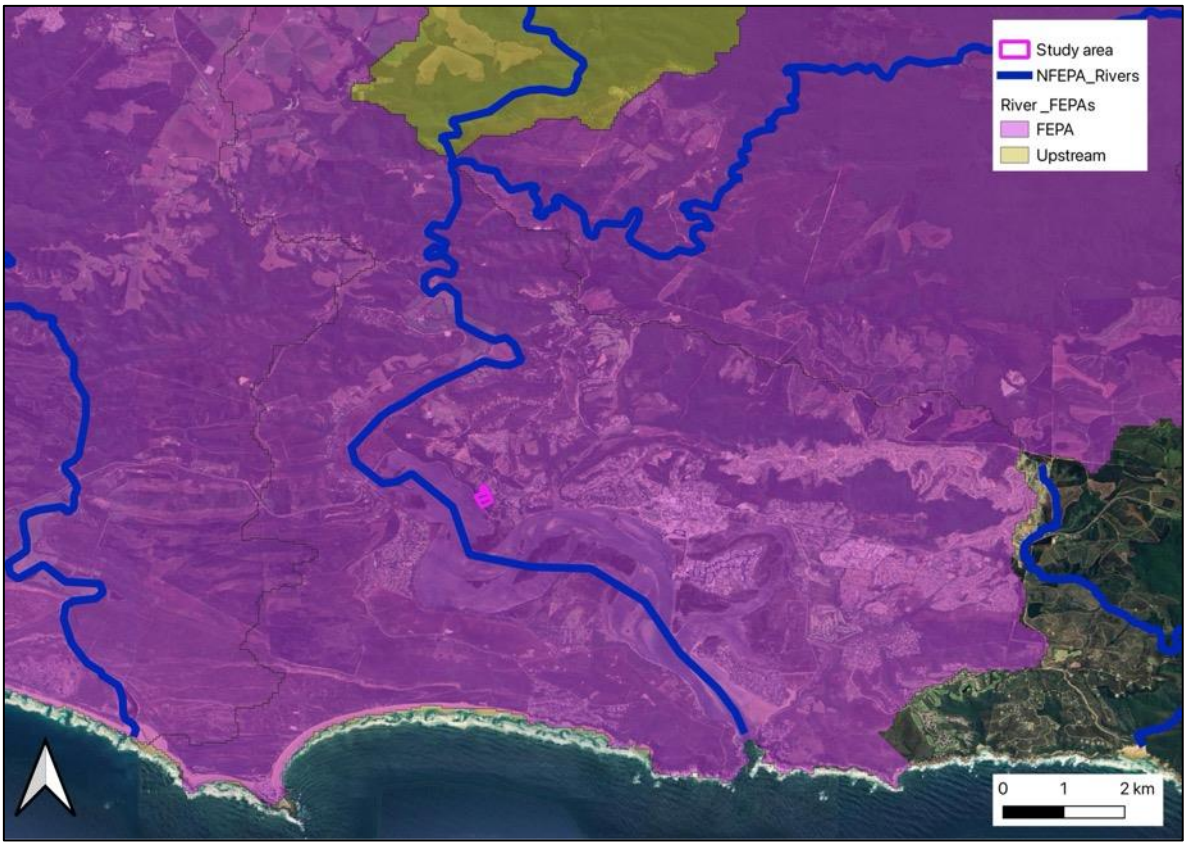

Figure 12. The study area overlaid onto a Google Earth ™ satellite image showing the NFEPA Rivers and sub catchment layer.

6.6. PROTECTED AREA EXPANSION

The National Protected Area Expansion Strategy for South Africa 2018 (DEA, 2018) is a detailed document that outlines the need for protected area expansion in South Africa, the priority areas and the mechanisms through which it can be achieved. The main motivation for protected area expansion according to the NPAES is that “South Africa’s protected area network currently falls far short of representing all ecosystems and maintaining ecological processes”. Parts of the study area have been identified in the NPAES as priority focus areas for conservation, specifically the south-western part of the site (Figure 13).

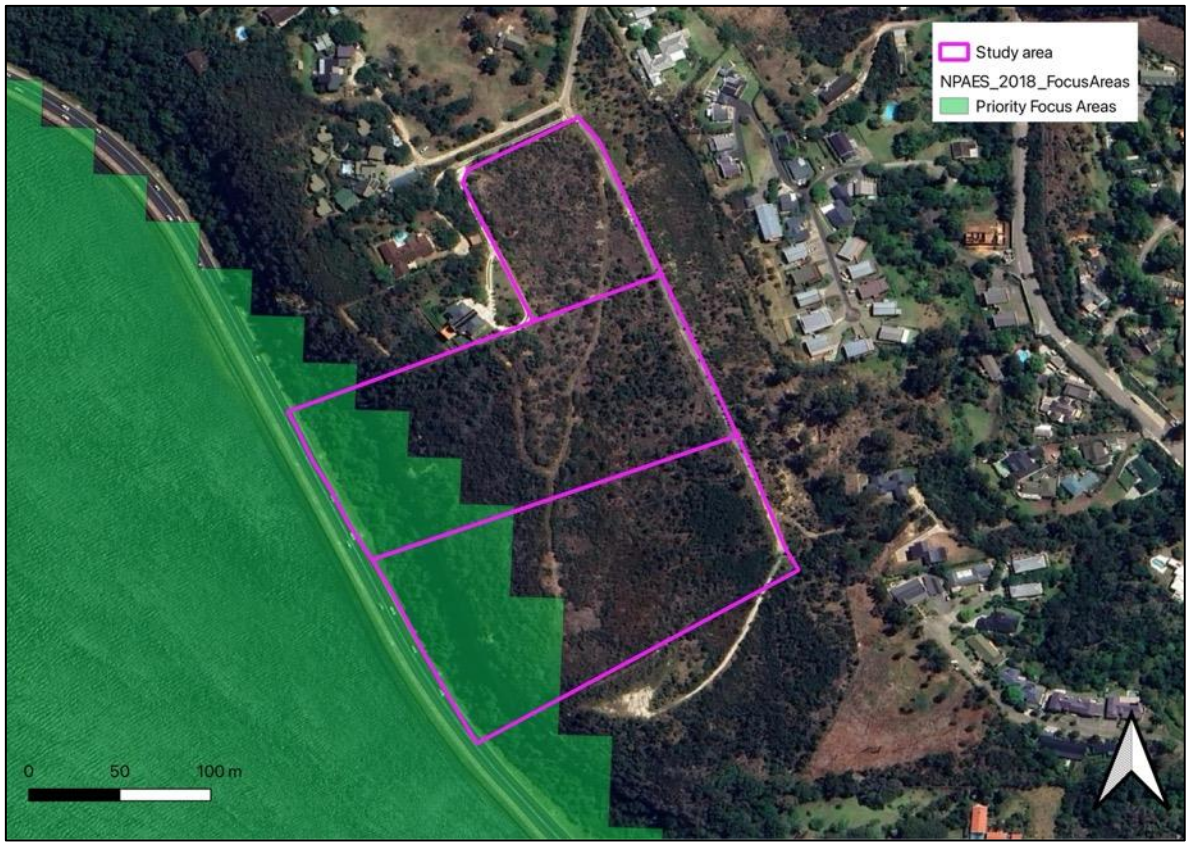

Figure 13 The NPAES map for the region showing the already protected areas as well as the priority focus areas for expansion. Note that the already Protected Areas shown in this image include lower-level protected areas that may not be as well conserved as a National Park.

7. VEGETATION OF THE STUDY AREA

The study area is mapped as Garden Route Shale Fynbos according to the VEGMAP. Whereas fynbos is present on the upper ridge and northern slope of the site, the south-west facing cliffs and southern part include Southern Cape Afrotemerate Forest. The Vegetation Map for the Garden Route assigns the entire terrestrial portion of the site as Groenvlei Coastal Forest with the low lying area adjacent to the N2 as Garden Route Estuary. This is also not accurate as the fynbos present is not accounted for. The adjacent vegetation type of Knysna Enon Fynbos should have been mapped on the higher elevations of the site.

The habitat map provided in Figure 14 distinguishes between Forest and Fynbos and their condition. The habitats include (1) Semi-intact Forest, (2) Degraded Fynbos, (3) Degraded to Highly degraded Fynbos, and (4) Transformed. The description of habitat condition classes appears in Table 4.

Table 3. The habitat condition descriptions used for the vegetation on the site.

Habitat category	Description	Indigenous vegetation
Intact vegetation	A true representation of the original vegetation type in terms of structure and species makeup. Minimal soil disturbance. Unlikely to have ever been ploughed. Disturbance may be evident.	Yes
Semi-intact	Resembles the original vegetation type in terms of structure and species makeup but has lower species diversity than intact vegetation. Dominated by disturbance-resilient species. Soils may have been heavily disturbed in the past. Restoration potential is high.	Yes
Degraded	Only a few species representative of the original vegetation type are present. The vegetation has undergone heavy disturbance. Restoration potential is either low or moderate.	Yes
Highly degraded	The original vegetation is usually absent and has been removed in the past. Only a few remnant or pioneer species are present. Soils usually ploughed in the past. Restoration potential is very low.	*No (not naturally occurring as per the NEMA definition)
Transformed	No remnant species exist anymore. The landscape is altered irreversibly with no restoration potential. Examples include cultivated farmland and the built environment.	*No (not naturally occurring as per the NEMA definition)

Figure 14. HABITAT MAP: The habitats identified in the screened areas, overlaid on a Google™ aerial image.

The fynbos areas on the site have been subject to historical disturbances and high levels of Invasive Alien Plants (IAPs) over the past few decades. The earliest available image on Google Earth from 2003 shows the entire site completely covered in dense vegetation, presumably forest in the current forest area and IAPs in the Fynbos areas (Figure 15A). This scenario persists until 2017 after t major fires occurred. The Fynbos habitat burnt on the site, and as can be expected from these ecosystems, the Forest habitat did not burn (Figure 15B). Since 2017 the IAPs have recolonised the fynbos habitats and the fynbos species did not have a chance to recover. The current vegetation conditions on the site are described below.

Figure 15A. Google Earth ™ aerial image form 2003 showing high density of IAPs across the study area.

Figure 15B. Google Earth ™ aerial image form 2017, after the Knysna Fires, showing burnt areas previously occupied by IAPs.

7.1 SEMI-INTACT FOREST

This area occurs on steep south-west facing slopes adjacent to the N2. There is a narrow vertical cliff band at the top of this habitat that separates it from the fynbos habitat, except on the boundary of Erf 2924 where the forest occurs at higher altitudes. This may be due to a drainage line. The forest habitat has some erosion and low levels of IAPs present, as well as some edge effects from the road, but is otherwise in good condition. The species noted in this habitat are thicket and true forest species and are listed below in Table 4. No species of conservation concern (SCC) were identified in this habitat.

Table 4. Plant Species List for Semi-intact Forest Habitat

Scientific name	Common name
Clausena anisata	Samandua
Cussonia thyrsiflora	Cape Coast Cabbagetree
Cynanchum ellipticum	Monkeyrope Buckhorn

Delairea odorata	Cape-ivy
Diospyros dichrophylla	
Elaeodendron croceum	Forest saffron
Euclea daphnoides	
Lauridia tetragona	Climbing Saffron
Olea capensis	Black Ironwood
Pterocelastrus tricuspidatus	Candlewood
Scutia myrtina	cat-thorn
Searsia cf. pyroides	Karees
Searsia cf. rehmanniana	Karees
Searsia pterota	Wing Currantrhus
Searsia chirindensis	Forest currant
Sideroxylon inerme	White Milkwood (Protected tree)
Trimeria grandifolia	Wild Mulberry

The ecological functioning of the forest habitat on this site is likely to be moderately to highly altered in its current state, mainly due to the presence of the N2. The road severs the connection between this habitat and the estuary, limiting faunal movement and creating a constant source of noise and human presence. The traffic noise prohibited any identification of bird calls, so the likely presence of avian species such as the rare Knysna Woodpecker (*Campethera notata*) or Knysna Warbler (*Bradypterus sylvaticus*) could not be determined.

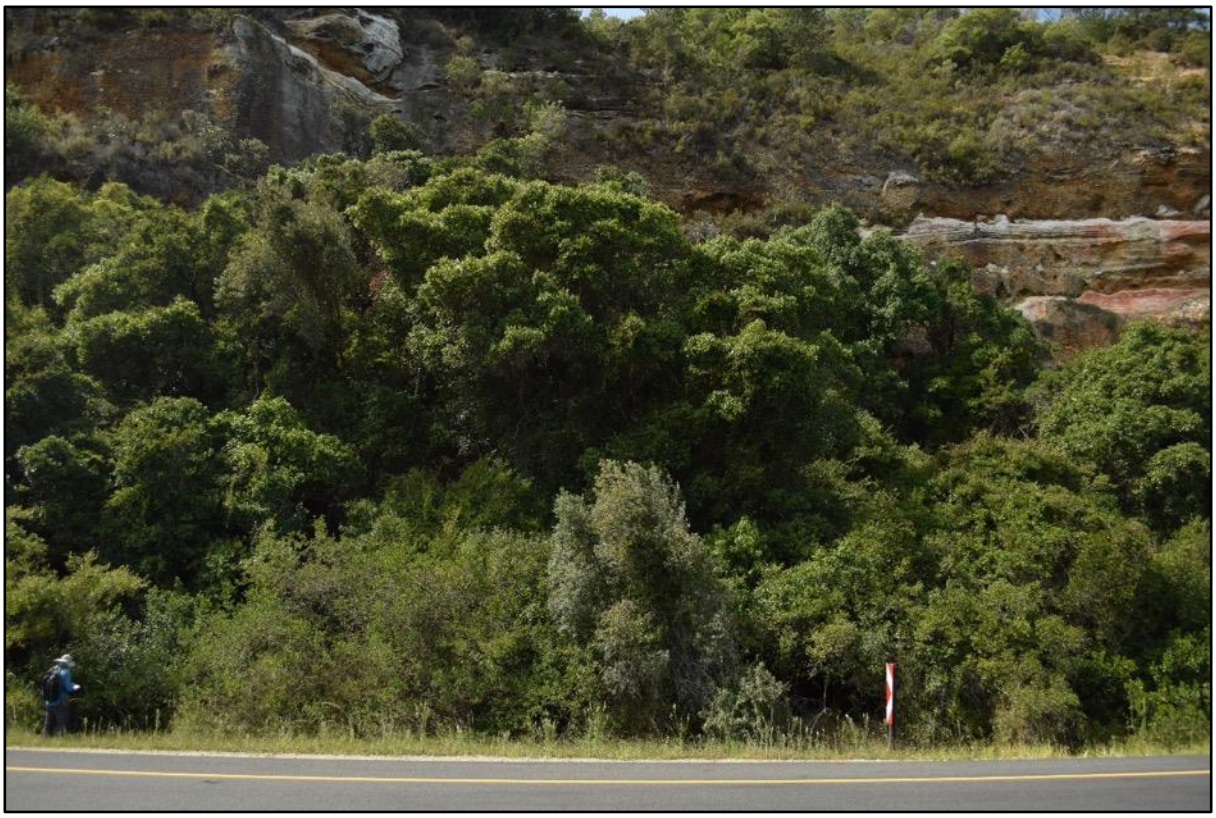

Figure 16. The Semi-intact Forest habitat as seen from the N2 showing the diverse and dense forest below the cliffs.

Figure 17. The southernmost part of the Forest habitat has been impacted by erosion and IAPs and the habitat is therefore not considered Intact.

7.2 DEGRADED FYNBOS

Upslope from the forest habitat is the best condition Fynbos on the site. This area has a medium to high density of IAPs but small patches are dominated by fynbos. This habitat occurs on the steep slopes above the cliffs. It was not accessible during the site visit due to the steepness of the slopes and the impenetrable vegetation. These steep slopes are very vulnerable to erosion if disturbed. The fynbos species found on the site are listed in Table 5. The species are both typical fynbos species, as well as some thicket species that occur in fynbos especially along the margin with the forest habitat, or fire safe areas. Some of these thicket elements are resprouting and hardy species and have persisted and possibly become more dominant under the IAPs. No species of conservation concern (SCC) were identified in this habitat. The ecological functioning of the this habitat is likely to be moderately altered. The plant species diversity is affected by the presence of IAPs and this impacts available habitat for other biota.

Table 5. Plant Species List for Degraded Fynbos Habitat

Scientific name	Common name	Scientific name	Common name
Anthospermum cf. prostratum	creeping flowerseed	*Lampranthus sp.*	Brightfigs
Anthospermum aethiopicum	common flowerseed	*Leucadendron eucalyptifolium*	Gumleaf Conebush
Agathosma apiculata	Garlic Buchu	*Colchicum eucomoides*	Green men in a boat
Agathosma ovata	False Buchu	*Metalasia cf. trivialis*	Eastern Blombush
Anginon difforme	Common Finkel	*Metalasia pungens*	Stink Blombush
Aspalathus ericifolia	Heathleaf Capegorse	*Metalasia trivialis*	Eastern Blombush
Aspalathus opaca	Shady Capegorse	*Muraltia alopecuroides*	Foxy Purplegorse
Asparagus africanus	Bush Asparagus	*Oedera calycina*	
Centella virgata	Branching Capepurse	*Osteospermum moniliferum*	Bitou
Chaenostoma revolutum	Fineleaf Skunkbush	*Oxalis sp.*	Sorrels
Chironia baccifera	Christmas Berry	*Oxalis imbricata*	Tile Sorrel
Delostemon sp.	Twobract Lobelias	*Phylica cf axillaris*	Hardleaves
Erica discolor	Discolorous Heath	*Restio triflorus*	
Erica peltata	Shield Heath	*Restio triticeus*	Wheat Capereed
Eulophia cochlearis	Spoon Cinderella Orchid	*Rhynchosia leucoscias*	Shiny Snoutbean
Euryops virgineus	Virgin True-Eye	*Schoenus sp.*	Veldrushes
Ficinia lateralis	Side Clubrush	*Selago cf. glomerata*	Eden Bitterbush
Ficinia nigrescens	Black Clubrush	*Selago corymbosa*	Stiff Bitterbush
Helichrysum petiolare	Kooigoed	*Senecio ilicifolius*	Kowanna Ragwort

Helichrysum cymosum	Fume Everlasting	*Tephrosia capensis*	Cape Hoarypea
Hermannia flammea	Flaming Dollsrose	*Tetraria involucrata*	Honey Tetrar
Hermannia hyssopifolia	Fat Dollsrose	*Ursinia scariosa*	Paper Paraseed

Table 6. Plant Species List for Thicket elements within Degraded Fynbos Habitat

Scientific name	Common name
Capparis sepiaria	Indian caper
Diospyros dichrophylla	Poison Starapple
Euclea crispa	Blue Guarri
Tarchonantus camphoratus	Coastal camphor

Figure 18. The Degraded fynbos habitat is partially representative of the original ecosystem. Species such as *Erica pelata, Osteospermum moniliferum* and *Metalasia pungens* are dominant with a graminoid understory. This habitat occurs on moderate to steep slopes. There is Moderate to High density of Invasive species in this habitat as can be seen in the background.

Figure 19. The Degraded habitat occupies a small corner within the fenced area on Erf 2925.

7.3 DEGRADED TO HIGHLY DEGRADED FYNBOS

The greater part of the site contains Degraded to Highly degraded fynbos. This area has a long history of IAPs and it is likely that the soil chemistry has changed over this time. There are low number of indigenous species under the IAPs. In areas where the IAPs have been cleared, there is a slightly higher diversity of indigenous species, suggesting that there may be some seeds still present in the top soil in at least parts of the site. The species found in this habitat are the same as the ones listed above in Table 7, however mostly far less abundant. Many parts of this habitat appear to be devoid of any indigenous species other than the most common and hardy species such as bitou *Osteospermum moniliferum*, coastal camphor *Tarchonanthus camphoratus* and sour fig *Carpobrotus edulis*. The areas bordering on adjacent developed properties have been impacted by dumping of garden waste, and some plants have established themselves within the study area, presumably from the adjacent cultivated gardens (e.g. *Coleus neochilus* and *Crassula sarmentosa*).

Table 7. Plant Species List for Exotic and/or Invasiva Alien Species

Scientific name	Common name	NEMBA Category
Acacia baileyana	Baileys Wattle	3
Acacia cyclops	Rooikrans	1b
Acacia mearnsii	Black Wattle	2
Acacia melanoxylon	Blackwood	2
Acacia podalyriifolia	Pearl Wattle	1b
Acacia saligna	Port Jackson Willow	1b
Coleus neochilus	Mosquito Spurflower	N/A
Crassula sarmentosa	Trailing Stonecrop	N/A
Eucalyptus cladocalyx	sugar gum	N/A
Lantana camara	Lantana	1b
Melaleuca linearis	Narrow-leaved Bottlebrush	1b
Pinus radiata	Monterey pine	1b

Figure 20. The typical appearance of the Degraded to Highly degraded habitat. The more open areas in the foreground has been cleared of IAPs and looks very poor, but contains a low diversity of indigenous species that have come up in the gaps. This suggests that some seeds still exist in the topsoil, however, there is clearly a low diversity and the vegetation is unlikely to recover well without active inputs, even if all IAPs are removed.

Figure 21. Some parts of this habitat are still covered in very high densities of invasive species. A few naturally occurring indigenous species still occur under these IAPs.

Figure 22. Some parts of this habitat have been cleared of larger IAPs. In these areas more indigenous species occur, however, IAPs are recolonizing. Invasive *Lantana camara* can be seen in the foreground and the uncleared taller Acacia species can be seen in the background.

Figure 23. The Degraded to Highly habitat in Erf 7594. This property is probably in the worst condition from a botanical perspective. However, despite this, there are still naturally occurring indigenous species and it therefore contains "indigenous vegetation". A number of exotic garden escapees from the adjacent developed properties were found in this Erf.

8. SENSITIVITY

Sensitivity is defined here as the **'conservation value'** together with the **'degree of resilience to disturbance'**. The conservation value relates to the conservation status (including the ecosystem threat status) and other factors including ecological connectivity, habitat condition, persistence of ecological process and the site's role in supporting biodiversity. The degree of resilience takes into consideration factors such as sensitivity to disturbance and restoration potential.

In the case of the study area, a **High sensitivity** applies to the Semi-intact Forest habitat for the following reasons:

1. The vegetation present is in good condition over the greater part of the habitat and is representative of Southern Afrotemperate Forest (a Least Concern but arguably high sensitivity ecosystem).

2. This habitat occurs on sheer cliffs and steep lower slopes and would be prone to erosion if disturbed.
3. The ecological functioning of the habitat is moderate and an important linkage between the lagoon and the upper slopes of Fynbos.
4. Most of this habitat is classified as a Protected Area (Garden Route National Park) and a smaller part as CBA 1 in the WCBSP 2017.

In the case of the study area, a **Medium sensitivity** applies to the Degraded Fynbos habitat for the following reasons:

1. The vegetation type present is Endangered and the vegetation is partially representative of this ecosystem.
2. The site classified as a Protected Area or CBA 1 in the WCBSP. The vegetation is not Intact and the CBA 1 area may be more accurately classified as CBA 2.
3. No SCC were found in this habitat.
4. The ecological functioning of this habitat is moderately modified and impacted by a medium to high density of IAP.
5. This habitat occurs on moderate to steep slopes which would be prone to erosion if developed.
6. The restoration potential of this area is moderate to high if the IAP are removed.

A **Low sensitivity** applies to the Degraded to Highly degraded habitat for the following reasons:

1. The vegetation type present is Endangered, however the vegetation that remains in this habitat is in poor condition, and only marginally representative of the original ecosystem in its current condition. However, it does contain “indigenous vegetation” by definition.
2. The site classified as CBA 1 or unclassified in the WCBSP. The CBA 1 area would be more accurately classified as CBA 2 or ESA 2 due to the poor condition.
3. No SCC were found in this habitat
4. The ecological functioning of this habitat is severely modified in its current state due to the long history of high-density IAP.
5. The restoration potential of this habitat is low without active management inputs, but restoration is possible, and recommended for the areas which are not developed.

A **Very Low sensitivity** applies to the Transformed habitat for the following reasons:

1. The indigenous vegetation has been completely removed from this habitat, and it consists of the N2 and another road on the site.
2. The habitat excluded from the WCBSP.
3. No SCC were found in this habitat.

The sensitivity map is provided below in Figure 23.

The threatened animal species that potentially occur on the site as generated by the screening tool have been summarised in relation to the study area. This information appears in Table 8.

Table 8. Sensitive Animal species list generated by wed based screening tool, including their threat status, distribution, habitat presence on site, likelihood of occurrence and presence on site during the site visit.

Species	Common Name	Threat Status	Distribution includes or partly includes project area	Preferred Habitat Present	Likelihood of occurrence in project area	Present/Absent as per site visit
Birds						
Stephanoaetus coronatus	Crowned Eagle	VU	Yes	Yes	Low	Absent
Hydroprogne caspia	Caspian Tern	VU	Yes	Yes	High	Absent
Bradypterus sylvaticus	Knysna Warbler	VU	Yes	Yes	High	Absent
Amphibian						
Afrixalus knysnae	Knysna Leaf folding frog	EN	Yes	Yes	Low	Absent
Mammals						
Chlorotalpa duthieae	Duthie's Golden Mole	VU	Yes	No	Low	Absent
Sensitive species 8	*Sensitive species 8*	VU	Yes	No	Low	Absent
Invertebrates						
Aneuryphymus montanus	Yellow Winged Agile Grasshopper	VU	Yes	Yes	Moderate	Absent

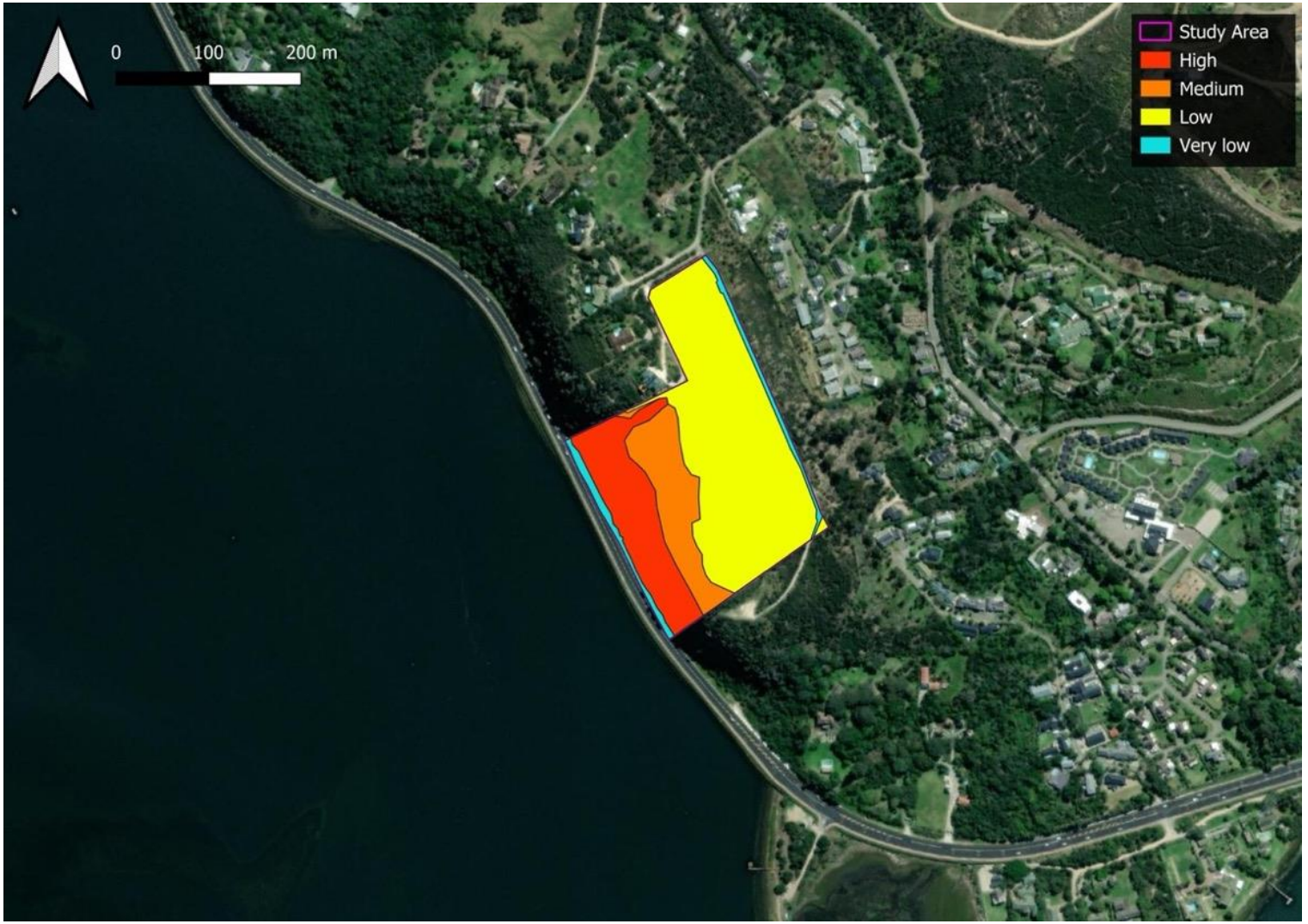

Figure 24. SENSITIVITY MAP: The sensitivities for the stud area overlaid on an ESRI ™ image.

9. IMPACT ASSESSMENT

The impact assessment is a measure of the impacts likely to occur on the affected environment, specifically the vegetation, ecological processes, important species and habitats. They are considered for (a) the 'No Go' scenario and (b) the direct, indirect and cumulative impacts of the proposed project. Impacts are assessed for the construction and operational phase together (Table 8).

The impact assessment methodology is explained in detail in Appendix 1.

9.1. 'NO GO' OR NO DEVELOPMENT SCENARIO

The 'No Go' or no development scenario takes into consideration the impacts associated with the no construction option. It is a prediction of the future state of the affected area in the event of no construction activities taking place and is based on the current and/or anticipated future land use. If no construction were to take place and the *status quo* would remain the same, the site would continue to be invaded by IAP into the parts of the site with some representative indigenous vegetation. The indigenous seed bank would be further reduced in the next fire event reducing the chance of positive restoration of the site. In the medium term, the impact of the No-Go scenario is **Low to Medium Negative** as it would likely result in the complete loss of fynbos on the site. However, it is the legal responsibility of the landowner to remove and control these species so this should not be considered as a reason to allow development on the site.

9.2. DIRECT IMPACTS

Direct impacts are those that would occur as a direct result of the housing developments proposed. The vegetation that occurs in the areas proposed for expansion would be removed and permanently lost. The entire of Erf 7594 would be lost, whereas only one house is proposed for each of Erf 2924 and 2925 (See Figures 25A-C)).

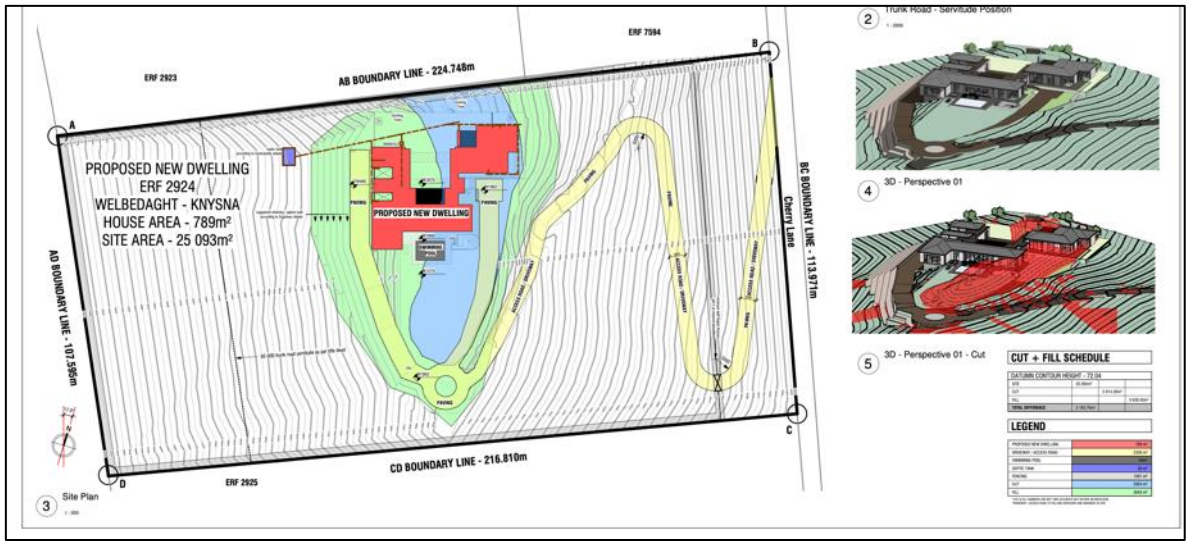

Figure 25A. The proposed development for Erf 2924 as provided by the applicant.

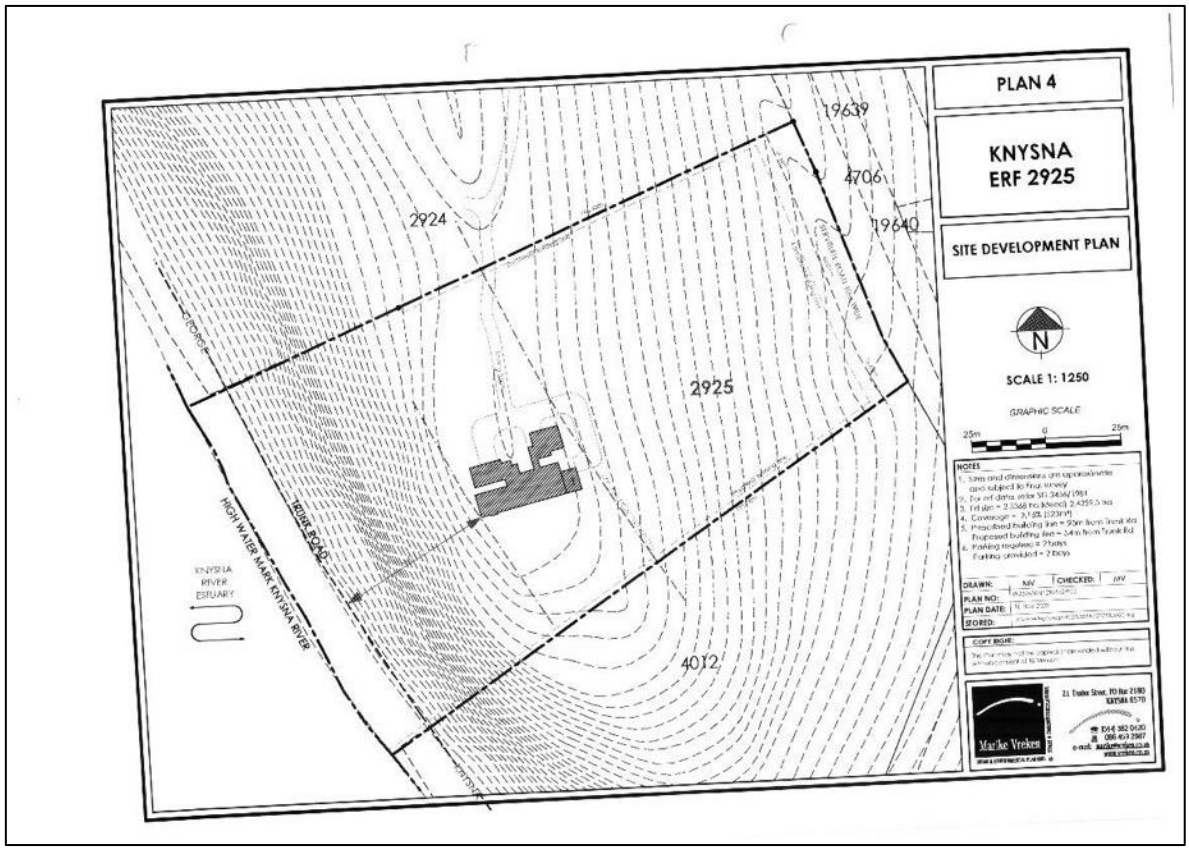

Figure 25B. The proposed development for Erf 2925 as provided by the applicant.

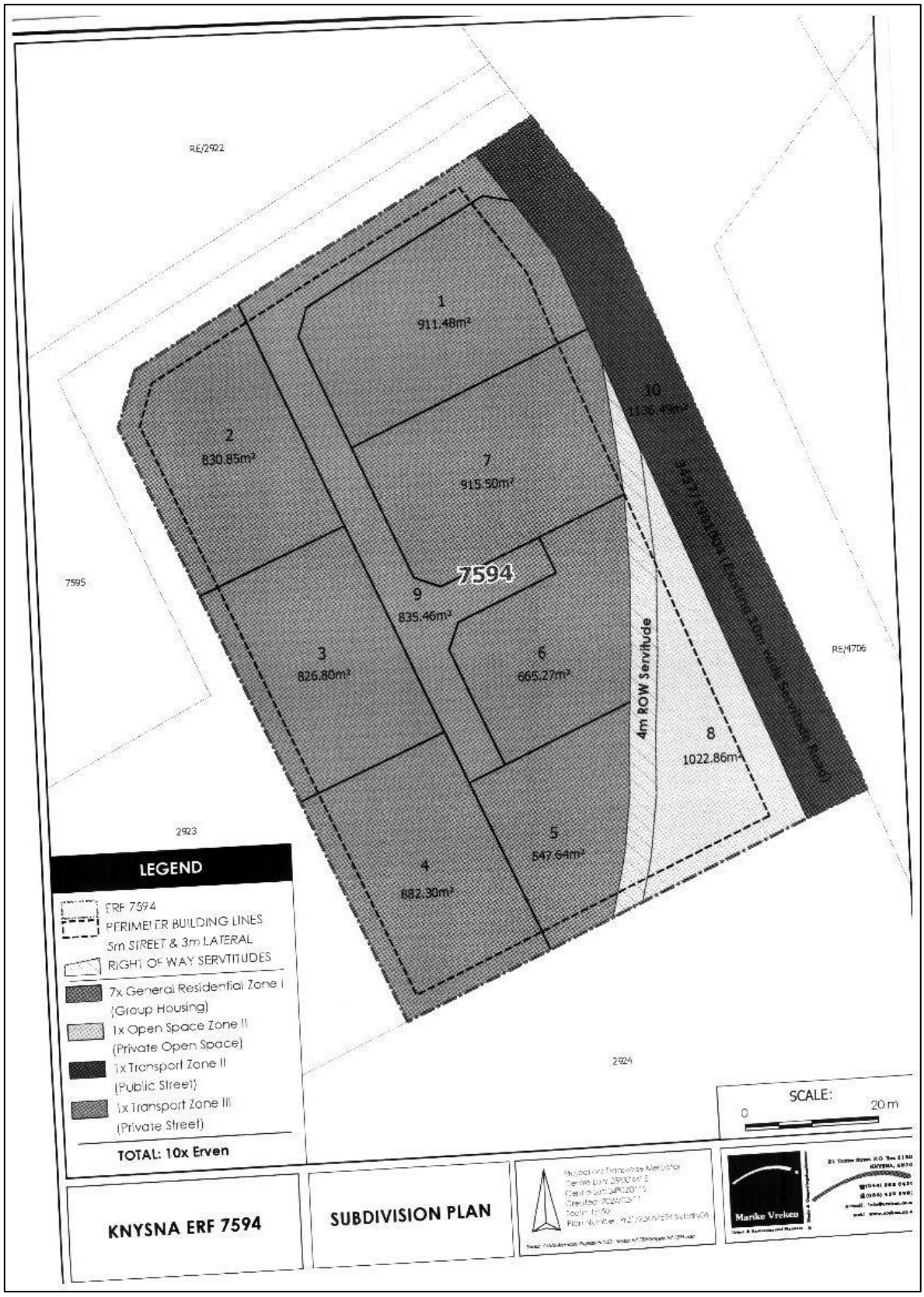

Figure 25C. The proposed development for Erf 7594 as provided by the applicant.

The direct impacts are considered separately for the two following components:

1. Loss of terrestrial ecology including: vegetation type, ecological processes, indigenous vegetation, ecologically important species, terrestrial habitat and ecological connectivity.
2. Loss of species of conservation concern (SCC).

The proposed developments are mostly limited to the Degraded to Highly degraded fynbos habitat, with only a small part of the Degraded fynbos habitat likely to be impacted. The vegetation in these habitats is only partially representative of the original ecosystem, the Endangered Garden Route Shale Fynbos. The proposed development will have a **Medium negative** impact on loss of terrestrial biodiversity on site. However this can be reduced to **Low negative with mitigation** as discussed in section 9.5.

No SCC were found on the site and none are likely to be present, however, it is possible that species could have been missed due to the seasonality of the survey. The impact of the development on SCC is rated as **Very Low negative** and no mitigation is proposed.

Table 8. Impact table for the construction and operational phase of the proposed developments

	Loss of SCC	**Loss of Terrestrial Biodiversity**	**No-Go Alternative**
Potential impact and risk:	Loss of three SCC from site	Complete loss of Erf 7594 (0.85ha), loss of approximately 1 ha on each or Erf 2924 and 2925. Total loss approximately 2.8 ha over all properties.	Status quo remains
Nature of impact:	Negative	Negative	Negative
Extent and duration of impact:	Site (1) and Long-term (3)	Site (1) and Long-term (3)	Site (1) and Long term (3)
Magnitude	Low (1)	High (3)	Medium (2)
Consequence of impact or risk:	Slightly detrimental (5)	Moderately detrimental (7)	Slightly detrimental (6)
Probability of occurrence:	Possible (2)	Definite (4)	Definite (4)
Degree to which the impact may cause irreplaceable loss of resources:	Low	Low	Low
Degree to which the impact can be reversed:	Low	Low	Low
Cumulative impact prior to mitigation:	Low	Low	Low
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Very low (10)	Medium (28)	Low (24)
Degree to which the impact can be avoided:	Low	Low	Low

Degree to which the impact can be managed:	Low	Low	Low
Degree to which the impact can be mitigated:	Low	Low	Low
Proposed mitigation:	N/A	Rehabilitation of fynbos habitat not developed.	N/A
Residual impacts:	Very low	Low	Low
Cumulative impact post mitigation:	Low	Low	Low
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Very low (10)	Low (24)	Low (24)

9.3 INDIRECT IMPACTS

Indirect impacts occur mostly at the operational stage and are less obvious. Examples include loss of diversity due to loss of connectivity between vegetation remnants and associated loss of pollination. No botanically related indirect impacts were identified in this instance.

9.4 CUMULATIVE IMPACTS

Cumulative impacts are those impacts linked but not limited to (a) increased loss of vegetation type or the ecosystems listed in the Revised National List of Ecosystems that are threatened and in need of protection (Government Gazette, 2022) and (b) other local developments taking place in the region. The area that would be lost within the Garden Route Shale Fynbos ecosystem, is 2.8 ha. This represents 0.01% of the remaining natural area of the ecosystem (24848 ha) (Government Gazette, 2022). Considering the Low percentage lost, the impact rated as **Low negative**.

9.5 MITIGATION

Mitigation options are generally considered in terms of the following mitigation hierarchy: (1) avoidance, (2) minimization, (3) restoration and (4) offsets. A distinction is also made between essential mitigation (non-negotiable mitigation measures that lower the impact significance) and non-essential mitigation (best practise measures that do not lower the impact significance).

In this instance, a number of essential mitigation measures are necessary to reduce the impact of the development.

1. The vegetation from the fynbos habitat that is not developed must be rehabilitated to a state where it is at least partially representative of the original fynbos ecosystem and supports ecological functioning to a moderate or high level.
2. The rehabilitation must be undertaken in a phased approach, according to a rehabilitation plan and undertaken by a qualified botanist or restoration ecologist.
3. The initial step will require the removal and control of all IAPs on the property and erosion control if necessary. Passive rehabilitation on the parts of the site where no earthworks have taken place can be allowed for one winter season following the removal of IAPs. Thereafter the site must be assessed by the restoration contractor to determine the level of active rehabilitation input. Active rehabilitation will be required for areas where topsoil has been removed.
4. Follow-up clearing of all exotic and listed IAPs is required every 6 months for the first three years, and annually thereafter to ensure that the IAPs do not dominate the fynbos.

Best practise mitigation

1. Mark off the areas that are not going to be developed prior to undertaking any works, and ensure that no unnecessary loss of adjacent vegetation occurs.
2. Sites for building material stocks, vehicles, toilets etc must be clearly marked and restricted to the building footprint, exiting roads or existing disturbed areas.

10. CONCLUSIONS AND RECOMMENDATIONS

According to the VEGMAP, the study area contains only the Endangered Garden Route Shale Fynbos, however, it also supports one Least Concern ecosystem, namely Southern Afrotemperate Forest. According to the Vegetation Map for the Garden Route the site only supports Groenvlei Coastal Forest, an Endangered ecosystem, however, it also supports Knysna Enon Fynbos, a Vulnerable Ecosystem. The mapping of both resources is not completely accurate for the site, however, the threat status of both resources suggest that any remaining natural fynbos habitat is threatened and sensitive.

The WCBSP 2017 assigns parts of the site as Protected Area and CBA 1. The proposed developments occurs within CBA 1 sites on Erf 2924 and Erf 2925. This classification is questionable as the sites are not intact. Parts of the development footprint on Erf 7594 is assigned as CBA 1. This classification is also questionable due to the vegetation condition on the site. A classification of CBA 2 would have been more appropriate. The part of the site that has been classified as a Protected Area (and NPAES focus area) will not be impacted.

The areas proposed for development are not intact (Degraded, or Degraded to Highly degraded) and only partially representative of the original fynbos ecosystem in some parts of the site. The sensitivity of the Degraded habitat is Medium and the rest of Degraded to Highly degraded to habitat is rated as Low sensitivity. The high sensitivity Forest habitat that contains one protected tree species, the white milkwood *Sideroxylon inerme* will not be impacted.

The proposed development will result in the permanent loss of habitat which is currently Degraded to Highly degraded. The mitigation of rehabilitation will result in the remaining habitat on the site improving in condition. The this will improve the overall ecological functioning of the Erf 2924 and Erf 2925 by ensuring that the dominant vegetation is locally occurring indigenous vegetation. This will allow for better habitat for faunal species, improving plant animal interactions such as pollination. The connectivity between the upper and lower elevations on the site will allow for better faunal movement between the site and surrounding areas. The occurrence of fires which are an important ecological driver for fynbos ecosystems may be reduced by increasing density of urban developments. Fire suppression will be practised in the urban environment, however, as evident in 2017 fires may still occur in the urban environment.

The proposed development is for a single residential house on each for Erf 2924 and Erf 2925. Seven houses are proposed for Erf 7594. The total area proposed for development is expected to be around 2.8 ha out of a total of 5.7 ha for all three properties. This will have a Low negative cumulative impact, and no change to the ecosystem threat status will occur as a result of the proposed development. This is seen as acceptable in the context of the areas that will remain undeveloped and rehabilitated on the subject properties. The application is thus supported from a Terrestrial Biodiversity perspective, provided that the mitigation measures are adhered to.

11. REFERENCES

Brownlie, S. 2005. *Guideline for involving biodiversity specialists in EIA processes: Edition 1.*CSIR Report No. ENV-S-C 2005-053 C. Provincial Government of the Western Cape: Department of Environmental Affairs and Development Planning.

Cadman, M., de Villiers, C., Holmes, P., Rebelo, T., Helme, N., Euston Brown, D., Clark, B., Milton, S., Dean, R., Brownlie, S., Snaddon, K., Day, L., Ollis, D., Job, N.,

Dorse, C., Wood, J., Harrison, J., Palmer, G., Maree, K., Manuel, J., Holness, S., Ralston, S. and Driver, A. 2016. Fynbos Forum Ecosystem Guidelines for Environmental Assessment in the Western Cape Fynbos Forum, Edition 2.

Cape Farm Mapper website: https://gis.elsenburg.com/apps/cfm/

Government Gazette No. 26436. 2004. National Environmental Management: Biodiversity Act 2004.

Government Gazette 37885. 2014. Invasive Species Regulations of the National Environmental Management: Biodiversity Act (No. 10 of 2004).

Government Gazette No. 34809. 2011. Threatened Terrestrial Ecosystems in South Africa. National Environmental Management: Biodiversity Act (No. 10 of 2004).

Government Gazette No. 47526 (2747), 18 November 2022. The Revised National List of Ecosystems that are Threatened and in need of protection. Department Of Forestry, Fisheries and the Environment.

Government Gazette No. 49208, 28 July 2023. Amendment to the protocols for the specialist assessment and minimum report content requirements for Environmental Impacts on Terrestrial Plant and Animal species in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998.

Holness, S., Bradshaw, P. & Brown, A. 2010. Critical Biodiversity Areas of the Garden Route Conservation Planning Technical Report. South African National Biodiversity Institute.

Lötter, M.C. & Le Maitre, D. (2021) Fine-scale delineation of Strategic Water Source Areas for surface water in South Africa using Empirical Bayesian Kriging Regression Prediction: Technical report. Prepared for the South African National Biodiversity Institute (SANBI), Pretoria. 33 pages. http://hdl.handle.net/20.500.12143/8521

Mucina, L. & Rutherford, M.C. 2006. (eds.) The Vegetation of South Africa. Lesotho & Swaziland. *Strelitzia 19.* South African National Biodiversity Institute, Pretoria.

Pool-Stanvliet, R., Duffell-Canham, A., Pence, G. & Smart, R. 2017.The Western Cape Biodiversity Spatial Plan Handbook. Stellenbosch: CapeNature.

Raimondo, D., Von Staden, L., Foden, W., Victor, J.E., Helme, N.A., Turner, R.C., Kamundi, D.A. & Manyama, P.A. (eds) 2009. Red List of South African plants 2009.*Strelitzia* 25. South African National Biodiversity Institute, Pretoria.

Skowno, A.L., Holness, S.D. and P.G. Desmet (2010) Biodiversity Assessment of the Kannaland and Oudtshoorn Local Municipalities, and Eden District Management Area (Uniondale). DEADP Report LB07/2008a, 65 pages

South African National Biodiversity Institute (SANBI). 2019. National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report. South African National Biodiversity Institute, an entity of the Department of Environment, Forestry and Fisheries, Pretoria. http://hdl.handle.net/20.500.12143/6362

South African National Biodiversity Institute. 2018 Vegetation Map of South Africa, Lesotho and Swaziland [vector geospatial dataset] 2018. Available from the Biodiversity GIS website, downloaded on 18 January 2020.

Turner, A.A. 2013. CapeNature's requirements for providing comments on agricultural, environmental, mining, planning and water-use related applications. Jonkershoek Scientific Services Offices.

Turner, A. A. (ed.) 2017. Western Cape State of Biodiversity. Cape Nature Scientific Services. Stellenbosch. ISBN:978-0-621-45962-3

Vlok, J.H.J., Euston-Brown D.I.W. & Wolf, T. 2008. A vegetation map for the Garden Route Initiative. Unpublished 1:50 000 maps and report supported by CAPE FSP task team.

APPENDIX 1: ASSESSMENT METHODOLOGY

For each impact, the **nature** (positive/negative), **extent** (spatial scale), **magnitude/intensity** (intensity scale), **duration** (time scale), **consequence** (calculated numerically) and **probability** of occurrence is ranked and described. These criteria would be used to ascertain the **significance** of the impact, firstly in the case of no mitigation and then with the most effective mitigation measure(s) in place.
The tables below show the rankings of these variables, and defines each of the rating categories.

Table 2: Assessment criteria for the evaluation of impacts

CRITERIA	RANK	DESCRIPTION
Nature	**Positive (+)**	The environment will be positively affected.
	Negative (-)	The environment will be negatively affected.
Extent or spatial influence of impact	**National (4)**	Beyond provincial boundaries, but within national boundaries.
	Regional (3)	Beyond a 10 km radius of the proposed activities, but within provincial boundaries.
	Local (2)	Within a 10 km radius of the proposed activities.
	Site specific (1)	On site or within 100 m of the proposed activities.
	Zero (0)	Zero extent.
Magnitude/ intensity of impact (at the indicated spatial scale)	**High (3)**	Natural and/ or social functions and/ or processes are *severely* altered.
	Medium (2)	Natural and/ or social functions and/ or processes are *notably* altered.
	Low (1)	Natural and/ or social functions and/ or processes are *slightly* altered.
	Zero (0)	Natural and/ or social functions and/ or processes remain *unaltered.*
Duration of impact	**Long Term (3)**	More than 10 years, but impact ceases after the operational phase.
	Medium Term (2)	Between 3 – 10 years.
	Short Term (1)	Construction period (up to 3 years).
	None (0)	Zero duration.
Consequence (Nature x (Extent + Magnitude/ Intensity + Duration))	**Extremely beneficial/ detrimental (10 – 11) (+/-)**	The impact is *extremely* beneficial/ detrimental.
	Highly beneficial/ detrimental (8 – 9) (+/-)	The impact is *highly* beneficial/ detrimental.
	Moderately beneficial/ detrimental (6 – 7) (+/-)	The impact is *moderately* beneficial/ detrimental.
	Slightly beneficial/ detrimental (4 – 5) (+/-)	The impact is *slightly* beneficial/ detrimental.
	Negligibly beneficial/ detrimental (1 – 3) (+/-)	The impact is *negligibly* beneficial/ detrimental.
	Zero consequence (0) (+/-)	The impact has zero consequence.

Probability of occurrence	**Definite (4)**	Estimated at a greater than 95% chance of the impact occurring.
	Probable (3)	Estimated 50 – 95% chance of the impact occurring.
	Possible (2)	Estimated 6 – 49% chance of the impact occurring.
	Unlikely (1)	Estimated less than 5% chance of the impact occurring.
	None (0)	Estimated no chance of impact occurring.

The **significance** of an impact is derived by taking into account the **consequence** (nature of the impact and its extent, magnitude/intensity and duration) of the impact and the **probability** of this impact occurring through the use of the following formula:

Significance Score = Consequence x Probability

The means of arriving at a significance rating is explained in Table 3.

Table 3: Definition of significance ratings

SIGNIFICANCE SCORE	SIGNIFICANCE RATINGS	
32 – 40	**High (+)**	**High (-)**
25 – 31	**Medium (+)**	**Medium (-)**
19 – 24	**Low (+)**	**Low (-)**
10 – 18	**Very-Low (+)**	**Very-Low (-)**
1 – 9	**Negligible**	

Once the significance of an impact has been determined, the **confidence** in the assessment of the impact, as well as the degree of **reversibility** of the impact and **irreplaceable loss of resources** would be determined using the rating systems outlined in Table 4, 5 and 6 respectively. Lastly, the **cumulative impact** is ranked and described as outlined in Table 7.

Table 4: Definition of confidence ratings

CONFIDENCE RATINGS	CRITERIA
High	Wealth of information on and sound understanding of the environmental factors potentially influencing the impact.
Medium	Reasonable amount of useful information on and relatively sound understanding of the environmental factors potentially influencing the impact.
Low	Limited useful information on and understanding of the environmental factors potentially influencing this impact.

Table 5: Degree of reversibility

REVERSABILITY OF IMPACT	CRITERIA
High	High potential for reversibility.
Medium	Medium potential for reversibility.
Low	Low potential for reversibility.
Zero	Zero potential for reversibility.

Table 6: Degree of irreplaceability

IRREPLACEABLE LOSS OF RESOURCES	CRITERIA
High	Definite loss of irreplaceable resources.
Medium	Medium potential for loss of irreplaceable resources.
Low	Low potential for loss of irreplaceable resources.
Zero	Zero potential for loss of irreplaceable resources.

Table 7: Cumulative Impact on the environment

CUMULATIVE IMPACTS	CRITERIA
High	The activity is one of *several* similar past, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the geographical, physical, biological, social, economic and cultural aspects of the environment.
Medium	The activity is one of a *few* similar past, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the geographical, physical, biological, social, economic and cultural aspects of the environment.
Low	The activity is localised and might have a negligible cumulative impact.
Zero	No cumulative impact on the environment.

APPENDIX 2: ABBREVIATED CURRICULUM VITAE: GREG NICOLSON

Experience

- Expertise in field work in the CFR – vegetation surveys, plant identification, plant collection, ecological monitoring
- Data management and analysis
- Basic skills in GIS programs
- Vegetation and species mapping
- MSc thesis entitled *" Road reserves as conservation assets: exploring the species of conservation concern and the ecological condition of the N7 road reserve".* Graduation date: December 2010
- Experience leading teams of field assistants in remote mountainous areas
- Completed over 100 botanical survey/assessment reports

Career History

- 2019 – present: Co-founder and independent botanist at Capensis Ecological Surveys
- March 2013 – Dec 2018: independent botanical specialist and associate of Bergwind Botanical Surveys & Tours CC
- March 2011 – December 2012: conducted a comprehensive post fire survey of the Paardeberg (Paardeberg Sustainability Institute)

Education and qualifications

- Pr. Nat. Sci. (116488)
- MSc (Botany) – University of Cape Town (2010).
- BSc: Hons (Env. Science) – University of Cape Town (2005)
- BSc: Environmental and Geographical Science - University of Cape Town (2002 – 2004)

Personal Details

- Greg Nicolson
- 25 Dartmouth Road, Muizenberg, 7945
- Cell: 072 211 9843. Home: 021 709 0750
- greg@capensis.co.za
- Date of birth – 26/08/1981
- Marital status – Single
- Dependents – 3

APPENDIX 3: ABBREVIATED CURRICULUM VITAE: ADAM LABUSCHAGNE

Experience

- Terretrial and aquatic ecological field experience across a wide range of biomes including Tropical Asia, Tempereate Europe, and the CFR
- Data management and analysis
- Experience with statisical and GIS programs including R and QGIS.
- Species distribution and Ecoloigcal Niche modelling experience.
- MSc Thesis Title "*Using satellite telemetry to understand the movement ecology and diving behavioir of Caretta caretta in the Cape Verde Archipelago"*
- Completed 17 Botanical/Terrestrial Biodiversity specialist survey reports

Career History

- 2023 – present: Independent ecologist at Capensis Ecological Surveys
- August 2023 – present: Independent Ecologist and Field Technician at Inkululeko Wildlife Services
- March 2023 – present: Independent ecology specialist and associate of Bergwind Botanical Surveys & Tours CC.
- December 2020-February 2023: Field Manager and Research Officer at Human Wildlife Solutions.

Education and qualifications

- Cand. Nat. Sci. (133686)
- MSc (Ecology & Evolutionary Biology) – Queen Mary University (2019).
- BSc (Zoology) – University of Roehampton (2015-2018)

Personal Details

- Adam Labuschagne
- 36a Wilson Street, Hunters Home, Knysna, 6571
- Cell: 072 830 6500.
- adam@capensis.co.za

- Date of birth – 31/10/1994
- Marital status – Single
- Dependents – None

APPENDIX 4: PLANT SPECIES THEME COMPLIANCE STATEMENT

1. Introduction

The relative plant species theme sensitivity for the site generated by the web-based Screening Tool (https://screening.environment.gov.za) is rated as "Medium" (Figure 1). "An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of "medium sensitivity" for terrestrial plant species, must submit either a **Plant Species Specialist Assessment Report** or a **Plant Species Compliance Statement**, depending on the outcome of a site inspection undertaken in accordance with paragraph 4" (Government Gazette, 2023). No plants listed as Species of Conservation Concern (SCC) have been identified at this site, and therefore a Plant Species Compliance Statement is provided. This report has been compiled following the guidelines set out for the **Terrestrial Fauna and Terrestrial Flora Species Protocols for Environmental Impact Assessments in South Africa** (SANBI 2022).[1]

[1] South African National Biodiversity Institute (SANBI). 2022. *Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa.* South African National Biodiversity Institute, Pretoria. Version 3.1.

Figure 1. Map of relative plant species theme diversity.

2. Project Area of Influence (PAOI) and Sampling Density

In this case the PAOI is the areas surveyed during the site visit (Figure 2). No impacts are expected to occur outside of this area if the mitigation is successfully applied. 20 waypoints were recorded in the 5.7 ha site making the sampling density 3.5 waypoints/hectare.

Figure 2. The map of the study area showing the survey tracks and waypoints recorded.

3. SCC within the study area

No SCC were identified on the site during thew site visit and none are likely to have been missed. The seasonality of the study was not optimal, however, geophytic plants were still visible from their leaves or dried flowering plants and none of the SCC predicated by the screening tool (Table 1) are likely to be present on the site in its current condition.

Table1. Species predicted to be in the study area (by the screening tool) AND those not predicted in the screening tool that were found in the adjacent vegetation.

Species	***IUCN Status***	***Observed/Likelihood of occurrence***	***Justification for likelihood of occurrence***
Ruschia duthiae	*VU*	*No/Low*	*Only one member of this family was found on the site and it is confirmed not to be this one.*
Leucospermum glabrum	*EN*	*No/Low*	*Distinctive growth form not seen on the site in any of the habitats*
Selago burchellii	*VU*	*No/Low*	*Genus is present but confirmed as a different species.*
Sensitive species 419	*VU*	*No/Low*	*Distinctive growth form not seen on the site in any of the habitats*
Sensitive species 1024	*EN*	*No/Low*	*A seasonal limitation for this species exists, however, no leaves from this genus were present on the site. And they are highly likely to have been up if they were present.*
Cotula myriophylloides	*CR*	*No/Low*	*The habitat is for the estuary and not present on the site.*
Acmadenia alternifolia	*VU*	*No/Low*	*This species was not found on the site and is unlikely to have been missed*
Sensitive species 763	*VU*	*No/Low*	*A seasonal limitation for this species exists, however, no leaves from this genus were present on the site. And they are highly likely to have been up if they were present.*
Zostera capensis	*EN*	*No/Low*	*The habitat is for the estuary and not present on the site.*

4. Impacts and Mitigation

No loss of SCC is expected to occur on the site due to the proposed development (Table 8). No specific mitigation related to SCC is proposed.

5. Conclusion

This plant species theme Compliance Statement has been compiled according to the relevant legislation using the guidelines provided. The impact on SCC of the proposed development is rated as Very Low negative and no SCC are likely to be impacted.

7. Content of report requirement and relevant sections

		Section or page of report
2.1	The assessment must be undertaken by a specialist registered with the South African Council for Natural Scientific Professions (SACNASP), within a field of practice relevant to the taxonomic groups ("taxa") for which the assessment is being undertaken.	Page ii and Appendix 3
2.2	The assessment must be undertaken within the study area.	It was
2.3	The assessment must be undertaken in accordance with the *Species Environmental Assessment Guideline*[23] and must:	
2.3.1	Identify the SCC which were found, observed or are likely to occur within the study area;	Tables 1 and 2 in Appendix 4
2.3.2	provide evidence (photographs) of each SCC found or observed within the study area, which must be disseminated by the specialist to a recognized online database facility[24] immediately after the site inspection has been performed (prior to preparing the report contemplated in paragraph 3).	Tables 1 and 2 in Appendix 4
2.3.3	identify the distribution, location, viability[25] and detailed description of population size of the SCC identified within the study area.	Table 2 and 3 in Appendix 4
2.3.4	identify the nature and the extent of the potential impact of the proposed development to the population of the SCC located within the study area.	Section 9
2.3.5	determine the importance of the conservation of the population of the SCC identified within the study area, based on information available in national and international databases including the IUCN Red List of Threatened Species, South African Red List of Species, and/or other relevant databases.	Table 3 in Appendix 4
2.3.6	determine the potential impact of the proposed development on the habitat of the SCC located within the study area.	Table 3 in Appendix 4
2.3.7	include a review of relevant literature on the population size of the SCC, the conservation interventions as well as any national or provincial species management	Table 3 in Appendix 4

	plans for the SCC. This review must provide information on the need to conserve the SCC and indicate whether the development is compliant with the applicable species management plans and if not, a motivation for the deviation;	
2.3.8	identify any dynamic ecological processes occurring within the broader landscape, that might be disrupted by the development and result in negative impact on the identified SCC, for example, fires in fire-prone systems.	N/A
2.3.9	identify any potential impact on ecological connectivity within the broader landscape and resulting impacts on the identified SCC and its long term viability.	N/A
2.3.10	determine buffer distances as per the *Species Environmental Assessment Guidelines* used for the population of each SCC; and	Section 4 of Appendix 4
2.3.11	discuss the presence or likelihood of additional SCC including threatened species not identified by the screening tool, *Data Deficient or Near Threatened Species, as well as any undescribed species26; and*	Table 1 of Appendix 4.
2.3.12	identify any alternative development footprints within the preferred development site which would be of "low" sensitivity" or "medium" sensitivity as identified by the screening tool and verified through the site sensitivity verification.	N/A

3.	**Terrestrial Plant Species Specialist Assessment Report**[27]	Section/Page
3.1	This report must include as a minimum the following information:	
3.1.1	contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the assessment including a curriculum vitae;	See above
3.1.2	a signed statement of independence by the specialist.	Page iii
3.1.3	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment.	Section 4
3.1.4	a description of the methodology used to undertake the site sensitivity verification and impact assessment and site inspection, including equipment and modelling used where relevant;	Section 4
3.1.5	a description of the assumptions made and any uncertainties or gaps in knowledge or data.	Section 4
3.1.6	a description of the mean density of observations/number of samples sites per unit area[28] of site inspection observations.	Figure 2 of Appendix 4.
3.1.7	details of all SCC found or suspected to occur on site, ensuring sensitive species are appropriately reported.	See above
3.1.8	the online database name, hyperlink and record accession numbers for disseminated evidence of SCC found within the study area.	Table 2 of Appendix 4
3.1.9	the location of areas not suitable for development and to be avoided during construction where relevant.	N/A
3.1.10	a discussion on the cumulative impacts;	Section 9
3.1.11	impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr).	Section 9
3.1.12	a reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not, of the development related to the specific theme considered,	Section 10

	and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant; and	
3.1.13	a motivation must be provided if there were any development footprints identified as per paragraph 2.3.12 above that were identified as having “low” or “medium” terrestrial plant species sensitivity and were not considered appropriate	N/A
3.2	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report	

APPENDIX 5: MINIMUM CONTENT REQUIREMENTS FOR TERRESTRIAL BIODIVERSITY SPECIALIST REPORTS AS PER PROTOCOL FOR THE SPECIALIST ASSESSMENT OF ENVIRONMENTAL IMPACTS ON TERRESTRIAL BIODIVERSITY (GN 320 OF 20 MARCH 2020)

Protocol ref	**Terrestrial Biodiversity Specialist Assessment Report Content**	**Section / Page**
3.1.1.	contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Page ii and Appendix 3
3.1.2.	a signed statement of independence by the specialist;	Page iii
3.1.3.	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 5
3.1.4.	a description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	Section 5
3.1.5.	a description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	Section 5
3.1.6.	a location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	Section 8
3.1.7.	additional environmental impacts expected from the proposed development;	Section 9
3.1.8.	any direct, indirect and cumulative impacts of the proposed development;	Section 9
3.1.9.	the degree to which impacts and risks can be mitigated;	Section 9
3.1.10.	the degree to which the impacts and risks can be reversed;	Section 9
3.1.11.	the degree to which the impacts and risks can cause loss of irreplaceable resources;	Section 9
3.1.12.	proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	Section 9
3.1.13.	a motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a "low" terrestrial biodiversity sensitivity and that were not considered appropriate;	N/A
3.1.14.	a substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	Section 10
3.1.15.	any conditions to which this statement is subjected.	Section 10