

---

# Proposed Residential Development on Erven 7594, 2924 and 2925, Knysna, Western Cape.

Aquatic Biodiversity Site Sensitivity Verification and Compliance Statement



**Prepared For:** Eco Route Environmental Consultancy

**Author:** Mr. Franco de Ridder (MSc)  
Confluent Environmental Pty (Ltd)  
7 St. Johns Street,  
Dormehls Drift,  
George, 6529

**SACNASP:** Cand. Sci. Nat. (Aquatic Science – 166398)

**Reviewer:** Dr. J. Dabrowski (PhD)

**SACNASP:** Pr. Sci. Nat. (Aquatic Science – 115166)

**Date:** 24 April 2024

**Version:** Final



---

## EXECUTIVE SUMMARY

Confluent Environmental Pty (Ltd) has been engaged by Eco Route to provide aquatic specialist inputs for proposed residential developments on Erven 7594, 2924, and 2925 in Knysna, Western Cape. The sensitivity of the aquatic biodiversity at the site, classified as 'Very High' by the DFFE Screening Tool, necessitates adherence to legislative requirements outlined in the National Environmental Management Act (NEMA) and the National Water Act (NWA).

Located adjacent to the N2 Highway and the Knysna Estuary, the three erven are located on land above cliffs adjacent to the highway. The desktop study highlighted concerns regarding soil erosion, rainfall intensity, stormwater management, and conservation efforts for the Knysna Estuary, which is rated as the most important in South Africa.

The categorisation of the area as a Critical Biodiversity Area 1 (CBA1) underscores the need to maintain natural habitats and implement low-impact, biodiversity-sensitive land uses. Additionally, the presence of mapped watercourses close to the site boundaries necessitates careful consideration to prevent negative impacts to aquatic ecosystems.

To mitigate the adverse effects of residential development, several recommendations have been proposed. These include relocating infrastructure to minimise stormwater impact, implementing erosion control measures, and adhering to Sustainable Drainage System (SuDS) principles for stormwater management. Furthermore, the strategic placement of rainwater harvesting tanks, swales, detention ponds, and permeable paving can help attenuate stormwater runoff from the development areas.

While challenges exist due to the site's proximity to vertical cliffs above the estuary, following the recommended management strategies in this report can reduce the risk to aquatic biodiversity and water resources. By implementing the proposed measures, the sensitivity of aquatic biodiversity on the property can be regarded as **low**, ensuring sustainable development within the Knysna region while preserving the integrity of the local ecosystem. This assessment therefore serves as a Compliance Statement that Aquatic Biodiversity at all three erven is rated as Low in contrast to the Screening Tool.

## DECLARATION OF SPECIALIST INDEPENDENCE

- I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP);
- At the time of conducting the study and compiling this report I did not have any interest, hidden or otherwise, in the proposed development that this study has reference to, except for financial compensation for work done in a professional capacity;
- Work performed for this study was done in an objective manner. Even if this study results in views and findings that are not favourable to the client/applicant, I will not be affected in any manner by the outcome of any environmental process of which this report may form a part, other than being members of the general public;
- I declare that there are no circumstances that may compromise my objectivity in performing this specialist investigation. I do not necessarily object to or endorse any proposed developments, but aim to present facts, findings and recommendations based on relevant professional experience and scientific data;
- I do not have any influence over decisions made by the governing authorities;
- I undertake to disclose all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by a competent authority to such a relevant authority and the applicant;
- I have the necessary qualifications and guidance from professional experts in conducting specialist reports relevant to this application, including knowledge of the relevant Act, regulations and any guidelines that have relevance to the proposed activity;
- This document and all information contained herein is and will remain the intellectual property of Confluent Environmental. This document, in its entirety or any portion thereof, may not be altered in any manner or form, for any purpose without the specific and written consent of the specialist investigators.
- All the particulars furnished by me in this document are true and correct.



Jackie Dabrowski (Ph.D., Pr.Sci.Nat. *Aquatic Science*)  
SACNASP Registration Number 115166  
Co-director: Confluent Environmental (Pty) Ltd

**Qualifications:** BSc, BSc Honours (Entomology), MSc & PhD (Veterinary Science)

**Expertise:** > 13 years' experience working on aquatic ecosystems across South Africa, with a focus on the Southern Cape in the last 7 years. Includes research and consulting expertise, having published > 10 water-related research articles and compiled > 450 aquatic specialist reports. Research and consulting have been in a range of sectors including agriculture, urban developments, linear structures, renewable energy, conservation, and mining.

## TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>I</b>
<b>DECLARATION OF SPECIALIST INDEPENDENCE .....</b>	<b>II</b>
<b>LIST OF TABLES .....</b>	<b>IV</b>
<b>LIST OF FIGURES .....</b>	<b>IV</b>
<b>GLOSSARY.....</b>	<b>V</b>
<b>ABBREVIATIONS .....</b>	<b>VI</b>
<b>1. INTRODUCTION .....</b>	<b>1</b>
1.1 KEY LEGISLATIVE REQUIREMENTS .....	1
1.1.1 National Environmental Management Act .....	1
1.1.2 National Water Act.....	2
1.2 DFFE SCREENING TOOL RESULTS .....	3
1.3 ASSUMPTIONS AND EXCLUSIONS.....	4
1.4 THE PROPOSED DEVELOPMENT.....	4
<b>2. CATCHMENT CONTEXT .....</b>	<b>7</b>
2.1 CATCHMENT FEATURES .....	7
2.2 VEGETATION.....	9
2.3 CONSERVATION AND CATCHMENT MANAGEMENT .....	9
2.3.1 Western Cape Biodiversity Spatial Plan.....	9
2.3.2 National Freshwater Ecosystem Priority Areas .....	10
2.3.3 Knysna Estuary Management Plan .....	11
2.4 MAPPED WATERCOURSES .....	12
2.5 HISTORICAL ASSESSMENT .....	12
2.6 SITE TOPOGRAPHY.....	13
<b>3. SITE ASSESSMENT .....</b>	<b>14</b>
<b>4. LEGISLATIVE IMPLICATIONS .....</b>	<b>16</b>
4.1 AQUATIC BIODIVERSITY COMPLIANCE STATEMENT .....	16
4.2 NATIONAL WATER ACT .....	16
<b>5. MANAGEMENT RECOMMENDATIONS .....</b>	<b>17</b>
5.1 STORMWATER MANAGEMENT.....	17
5.2 RECOMMENDATIONS TO REDUCE STORMWATER ON THE SOUTHWESTERN SLOPE.....	17
5.3 EROSION MANAGEMENT.....	18
<b>6. REFERENCES .....</b>	<b>20</b>

## LIST OF TABLES

Table 1. Summary of relevant catchment features for the proposed development area.....	7
Table 2. Definitions and objectives for conservation categories identified in the Western Cape Biodiversity Spatial Plan (WCBSP, 2017).....	10

## LIST OF FIGURES

Figure 1. Erven 7594, 2924 and 2925, Knysna, Western Cape. ....	1
Figure 2: Results of the DFFE Screening Tool which indicate Very High Sensitivity of the Aquatic Biodiversity theme for the preferred development site on Erven 2924, 2925 and 7594.....	3
Figure 3: Erven 2924, 2925 and 7594 with access road. ....	4
Figure 4: Proposed site development plan on Erf 7594.....	5
Figure 5: 3D model of the proposed dwelling on Erf 2924.....	6
Figure 6: Proposed development plan excluding a large part of the access road on Erf 2924. ....	6
Figure 7. Location of Erven 2924, 2925 and 7594 in the quaternary catchment K50B. ....	8
Figure 8: The proposed development sites in relation to mapped watercourses. ....	8
Figure 9. Area-averaged monthly rainfall for the coastal Southern Cape indicating peaks in Mar-Apr, Aug, and Oct. Data averaged between 1979 and 2011 (Engelbrecht et al., 2015). ....	9
<i>Figure 10. The proposed development area to mapped conservation features of the Western Cape Biodiversity Spatial Plan (2017). ....</i>	<i>10</i>
Figure 11: Proposed development in relation to the Development Control Area of the Knysna estuary. ....	11
Figure 12. Historical photos showing Erven 2924, 2925 and 7594 through notable changes between 1958 and 2017 (CD:NGI & Google Earth imagery). ....	13
Figure 13: Properties in relation to 0.5 and 5 m contours.....	14
Figure 14: A & B - Sandstone and conglomerate cliff, C – Sandy soil present on site, D – vegetation present on site, E - Acacia cyclops.....	15
Figure 15: GPS track walked in relation to Properties. ....	15
Figure 16: Proposed development sites in relation to the 500 m and 100 m regulated areas. ....	16
Figure 17: SDP in relation to 0.5 m and 5 m contours on Erf 2924 .....	18
Figure 18: Examples of silt fences (left) and coir logs (right) used to trap sediment mobilised from steep slopes. ....	19

## GLOSSARY

<b>Aquatic Biodiversity</b>	The variety of plant and animal life in water ecosystems, relevant to the study due to the site's proximity to potential water bodies.
<b>Desktop Review</b>	Preliminary assessment based on existing data and information, conducted prior to on-site investigations.
<b>Erosion Control Methods</b>	Techniques employed to prevent or minimize soil erosion, such as haybale check dams or silt fencing, crucial in areas with high inherent erosion potential.
<b>Freshwater Ecosystem Priority Area (FEPA)</b>	Designated areas of high importance for freshwater ecosystem conservation, identified as a sensitivity feature in the DFFE screening tool.
<b>Site Assessment</b>	Comprehensive evaluation of the proposed development site, including the identification of wetlands, watercourses, and soil characteristics.
<b>Sensitivity</b>	The degree to which a particular area or ecosystem is susceptible to disturbance or impact, crucial in determining potential environmental consequences.
<b>Terrestrial Critical Biodiversity Area (CBA1)</b>	A designation indicating the significance of the area's biodiversity on land.
<b>Topography</b>	The physical features of the land surface, considered for its potential influence on drainage and ecological features.
<b>Wetland</b>	An area where water covers the soil, or is present either at or near the surface, contributing to biodiversity and ecological significance.
<b>Western Cape Biodiversity Spatial Plan (WCBSP)</b>	A plan indicating categorized areas based on their ecological importance in the Western Cape region.

## ABBREVIATIONS

<b>CBA:</b>	Critical Biodiversity Area
<b>CD:NGI:</b>	Chief Directorate: National Geo-spatial Information
<b>DFFE:</b>	Department of Environment, Forestry and Fisheries
<b>DWAF:</b>	Department of Water Affairs and Forestry
<b>DWS:</b>	Department of Water & Sanitation
<b>EIS:</b>	Ecological Importance and Sensitivity
<b>ESA:</b>	Ecological Support Area
<b>FEPA:</b>	Freshwater Ecosystem Priority Area
<b>GA:</b>	General Authorisation
<b>GPS:</b>	Global Positioning System
<b>NEMA:</b>	National Environmental Management Act
<b>NFEPA:</b>	National Freshwater Ecosystem Priority Areas
<b>NWA:</b>	National Water Act
<b>NWM5:</b>	National Wetland Map 5
<b>SACNASP:</b>	South African Council for Natural Scientific Professions
<b>WCBSP:</b>	Western Cape Biodiversity Spatial Plan
<b>WUL:</b>	Water Use License

## 1. INTRODUCTION

Confluent Environmental Pty (Ltd) was appointed by Eco Route to provide aquatic specialist inputs for the proposed residential developments on Erven 7594, 2924 and 2925, Knysna, Western Cape. (Figure 1). According to the DFFE Screening Tool, Erven 7594, 2924 and 2925 have a 'Very High' aquatic biodiversity sensitivity (Figure 2).

The scope of work for this report is guided by the legislative requirements of the National Environmental Management Act (NEMA) as well as the National Water Act (NWA).

The site is adjacent to the N2 and the Knysna estuary and approximately 3.4 km west of Knysna Central.

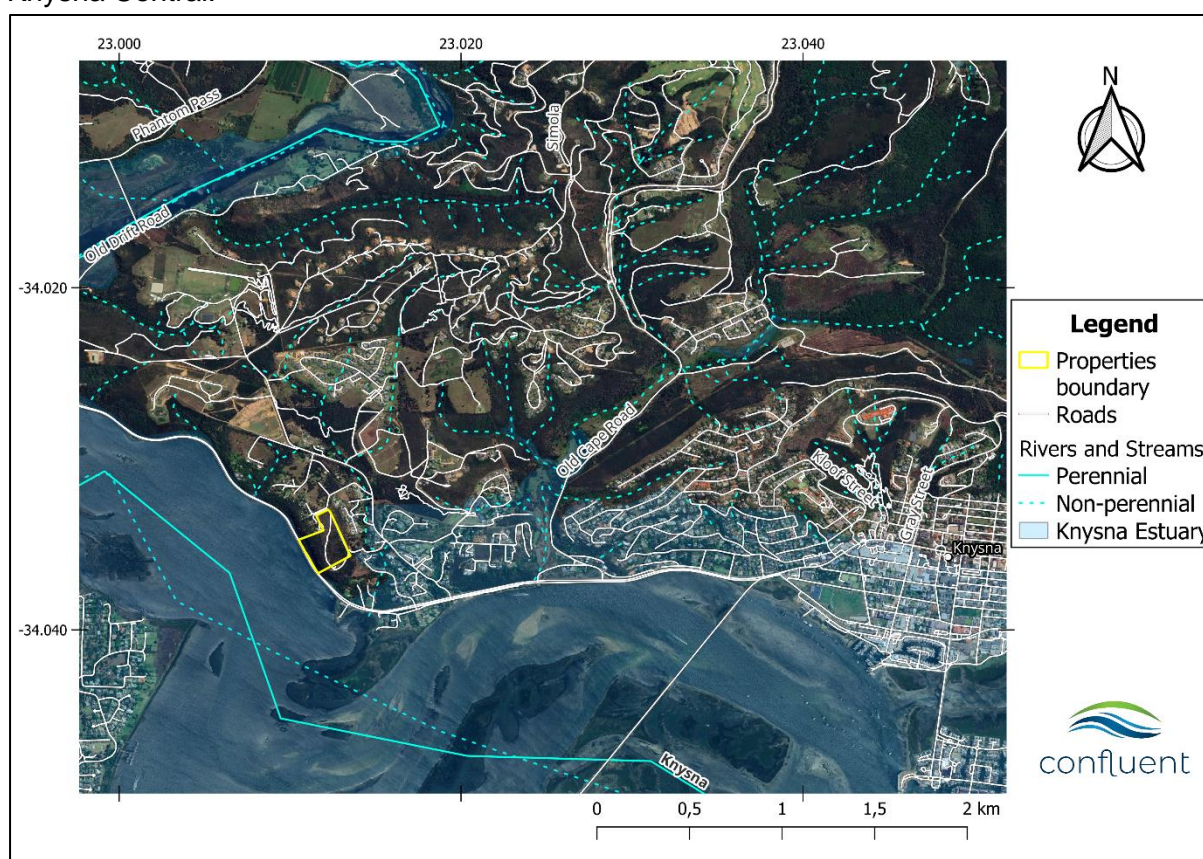


Figure 1. Erven 7594, 2924 and 2925, Knysna, Western Cape.

### 1.1 Key Legislative Requirements

#### 1.1.1 National Environmental Management Act

According to the protocols specified in GN 1540 (Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in Terms of Sections 24(5)(A) and (H) and 44 of the National Environmental Management Act, 1998, when Applying for Environmental Authorisation), assessment and reporting requirements for aquatic biodiversity are associated with a level of environmental sensitivity identified by the national web-based environmental screening tool. 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:



- **Very High** sensitivity for aquatic biodiversity, must submit an Aquatic Biodiversity Specialist Assessment; or
- **Low** sensitivity for aquatic biodiversity, must submit an Aquatic Biodiversity Compliance Statement.

The screening tool classified the site as being of **Low** aquatic biodiversity. According to the protocol, a site sensitivity verification must be undertaken to confirm the sensitivity of the site as indicated by the screening tool:

- Where the information gathered from the site sensitivity verification differs from the screening tool designation of **Low** aquatic biodiversity sensitivity, and it is found to be of a **Very High** sensitivity, an Aquatic Biodiversity Specialist Assessment must be submitted.

### 1.1.2 National Water Act

The Department of Water & Sanitation (DWS) is the custodian of South Africa's water resources and therefore assumes public trusteeship of water resources, which includes watercourses, surface water, or aquifers.

A watercourse means:

- A river or spring;
- A natural channel in which water flows regularly or intermittently;
- A wetland, lake or dam into which, or from which, water flows; and
- Any collection of water which the Minister may, by notice in the Gazette, declare to be watercourse, and

For the purposes of this assessment, a wetland area is defined according to the NWA (Act No. 36 of 1998):

*“Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil”.*

Wetlands must therefore have one or more of the following attributes to meet the NWA wetland definition (DWAf, 2005):

- A high water table that results in the saturation at or near the surface, leading to anaerobic conditions developing in the top 50 cm of the soil;
- Wetland or hydromorphic soils that display characteristics resulting from prolonged saturation, i.e. mottling or grey soils; and
- The presence of, at least occasionally, hydrophilic plants, i.e. hydrophytes (water loving plants).

No activity may take place within a watercourse unless it is authorised by the Department of Water and Sanitation (DWS). According to Section 21 (c) and (i) of the National Water Act, an authorization (Water Use License or General Authorisation) is required for any activities that impede or divert the flow of water in a watercourse or alter the bed, banks, course or

characteristics of a watercourse. The regulated area of a watercourse for section 21(c) or (i) of the Act water uses means:

- a) The outer edge of the 1 in 100-year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;
- b) In the absence of a determined 1 in 100-year flood line or riparian area the area within 100m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench (subject to compliance to section 144 of the Act); or
- c) A 500 m radius from the delineated boundary (extent) of any wetland or pan.

According to Section 21 (c) and (i) of the NWA, any water use activities that do occur within the regulated area of a watercourse must be assessed using the DWS Risk Assessment Matrix (GN4167) to determine the impact of construction and operational activities on the flow, water quality, habitat and biotic characteristics of the watercourse. Low-Risk activities require a General Authorisation (GA), while Medium or High-Risk activities require a Water Use License (WUL).

## 1.2 DFFE Screening Tool Results

According to the Department of Environment, Forestry and Fisheries (DFFE) screening tool, aquatic biodiversity at the site has a **Very High** sensitivity (Figure 2 **Error! Reference source not found.**). The sensitivity feature identified about the classification is:

- CBA 1: Aquatic
- Estuary\_Knysna
- FEPA Subcatchment
- SWSA (SW) \_Outeniqua
- Wetlands\_(Estuary)

The scope of work for this report is guided by the legislative requirements of the National Environmental Management Act (NEMA) and the National Water Act (NWA; Act No 36 of 1998).



Figure 2: Results of the DFFE Screening Tool which indicate Very High Sensitivity of the Aquatic Biodiversity theme for the preferred development site on Erven 2924, 2925 and 7594.

### 1.3 Assumptions and Exclusions

A site visit was conducted in April 2024 which is considered Autumn. It is possible that sensitive features such as rare or unique biota (e.g. amphibians), plants or habitat were not observed during the site visit, but are influenced by season, time of day, flow level or vegetation cover. However, recent good rainfall would have meant that any wetland features would have been quite evident and easy to identify.

### 1.4 The Proposed Development

Separate developments are proposed for each erf. On Erf 7594 a high-density residential development is proposed. On Erf 2924 one large single dwelling is proposed and on Erf 2925 a single dwelling is proposed. An existing access road, crossing all the erven can be seen in Figure 3



Figure 3: Erven 2924, 2925 and 7594 with access road.

Erf 7594 (0.85 ha) is proposed to be subdivided into 8 portions, with an access road. Seven of the sub-divisions would be used for housing developments, with the eighth portion left as open space (Figure 4).

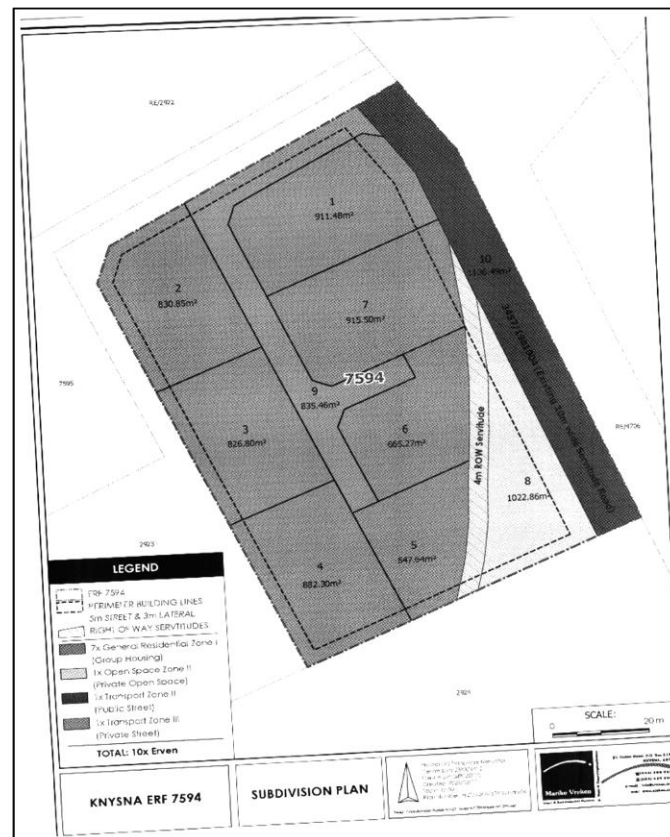


Figure 4: Proposed site development plan on Erf 7594.

A single dwelling with a footprint of 789 m<sup>2</sup> as well as an access road and driveway with a footprint of 2329 m<sup>2</sup> is proposed to be developed on Erf 2924 (2.4 ha). The total development footprint includes fencing, a swimming pool, and cut and fill, covering a total of 10 450 square metres. A septic tank is also proposed for development, situated 5 m west of the main footprint (Figure 5 and Figure 6).

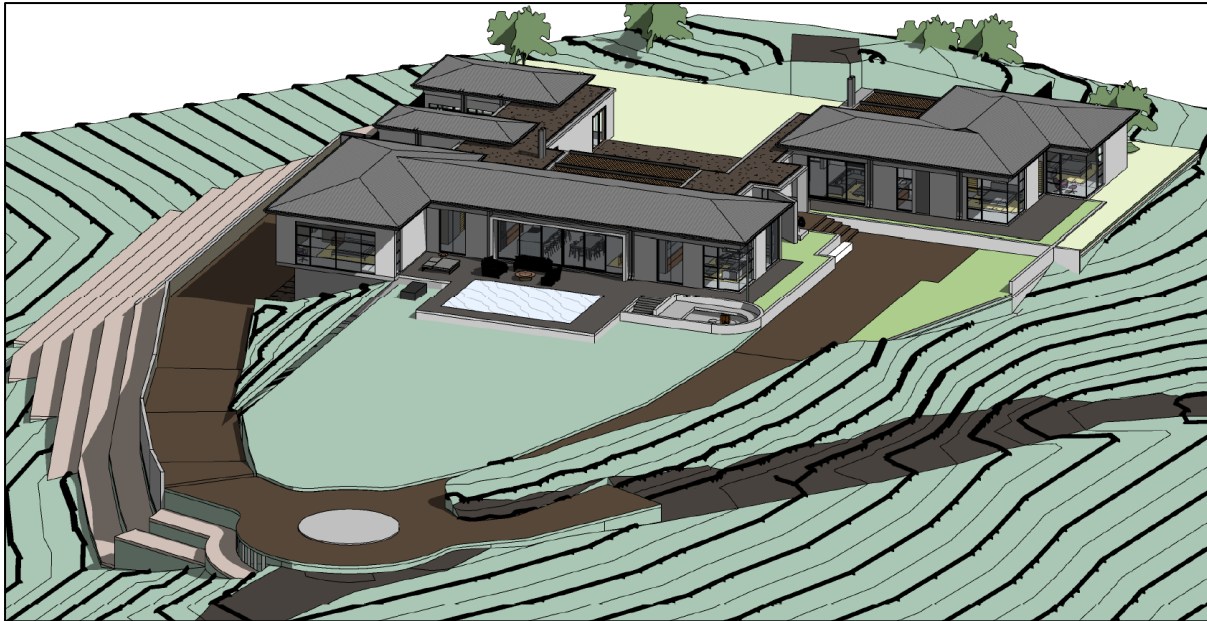


Figure 5: 3D model of the proposed dwelling on Erf 2924.

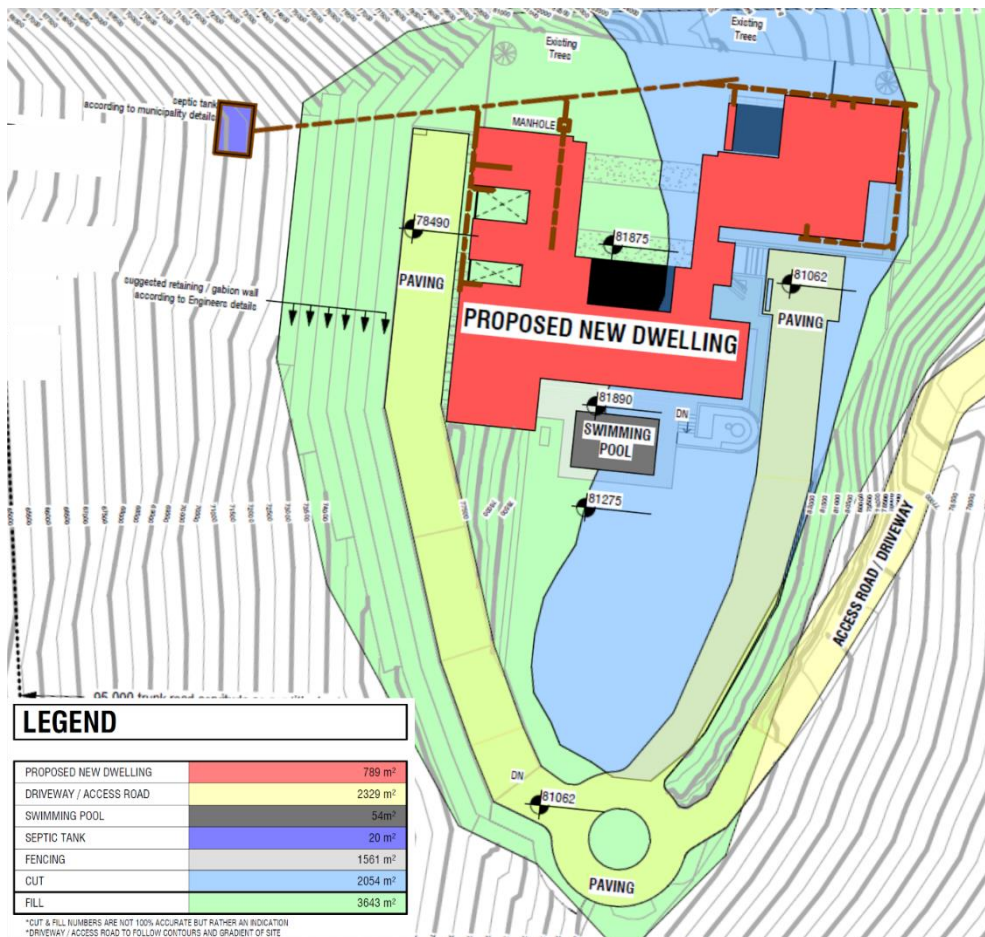


Figure 6: Proposed development plan excluding a large part of the access road on Erf 2924.

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 also including an access road and a paved area (Figure ).

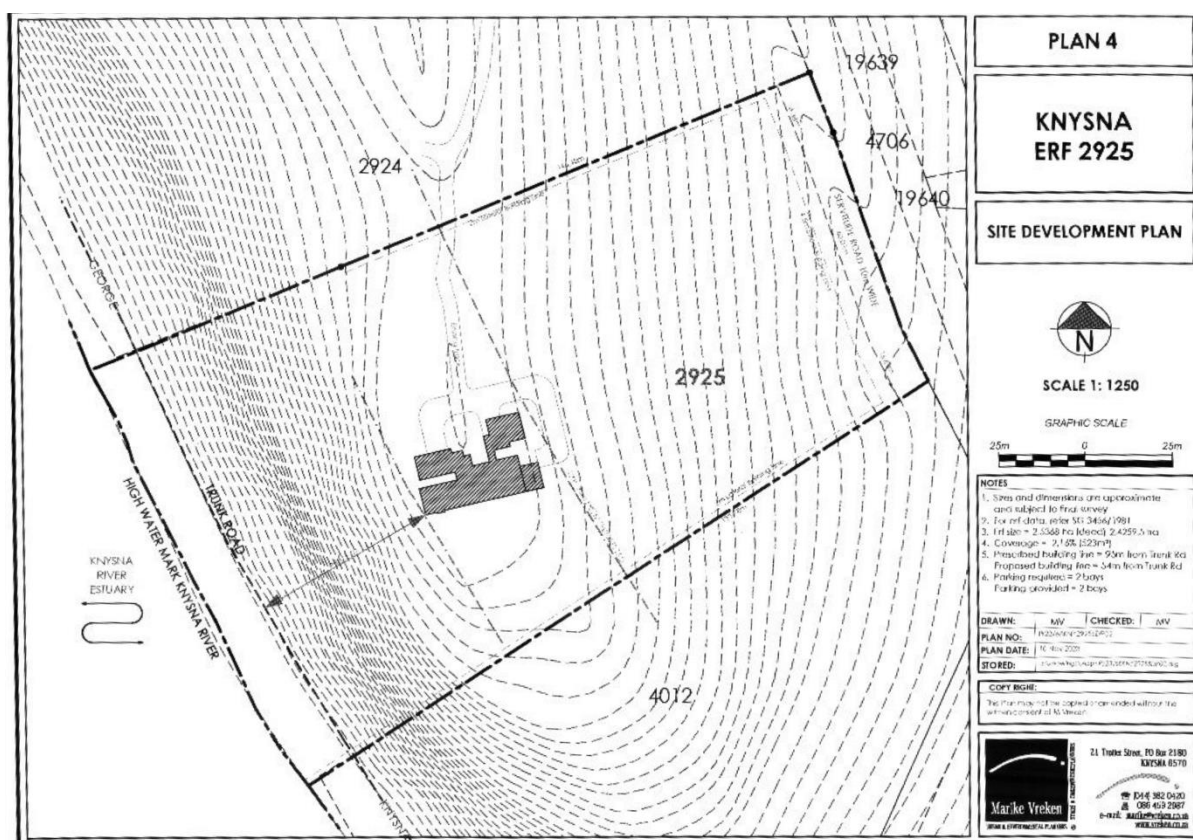


Figure 7: Proposed development plan for the single dwelling on Erf 2925

## 2. CATCHMENT CONTEXT

### 2.1 Catchment features

The proposed development sites (Erven 2924, 2925 and 7594) are located in the quaternary catchment K50B in the catchment of the Knysna Estuary (Figure 7). Only the Knysna Estuary is mapped adjacent to the properties, flowing in a southeast direction. As the rainfall intensity in the area is classified as Very High and the inherent erosion potential of soils also as High, erosion of soils and stormwater management are factors that must be carefully considered when developing in this area, especially considering the large amounts of stormwater associated with urban developments and the steepness of the slope towards the southwest. (**Error! Reference source not found.**, Figure 7 and Figure 8)

Table 1. Summary of relevant catchment features for the proposed development area.

Feature	Description
Quaternary catchment	K50B
Mean Annual Runoff	271.55 mm
Mean Annual Precipitation	605.00 mm
Inherent erosion potential of soils (K-factor)	0.65, High
Rainfall intensity	Very High
Ecoregion Level II	20.02, Southeastern coastal belt
Geomorphological Zone	Lowland river
NFEPA area	Sub-quaternary reach 9117, FEPA.
Mapped Vegetation Type	FFh9: Garden Route Shale Fynbos (Endangered)
Conservation	CBA1: Aquatic and Terrestrial; WCBSP (2017).

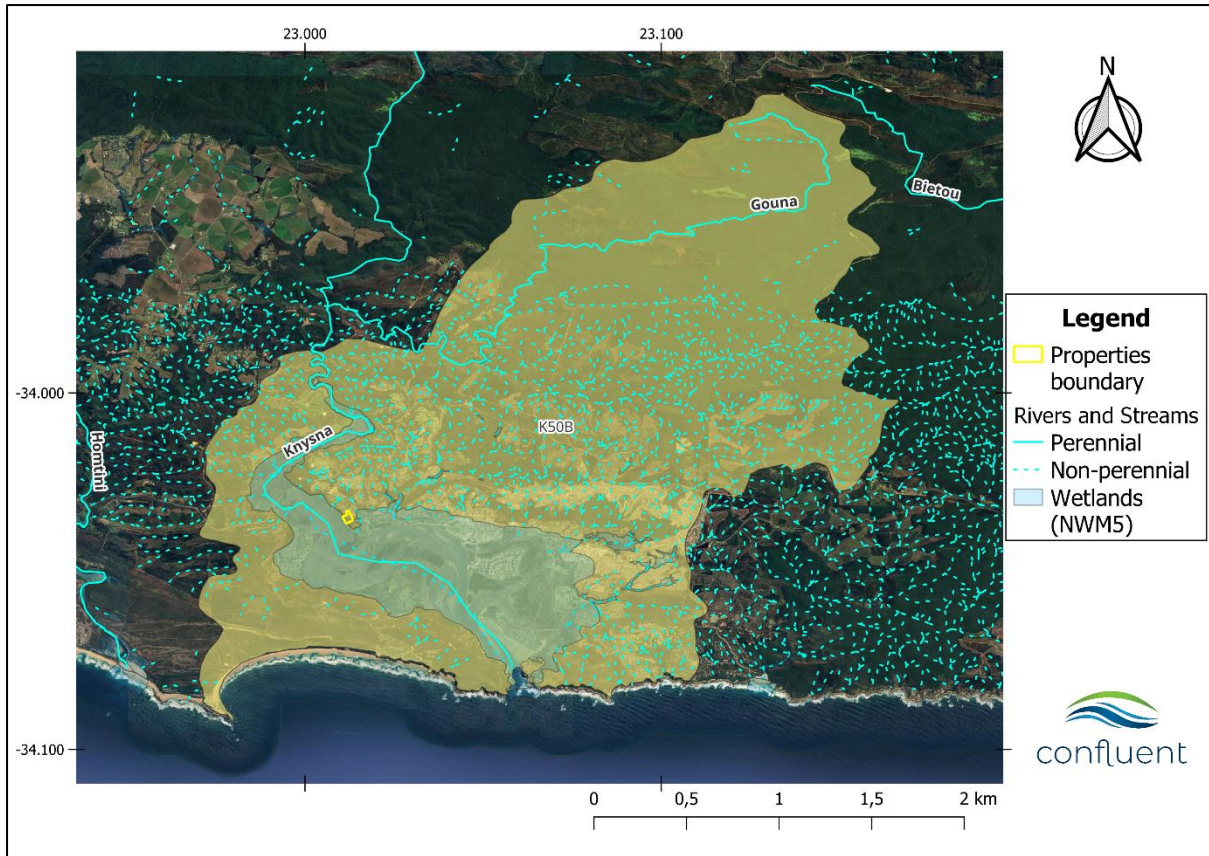


Figure 7. Location of Erven 2924, 2925 and 7594 in the quaternary catchment K50B.

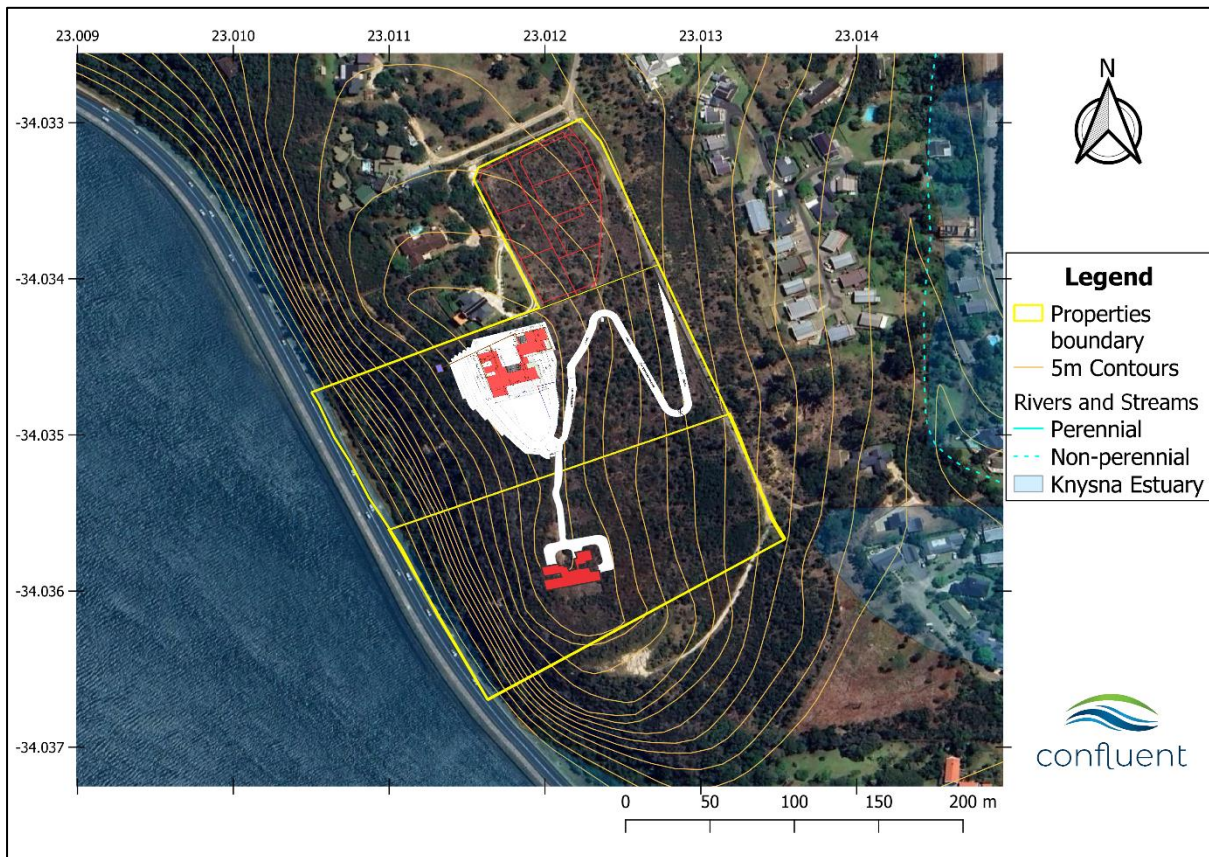


Figure 8: The proposed development sites in relation to mapped watercourses.

Rainfall occurs year-round with seasonal peaks in spring and autumn (Figure 9).

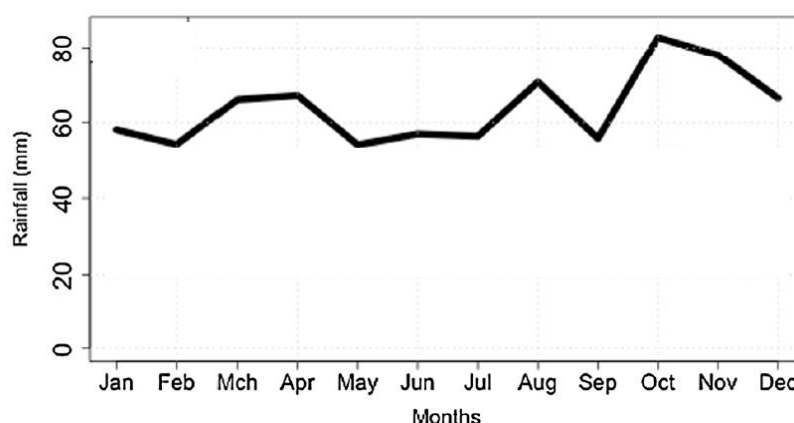


Figure 9. Area-averaged monthly rainfall for the coastal Southern Cape indicating peaks in Mar-Apr, Aug, and Oct. Data averaged between 1979 and 2011 (Engelbrecht et al., 2015).

The project area is located within the southeastern coastal belt (Ecoregion Level 2:20.02). The terrain is described as closed hills of moderate and high relief and moderately undulating plains. Altitude ranges between 0 – 1 300 m.a.m.s.l.

## 2.2 Vegetation

The vegetation type at the site is mapped as Garden Route Shale Fynbos, (FFh9; NVM, 2018). This vegetation type has been mapped as Endangered, because it is narrowly distributed with high rates of habitat loss in the past 28 years (1990-2018), placing the ecosystem type at risk of collapse (GN 47526, Revised national list of threatened ecosystems in need of protection in terms of NEM:BA, Act No. 10 of 2004). This vegetation type is primarily found on undulating hills and moderately undulating plains on the coastal forelands. The structure of this vegetation type consists of tall, dense proteoid and ericaceous fynbos in wetter areas, and graminoid fynbos (or shrubby grassland) in drier areas. Fynbos appears to be confined to flatter more extensive landscapes that are exposed to frequent fires. In fire-safe habitats closer to the coast have small clumps of thicket, with valley floors having scrub forests. Fairly wide belts of *Virgilia oroboides* occur on the interface between fynbos and forests (Rebelo et al., 2006).

## 2.3 Conservation and catchment management

### 2.3.1 Western Cape Biodiversity Spatial Plan

The Western Cape Biodiversity Spatial Plan (WCBSP; 2017) indicated the following categorised areas on the property and surrounding area;

- An aquatic and terrestrial Critical Biodiversity Area 1 (CBA1),

The main reasons for the categorisation of the area is that the area falls within the following:

- Knysna (Core) Estuary
- Water source protection- Knysna
- Watercourse protection- South Eastern Coastal Belt
- Garden Route Shale Fynbos (EN) (Figure 10).



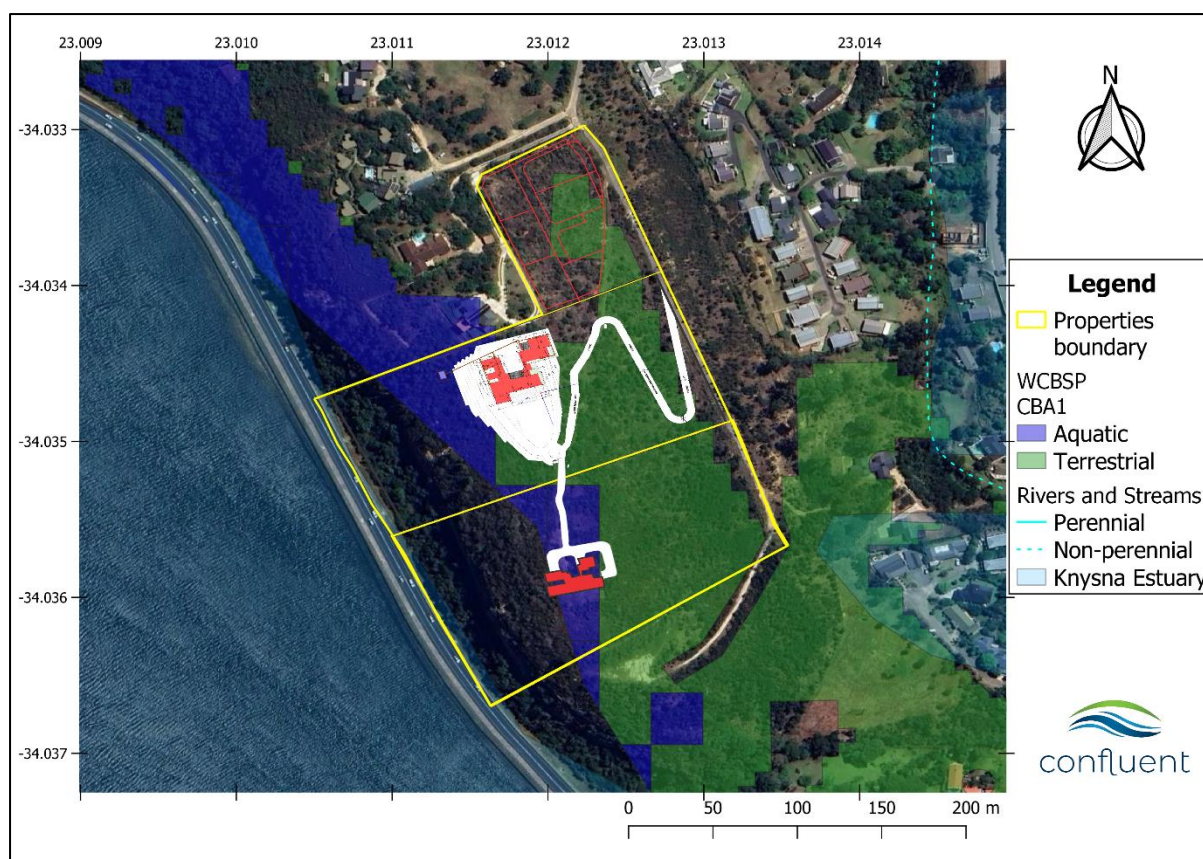


Figure 10. The proposed development area to mapped conservation features of the Western Cape Biodiversity Spatial Plan (2017).

Necessary actions in relation to the WCBSP are to ensure that development on the site does not result in negative impacts on the ecological structure and function of the estuary or any watercourses adjacent to and on to the site (Table 2). Even though the CBA1 Aquatic is not mapped within the estuary itself, its location on the steep slopes above the estuary were likely a precautionary step in recognition of the vulnerability of the site to erosion.

Table 2. Definitions and objectives for conservation categories identified in the Western Cape Biodiversity Spatial Plan (WCBSP, 2017).

WCBSP Category	Definition	Management Objective
Critical Biodiversity Area 1 (CBA1)	Areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure.	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.

### 2.3.2 National Freshwater Ecosystem Priority Areas

According to the National Freshwater Ecosystem Priority Atlas (NFEPAs; Nel *et al.*, 2011) the sub-quaternary reach (SQR 9117) is classified as a Freshwater Ecosystem Priority Area (FEPA) (NFEPAs; Nel *et al.*, 2011).

River FEPAs achieve biodiversity targets for river ecosystems and threatened/near-threatened fish species and were identified in rivers that are currently in a good condition (A or B ecological category). Their FEPA status indicated that they should remain in a good

condition in order to contribute to national biodiversity goals and support sustainable use of water resources (Nel et al., 2011).

For river FEPAs, the whole Sub-quaternary catchment (SQC) is identified as a FEPA. Thus, the whole sub-quaternary catchment indicates needs to be managed in a way that maintains the good ecological condition of the river reach, which in this case, is the Knysna Estuary. It is therefore important that development does not result in any deterioration of the estuary or its catchment area. Similarly, the Knysna Estuary has been identified as an estuary FEPA, which is also indicative of the good ecological condition of the estuary. The larger drainage network and surrounding land use should therefore be managed to ensure the estuarine system remains in a good ecological condition.

### 2.3.3 Knysna Estuary Management Plan

According to the Knysna River Estuary Management Plan (2017) a Development Control Area has been established. The Knysna River Estuary Management Plan (2017) states the following regarding the Development Control Area: “regard to development along the lagoon edge, according to the Regulations for the Proper Administration of the Knysna Protected Environment (Gazette No. 32797 – Notice 1175 dated 11 December 2009), any developments within the Development Control Area (100 m of the water’s edge) must seek SANParks approval since they are the designated management authority of the Knysna Protected Environment”.

Thus to reduce the impact of this development, the development must take place outside of the Development Control Area of the Knysna estuary Figure 11.

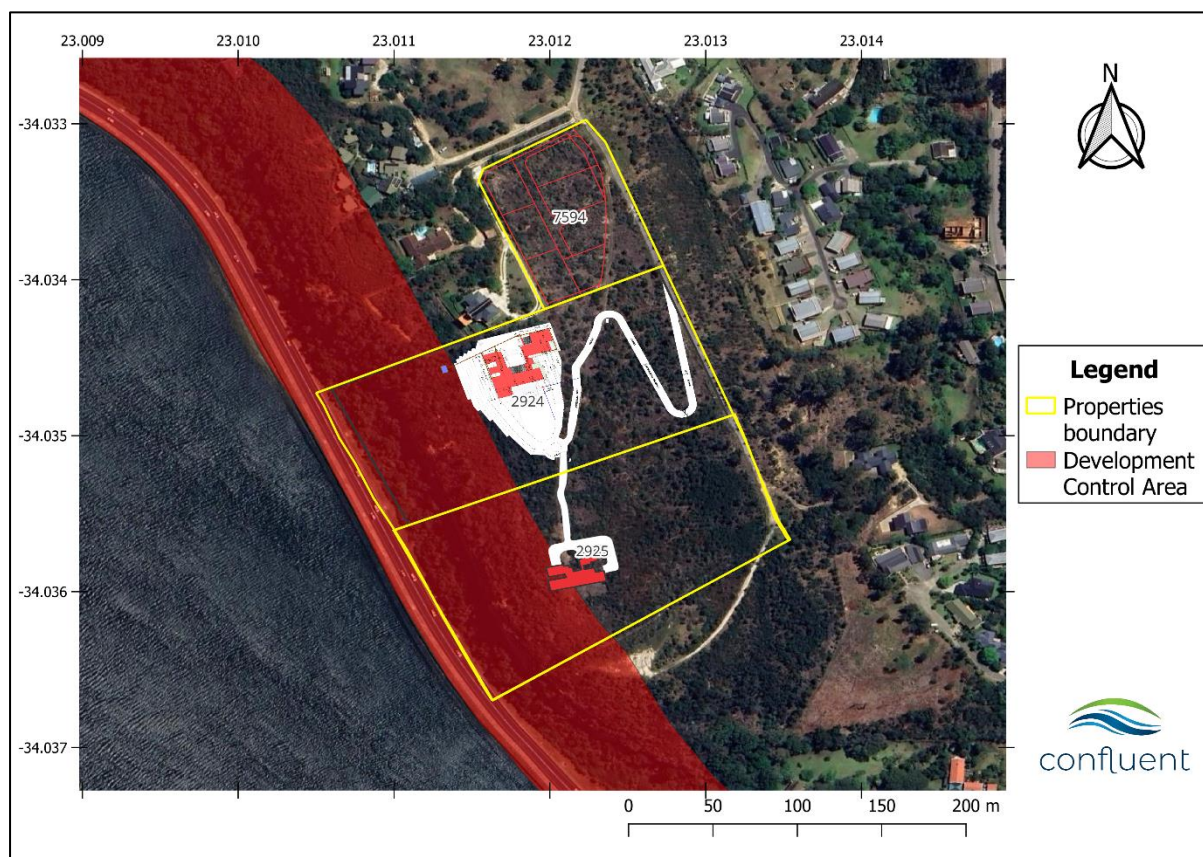


Figure 11: Proposed development in relation to the Development Control Area of the Knysna estuary.

### 2.3.3 Strategic Water Source Area

Erven 2924, 2925 and 7594 are in the Outeniqua Strategic Water Source Area for surface water (SWSA-sw). SWSAs are defined as areas of land that supply a disproportionate (ie. Relatively large) quantity of mean annual runoff in relation to their size and are therefore considered nationally relevant (Le Maitre *et al.*, 2018). A key objective in the management of SWSAs is to ensure the quantity and quality of water within and flowing from SWSAs is protected from developments that cause unacceptable and irreparable impacts.

Development of roads, parking areas and other impervious surfaces, along with wetland draining or infilling has the potential to change quantities of water in watercourses by intercepting, increasing, reducing or diverting flows from their normal path. Water quality can be impacted by flow-related alterations, particularly increased flows as this usually results in altered sediment transport causing scouring, sedimentation and increased turbidity due to suspended sediments. Especially during the construction phase. The operational phase of urban development's increase the risk of toxic hydrocarbons and other road-based pollutants as well as sewage from leaking or blocked drains or pump stations impacting on water quality.

## 2.4 Mapped Watercourses

The mapped watercourses near the proposed development sites are one non-perennial drainage line approximately 121 m northeast of the proposed development sites and the Knysna Estuary south-west of the site with no wetland or streams mapped within any of the erven under assessment (Figure 8).

## 2.5 Historical assessment

Historically Erven 2924, 2925 and 7594 have undergone no major anthropogenic changes throughout the past 66 years from 1958 to 2024. The properties seem to have been covered by alien vegetation at times in the past 66 years. The most notable disturbances on the properties were in 1958 and 2017. In 1958 the eastern part of the properties seemed to be cleared of vegetation and then recovered and revegetated in the years leading up to 1998. In 2017 the Knysna fires cleared almost the total of all three properties. The properties have since revegetated with areas dominated by alien vegetation (Figure 12). It is worth noting that the footprint of proposed dwellings on all three properties was completely burnt in the 2017 fires highlighting this factor as a significant risk that must be taken seriously and managed to reduce risks if the sites are to be developed.

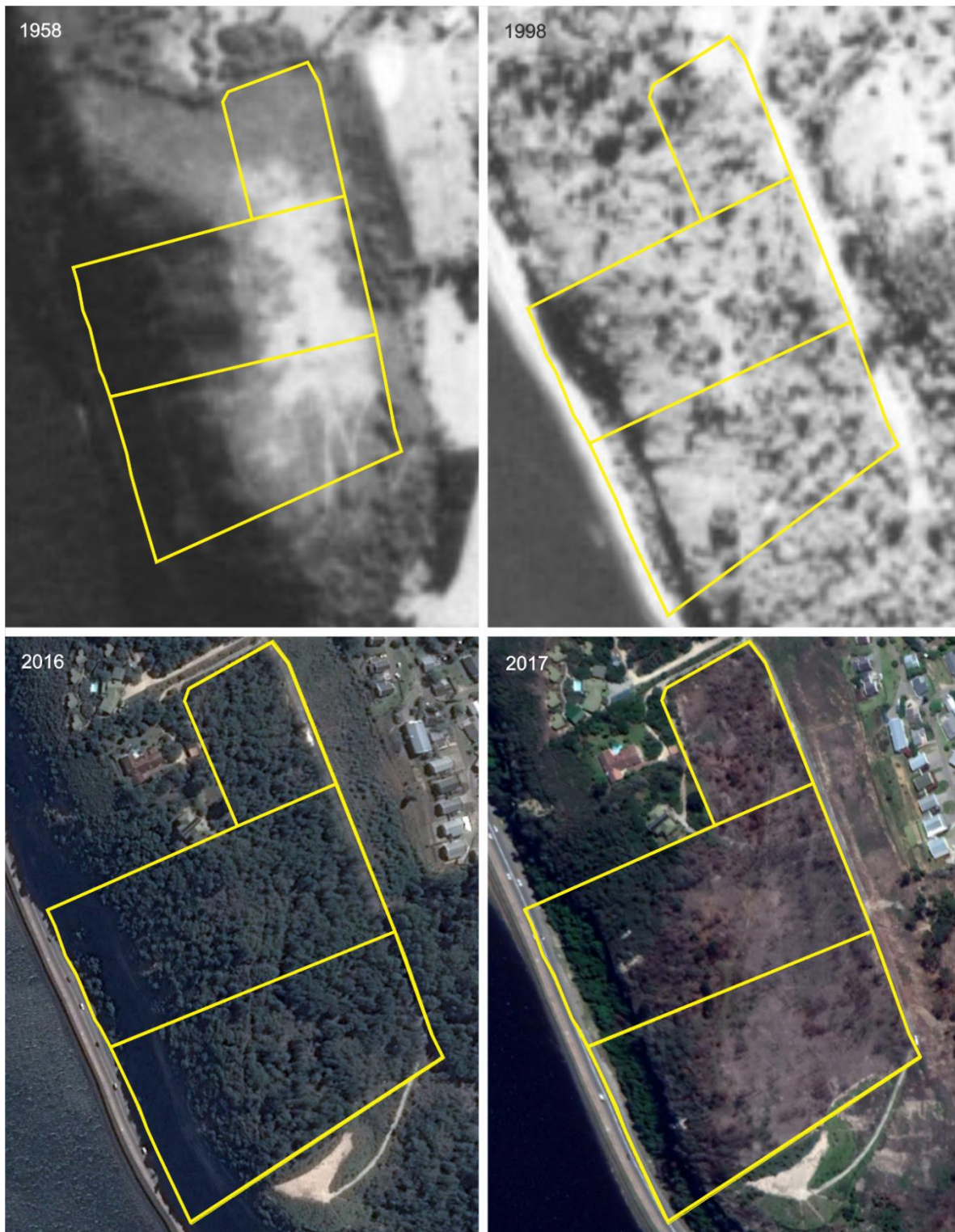


Figure 12. Historical photos showing Erven 2924, 2925 and 7594 through notable changes between 1958 and 2017 (CD:NGI & Google Earth imagery).

## 2.6 Site Topography

The 0.5m contours supplied by the DEA&DP do not cover the entire site, but do provide some perspective on the steep gradients present along the southwest of the properties which lead to sandstone and conglomerate cliffs. The properties also slope to the northeast although this is a gentler gradient (Figure 13).

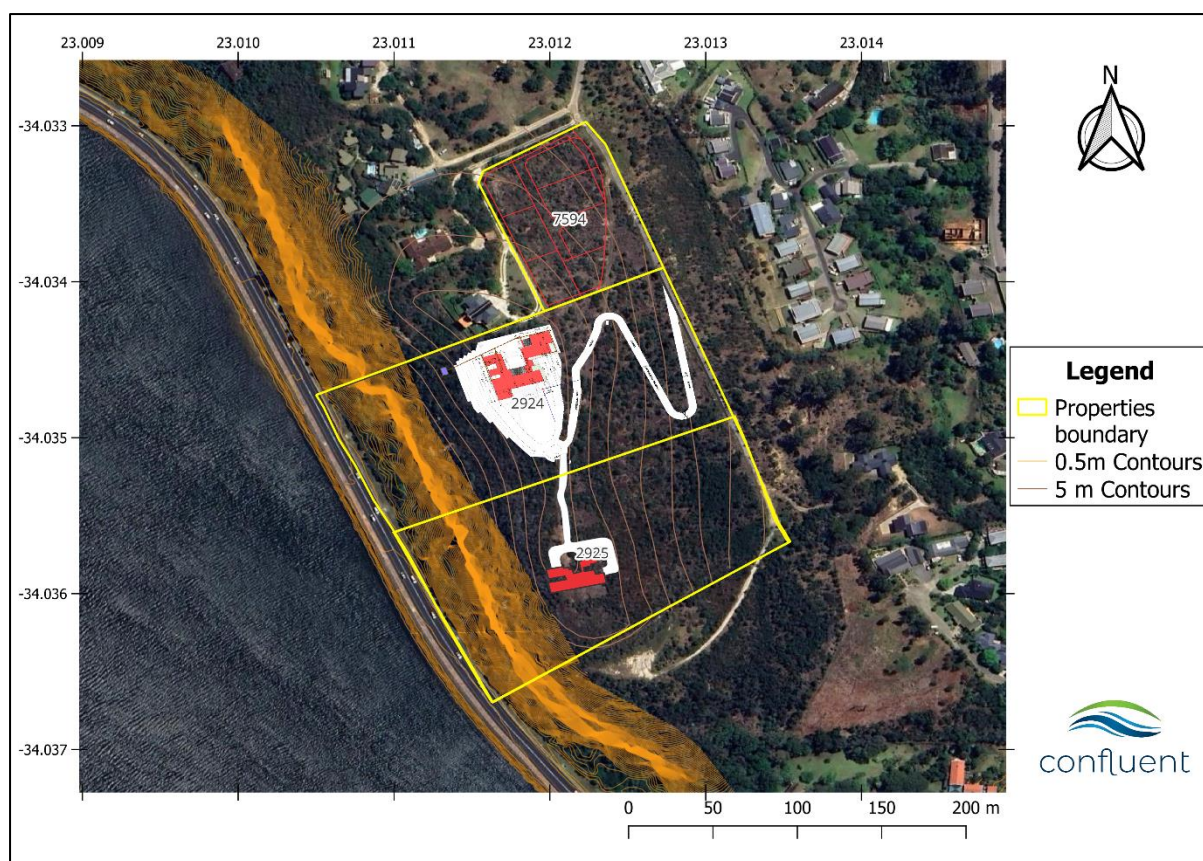


Figure 13: Properties in relation to 0.5 and 5 m contours.

### 3. SITE ASSESSMENT

The site visit was conducted on the 19th of April 2024 during which time the entire extent of the proposed development footprint on all three erven were traversed by foot. At the time of the site visit the weather was overcast. The sandstone and conglomerate cliffs, show signs of erosion which could be exacerbated if new micro flow paths are created from the development area above (Figure 14: A & B). The soil on all the properties is sandy (Figure 14: C) and no hydro-geomorphological landscape features (depressions, confined valleys, channels etc.) indicating the presence of a watercourse (i.e. stream, river or wetland) within the proposed development sites were observed. The vegetation present on all three erven was moderately to highly invaded Garden Route Shale Fynbos with the dominant invaders being, *Acacia cyclops*, *Pinus sp.* and *Acacia melanoxylon* (Figure 14: D & E).

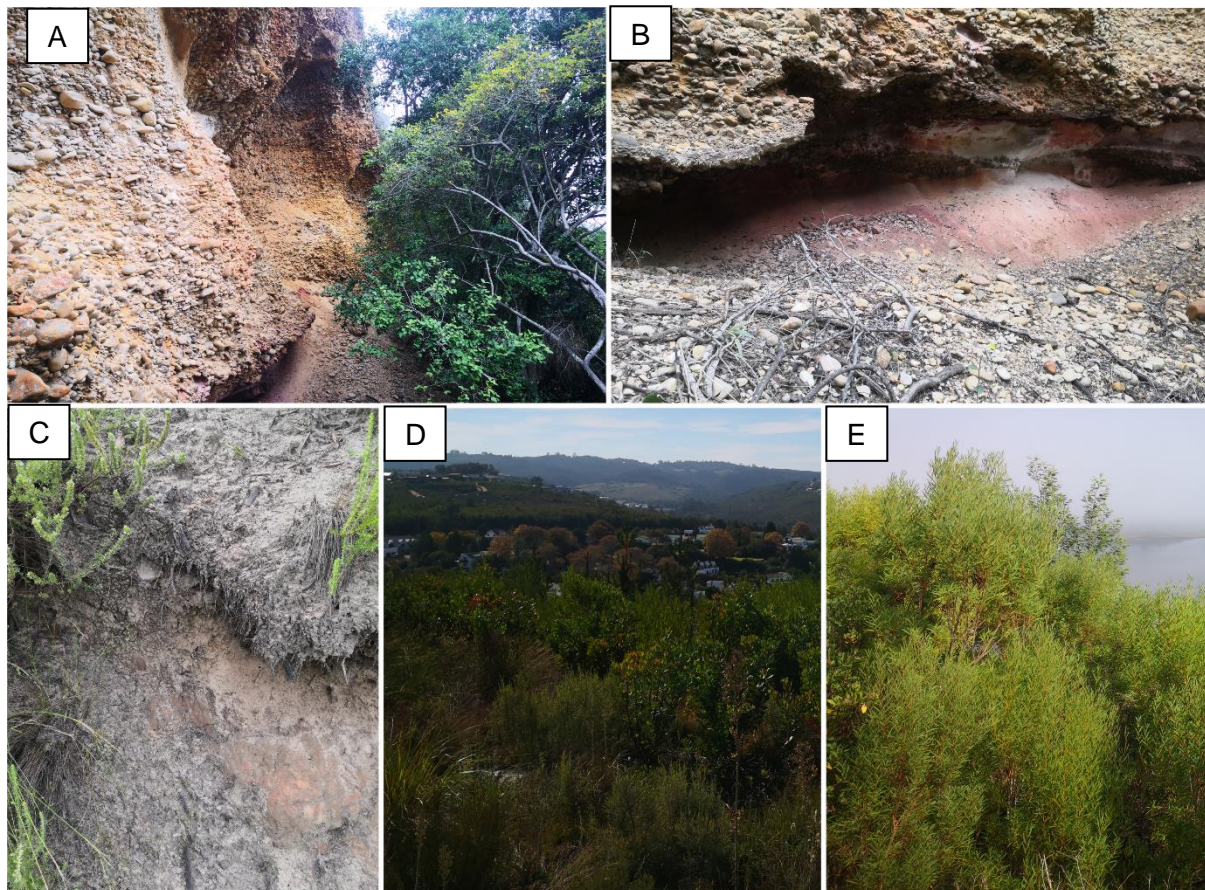


Figure 14: A & B - Sandstone and conglomerate cliff, C – Sandy soil present on site, D – vegetation present on site, E - Acacia cyclops.

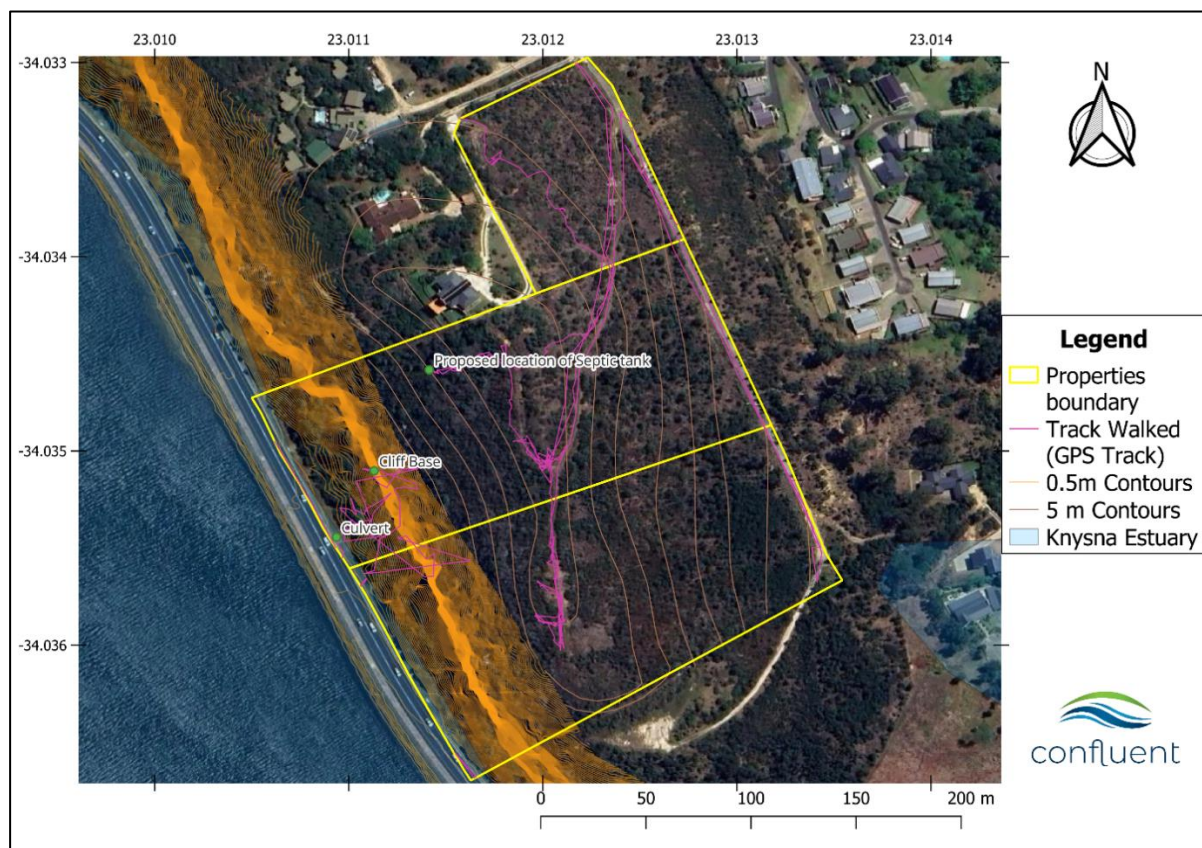


Figure 15: GPS track walked in relation to Properties.

In terms of legislation pertaining to the NWA, the development falls outside of the regulated area of the drainage line (i.e. outside of the riparian zone and 1:100 year floodline) and outside the regulated area of a wetland (Figure 16).

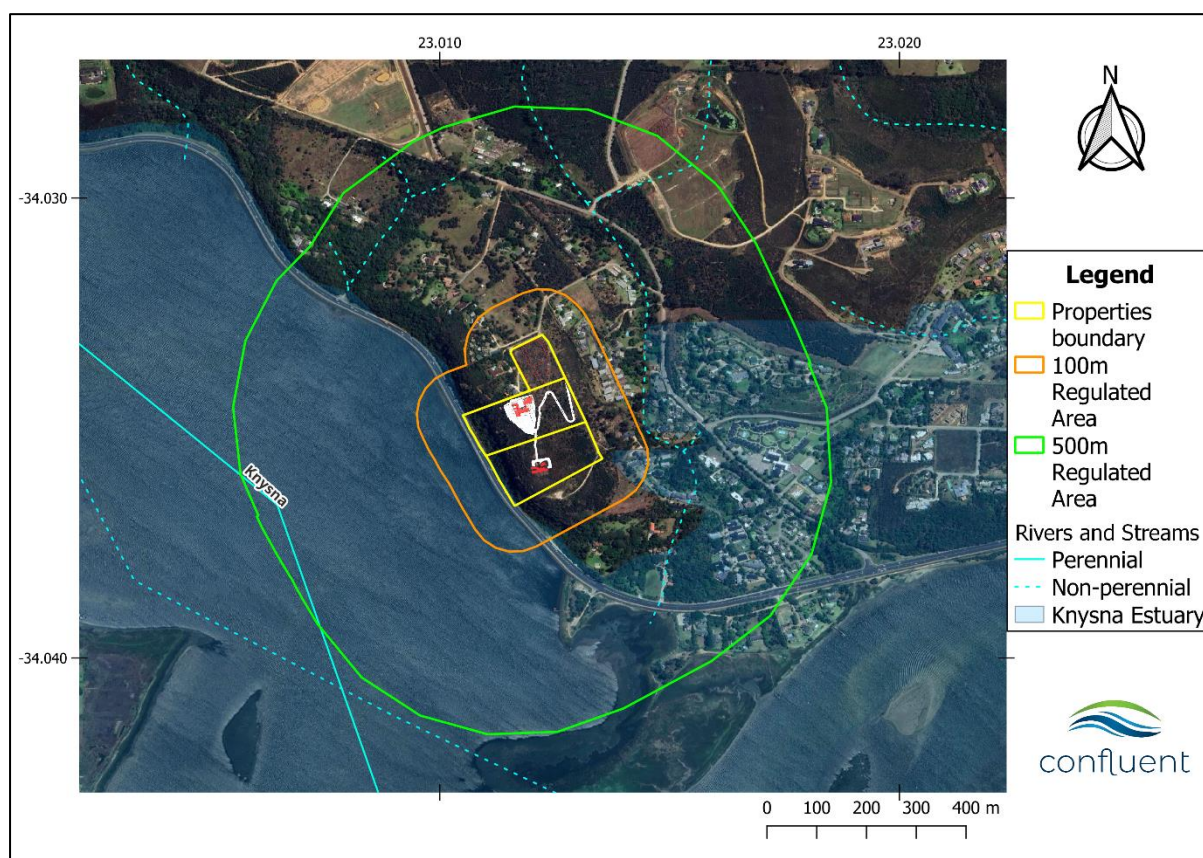


Figure 16: Proposed development sites in relation to the 500 m and 100 m regulated areas.

## 4. LEGISLATIVE IMPLICATIONS

### 4.1 Aquatic Biodiversity Compliance Statement

Given that there are no hydro-geomorphological landscape features (depressions, confined valleys, channels etc.) indicating the presence of a watercourse (i.e. stream, river or wetland) within the proposed development sites. And provided that, all stormwater is restricted to drain towards the northeast and no development occurs within the Development Control Area, the sensitivity of aquatic biodiversity on the property can be regarded as **Low**. As there are no watercourses on any of the three properties, the development of single residential or small cluster housing is unlikely to impact the ability of the SWSA to continue providing high quantities of good quality water. For the same reason, the status of the site within the FEPA associated with Knysna Estuary is unlikely to impact on the estuary provided the cliffs along the southwest are not compromised or further eroded.

### 4.2 National Water Act

In terms of legislation pertaining to the NWA, the development falls outside of the regulated area of the drainage line to the northeast (i.e. outside of the riparian zone and 1:100 year floodline) and outside the regulated area of any wetland that could realistically be impacted

(500 m; Figure 16). This implies a Risk Assessment Matrix is not needed for the development taking place on Erven 7594, 2924 and 2925.

## 5. MANAGEMENT RECOMMENDATIONS

### 5.1 Stormwater Management

A key impact related to residential developments is the generation of stormwater associated with an increased area of impermeable surfaces (i.e. roads, roofs and other infrastructure). Stormwater is typically conveyed into watercourses or low points, where high volumes (and associated high energy) cause degradation of watercourses, mainly due to soil erosion. In this respect given the steep slopes surrounding the property, even though the drainage line is located outside of the development footprint, it is potentially vulnerable to stormwater impacts. Cliffs along the southwestern boundary are also vulnerable to erosion if channeled water flow is directed towards this feature.

Stormwater generated on-site should be managed according to Sustainable Drainage System (SuDS) principles. This requires that as much stormwater as possible should be attenuated within the development footprint. For example, the City of Cape Town guideline is that developments must provide for 24-hour extended detention of the 1-year return interval 24-hour storm event. In this respect, the following measures, *inter alia*, should be considered:

- Rainwater harvesting tanks must be installed;
- Use of swales and detention ponds to attenuate stormwater runoff, encourage infiltration and reduce the speed, energy and volumes at which stormwater is discharged from the site;
- Use of permeable paving to encourage infiltration into the soil; and
- Use of retention ponds and artificial wetlands to capture stormwater runoff and prevent its discharge from the site.

### 5.2 Recommendations to reduce stormwater on the southwestern slope

As the slope is steeper towards the southwest, the Knysna Estuary is adjacent to the southwestern boundary of the properties, and the sandstone and conglomerate cliff show signs of erosion, it is recommended that the dwelling on Erf 2924 be moved approximately 12 m towards the northeastern slope of the property to reduce the filling on the southwest slope. This change will also reduce the amount of stormwater draining towards the southwest of the property. This will also ensure that the stormwater associated with the dwelling will have a low impact on the erosion of the sandstone and conglomerate cliff. Although the neighbouring dwelling seems in line with the proposed development, the neighbouring dwelling is on the 70 m contour “plateau”, thus giving water more time to infiltrate the soil and thus reducing the amount of stormwater running downslope. It is also recommended that the septic tank be moved towards the northeastern slope of the property to reduce the impact on the southwestern slope as well as to stay clear of the Development Control Area of the Knysna estuary (Figure 11 and Figure 17).



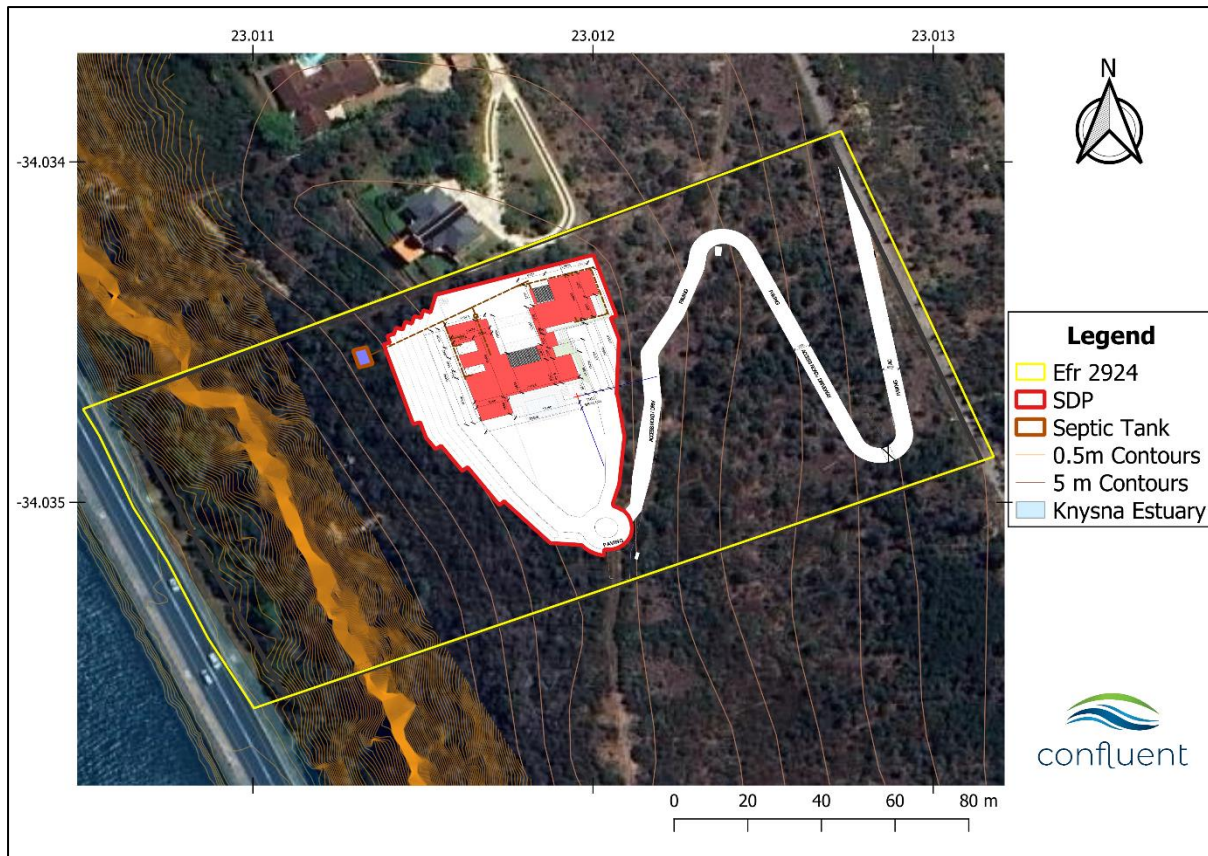


Figure 17: SDP in relation to 0.5 m and 5 m contours on Efr 2924

### 5.3 Erosion Management

The steep slopes of the properties, especially on the southwestern side, will be vulnerable to erosion during clearance of the site and the construction phase. It is therefore important that appropriate erosion control measures are implemented, which include *inter alia*, the following:

- Ensure that construction activities do not cause any preferential flow paths and concentrated surface runoff towards the southwestern cliffs during rainfall events.
- Clearly demarcate the construction area and ensure that heavy machinery does not compact soil or disturb vegetation outside of these demarcated areas.
- Reduce transport of sediment through use of structures such as silt fences and biodegradable coir logs or haybales placed along a contour below the development footprint (Figure 18).



*Figure 18: Examples of silt fences (left) and coir logs (right) used to trap sediment mobilised from steep slopes.*

- Revegetate exposed areas preferably with indigenous plants associated with Garden Route Shale Fynbos once construction has been completed.
- Ensure that stormwater runoff is discharged in retention areas (i.e. swales or retention ponds), to avoid concentrated runoff which increases the risk of erosion.

## 6. REFERENCES

- CapeNature (2017). 2017 WCBSP Mossel Bay [Vector] 2017. Available from the Biodiversity GIS website, downloaded on 26 March 2019.
- Council for Scientific and Industrial Research (CSIR). (2018). National Wetland Map 5 and Confidence Map [Vector] 2018. Available from the Biodiversity GIS website, downloaded on 30 September 2020.
- Department of Water Affairs and Forestry (DWAF) (2005). Final Draft: A Practical Field Procedure for Identification and Delineation of Wetlands and Riparian Areas.
- Grootjans, A., Adema, E. B., Bekker, R. M., & Lammerts, E. J. (2004). Why Young Coastal Dune Slacks Sustain a High Biodiversity. In M. L. Martínez, & N. P. Psuty, Coastal Dunes Ecology and Conservation (pp. 85-101). Berlin: Springer-Verlag
- Le Maitre, D.C., Walsdorff, A., Cape, L., Seyler, H., Audouin, M, Smith-Adao, L., Nel, J.A., Holland, M. and Witthüser. K. (2018). Strategic Water Source Areas: Management Framework and Implementation Guidelines for Planners and Managers. WRC Report No. TT 754/2/18, Water Research Commission, Pretoria.
- Macfarlane, D. and Bredin, I. (2017). Buffer Zone Guidelines for Rivers, Wetlands and Estuaries Part 1: Technical Manual. WRC Report No. TT/715/1/17. Water Research Commission, Pretoria, South Africa.
- Marker, M. E., & Holmes, P. J. (2002). The distribution and environmental implications of coversand. *South African Journal of Geology*, 135-146.
- Mucina, L., Adams, J. B., Knevel, I. C., Rutherford, M. C., Powrie, L. W., Bolton, J. J., van der Merwe, J. H., Anderson, R. J., Bornman, T. G., le Roux, A., Janssen, J. A. (2006). Fynbos Biome. In L. Mucina, & M. C. Rutherford, *The vegetation of South Africa, Lesotho and Swaziland 19* (pp. 660-690). Pretoria: South African National Biodiversity Institute.
- Rebelo, A. G., Boucher, C., Helme, N., Mucina, L., & Rutherford, M. C. (2006). Fynbos Biome. In L. Mucina, & M. C. Rutherford, *The vegetation of South Africa, Lesotho and Swaziland 19* (pp. 53-220). Pretoria: South African National Biodiversity Institute.
- Pye, K., & Tsoar, H. (2009). *Aeolian Sand*. Berlin: Typesetting and Production.
- Rebelo, A. G., Boucher, C., Helme, N., Mucina, L., & Rutherford, M. C. (2006). Fynbos Biome. In L. Mucina, & M. C. Rutherford, *The vegetation of South Africa, Lesotho and Swaziland 19* (pp. 53-220). Pretoria: South African National Biodiversity Institute.
- Western Cape government (2017). Draft: Knysna River Estuarine Management Plan.