Proposed Residential and Tourism Development on Portion 59/216 Uitzigt Farm, Knysna, Western Cape.

Aquatic Biodiversity Site Sensitivity Verification and Impact Assessment.

Prepared For:	Eco Route Environmental Consultancy
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EXECUTIVE SUMMARY

Confluent Environmental Pty (Ltd) was appointed by Eco Route to provide aquatic specialist inputs for the proposed residential and tourism development on Portion 59/216 Uitzigt, Knysna, Western Cape. According to the Department of Environment, Forestry and Fisheries (DFFE) Screening Tool, Portion 59/216 Uitzigt has a 'Very High' aquatic biodiversity sensitivity.

The scope of work for this report is guided by the legislative requirements of the National Environmental Management Act (NEMA), National Environmental Management: Integrated Coastal Management Act (NEMA: ICMA) and the National Water Act (NWA). The site is adjacent to the Knysna estuary towards the northeast, approximately 2.2 km east of Brenton on Sea and 3.8 km south of Knysna's town centre.

The proposed mixed developments are set to take place at the northern point of Farm 59 of 216, involving the construction of a large garage, conference and tourist facilities, a manager's cottage, and an entertainment facility. These developments will occur within the quaternary catchment K50B, adjacent to the Knysna Estuary. Given the high rainfall intensity and the inherent high erosion potential of the soils, careful consideration must be given to stormwater management and soil erosion prevention.

The Knysna Sand Fynbos vegetation type on the site has been classified as Critically Endangered due to extensive transformation and limited distribution. The Western Cape Biodiversity Spatial Plan categorizes the areas adjacent to the property as aquatic and terrestrial Critical Biodiversity Areas (CBA1 and CBA2).

According to the Knysna River Estuary Management Plan, a Development Control Area has been established, requiring SANParks approval for any developments within 100 meters of the estuary. To minimise environmental impacts, it is recommended that the development takes place outside of this control area.

The site visit revealed that the steep sand cliffs adjacent to the estuary are eroding, exacerbated by existing stormwater runoff from hardened surfaces. The proposed development is likely to increase erosion and sedimentation in the estuary, due to the increased amount of stormwater runoff and impermeable surfaces.

Given the high sensitivity of the aquatic biodiversity and the existing erosion issues, an aquatic biodiversity impact assessment is required. This assessment addressed both existing and future stormwater and erosion impacts. The impact assessment concluded that, with the proposed mitigation measures, the impact of the development could be mitigated.

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.

Specialist: Mr. Franco de Ridder (MSc., Candidate Natural Scientist. Aquatic Science – 166398)

Date: June 2024

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

GLOSSARY

Aquatic Biodiversity	The variety of plant and animal life in water ecosystems, relevant to the study due to the site's proximity to potential water bodies.
Desktop Review	Preliminary assessment based on existing data and information, conducted prior to on-site investigations.
Erosion Control Methods	Techniques employed to prevent or minimize soil erosion, such as haybale check dams or silt fencing, crucial in areas with high inherent erosion potential.
Estuary	Partially enclosed coastal body of water where freshwater from rivers and streams meets and mixes with saltwater from the ocean. This interaction between fresh and saltwater creates a unique and dynamic environment that supports a diverse array of plant and animal species.
Freshwater Ecosystem Priority Area (FEPA)	Designated areas of high importance for freshwater ecosystem conservation, identified as a sensitivity feature in the DFFE screening tool.
Site Assessment	Comprehensive evaluation of the proposed development site, including the identification of wetlands, watercourses, and soil characteristics.
Sensitivity	The degree to which a particular area or ecosystem is susceptible to disturbance or impact, crucial in determining potential environmental consequences.
Critical Biodiversity Area (CBA)	Areas that are essential for the conservation of biodiversity and maintaining ecosystem functions.
Topography	The physical features of the land surface, considered for its potential influence on drainage and ecological features.
Wetland	An area where water covers the soil, or is present either at or near the surface, contributing to biodiversity and ecological significance.
Western Cape Biodiversity Spatial Plan (WCBSP)	A plan indicating categorized areas based on their ecological importance in the Western Cape region.

ABBREVIATIONS

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

1. INTRODUCTION

Confluent Environmental Pty (Ltd) was appointed by Eco Route to provide aquatic specialist inputs for the proposed mixed developments on Farm 59 of 216 (Featherbed), Knysna, Western Cape. (Figure 1). According to the DFFE Screening Tool, Farm 59 of 216 has 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 Knysna estuary towards the northeast and approximately 2.2 km east of Brenton on Sea and 3.8 km south of Knysna's town centre.

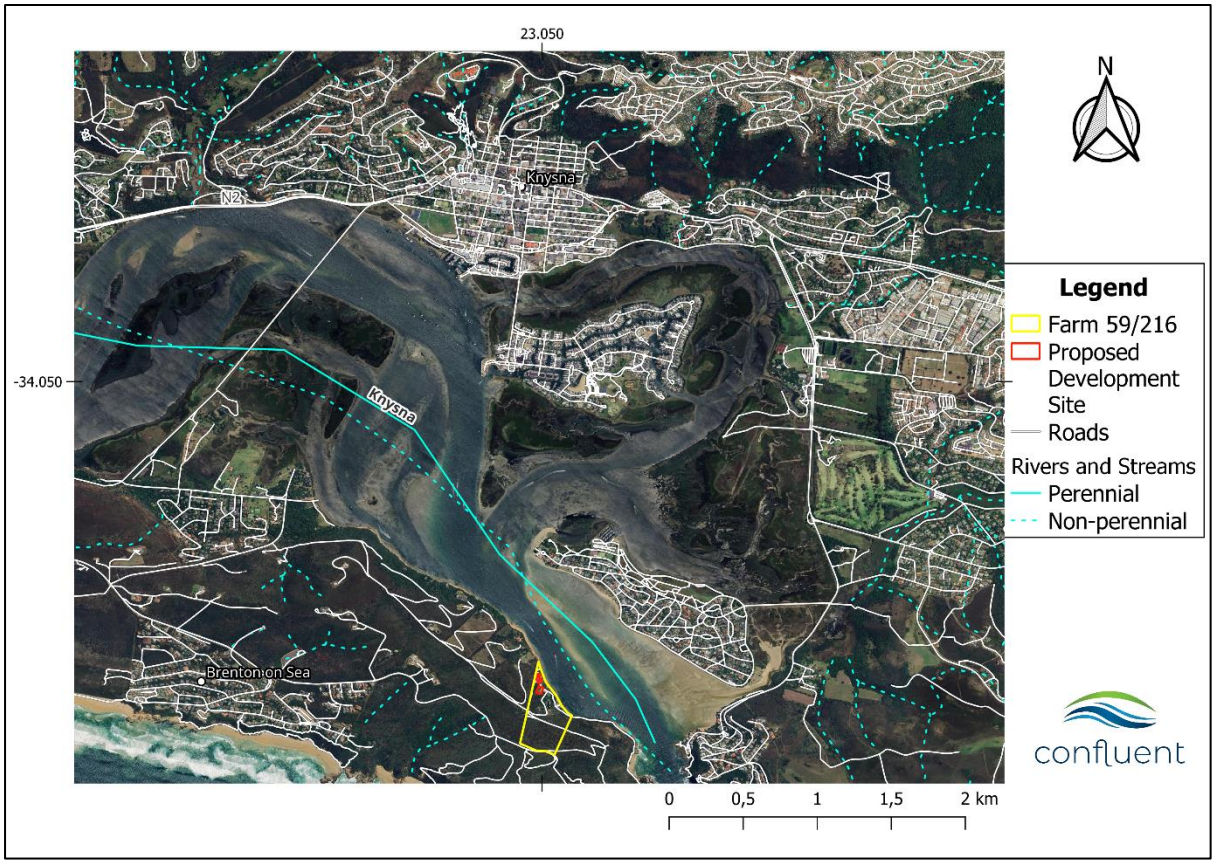

Figure 1. Farm 59 of 216, Knysna, Western Cape.

1.1 Knysna Estuary

The Knysna River estuary, a rare estuarine bay in South Africa, spans 1827 hectares and supports an array of critically endangered species, including the Knysna seahorse, pulmonate limpet, and Pansy shell. Its hydrology is primarily driven by tidal actions and seasonal freshwater inflows, creating distinct salinity gradients. The estuary's physico-chemical environment, characterised by strong seasonal temperature patterns and varying salinity levels, supports diverse habitats, including nutrient-poor oligotrophic waters and extensive intertidal wetlands. These wetlands, covering 1000 hectares, act as crucial nutrient sinks and habitats for numerous invertebrates and vertebrates, highlighting the estuary's ecological significance.

The benthic macrofauna in the Knysna estuary has seen increased diversity over the past 50 years, with 310 recorded species, including crabs, prawns, and bivalves, reflecting the estuary's healthy ecosystem. The ichthyofauna is equally diverse, with over 200 historically recorded species, and recent surveys noting 50 species of fish, rays, and skates, including endangered species like the Knysna seahorse and white Steenbras. Avifauna is also rich, with 267 bird species recorded in the area, including several vulnerable and near-threatened species, underscoring the estuary's critical role in supporting avian biodiversity.

Socio-economically, the Greater Knysna Municipal Area, home to a diverse and rapidly growing population, relies heavily on the estuary for its economic vitality. The estuary's natural beauty and ecological importance make it a central attraction in the Garden Route, drawing both South African and international tourists. Key economic activities include retail trade, construction, community services, and manufacturing, all of which support a vibrant tourism economy. The estuary's high property, tourism, and nursery values, along with its significant subsistence value, highlight its economic importance to the region. As a consequence, the Knysna River estuary ranks the highest in South Africa in terms of conservation importance and the preservation of its ecosystem function and processes would ensure that nearly 43% of South Africa's estuarine biodiversity is conserved.

Conservation efforts, including the establishment of a marine reserve and zonal restrictions, protect the estuary's critical habitats and biodiversity. The estuary offers numerous socio-economic development opportunities linked to its diverse environmental features, including clean beaches, forests, fynbos, and bird habitats. The tourism industry, driven by these natural attractions, remains a key economic driver for Knysna, emphasizing the need to balance development with ecological preservation to maintain the estuary's ecological and socio-economic benefits.

1.2 Key Legislative Requirements

1.2.1 National Environmental Management Act and Screening Tool

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 **Very High** aquatic biodiversity (Figure 2). According to the protocol, a site sensitivity verification must be undertaken to confirm the sensitivity of the site as indicated by the screening tool.

According to the Department of Environment, Forestry and Fisheries (DFFE) screening tool, the sensitivity feature identified about the classification is:

- 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).

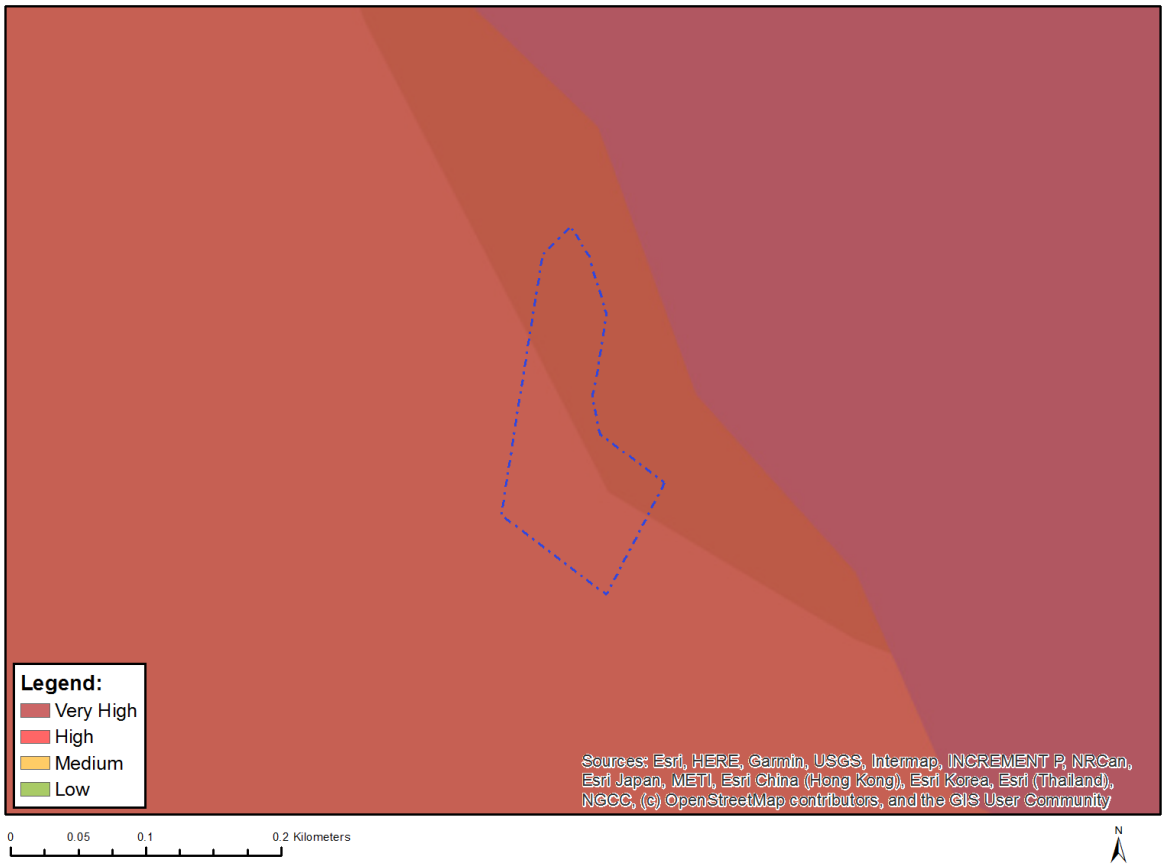

Figure 2: Results of the DFFE Screening Tool which indicate Very High Sensitivity of the Aquatic Biodiversity theme for the preferred development site on Farm 59 of 216.

The National Environmental Management: Integrated Coastal Management Act (No. 24 of 2008) outlines specific measures for developments within the coastal protection zone, which includes land within 100 meters of the high-water mark of the sea and estuaries.

According to the National Environmental Management: Integrated Coastal Management Act (No. 24 of 2008), as amended by Act No. 36 of 2014, an "estuary" is defined as:

- A body of surface water that is permanently or periodically open to the sea;
- A body of surface water in which a rise and fall of the water level as a result of the tides is measurable at spring tides when the body of surface water is open to the sea;

- A body of surface water in respect of which the salinity is higher than freshwater as a result of the influence of the sea, and where there is a salinity gradient between the tidal reach and the mouth of the body of surface water

The coastal protection zone is a crucial aspect of coastal management, consisting of various land areas, including:

- Any land unit situated wholly or partially within 100 meters of the high-water mark (Section 16e).

Estuaries must be managed in a coordinated and efficient manner according to a national estuarine management protocol, which includes the following requirements:

- Development within the defined estuarine boundaries must be consistent with the strategic vision and objectives set for effective integrated management of estuaries.

For any development activity within this zone, an environmental authorisation is required. This is to ensure that any proposed changes to the use, physical nature, or appearance of a place, including construction, alteration, demolition, or removal of structures, are compliant with environmental management principles and do not harm the coastal environment.

1.2.2 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

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).

1.3 Assumptions and Exclusions

- A site visit was conducted in May 2024 which is considered Autumn. It is possible that sensitive features such as rare or unique biota (e.g. amphibians), plants, or habitats 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.
- At the time of writing the report, no information was available regarding the sewer infrastructure and the source of water for domestic use.
- The proposed location of the entertainment facility was not known at the time of the site visit and thus the GPS track does not indicate a visit to the proposed location. However, as we exited the property we did drive past the proposed location and no distinctive wetland indicators (plants, topography or hydrology) were observed. Thus, it is highly unlikely that a wetland is present at the proposed location. If a wetland or wetland feature is observed during construction, an aquatic specialist must be appointed to assess the location in detail.

1.4 The Proposed Development

The mixed developments are to take place at the northern point of Farm 59 of 216. A large garage building is proposed on an existing concrete parking area. A conference and tourist facilities are proposed 26.5 m north of the garage building in an area where an existing shed/workshop stands. A manager cottage is proposed 7.5 m north of the conference and tourist facility in an area where two shipping containers are standing. Lastly, an entertainment facility is also proposed 23.6 m south of the existing house (Figure 3).

Figure 3: Farm 59 of 216 with Proposed development layouts.

The garage building (approximately 1963,96 m^2) is proposed to consist of ten garages (28.7 m^2 each), a workshop (145 m^2), a cafeteria (16.9 m^2), a bathroom (3.1 m^2), a store (8.7 m^2) and an area to store boats and/or golf carts (144 m^2; Figure 4).

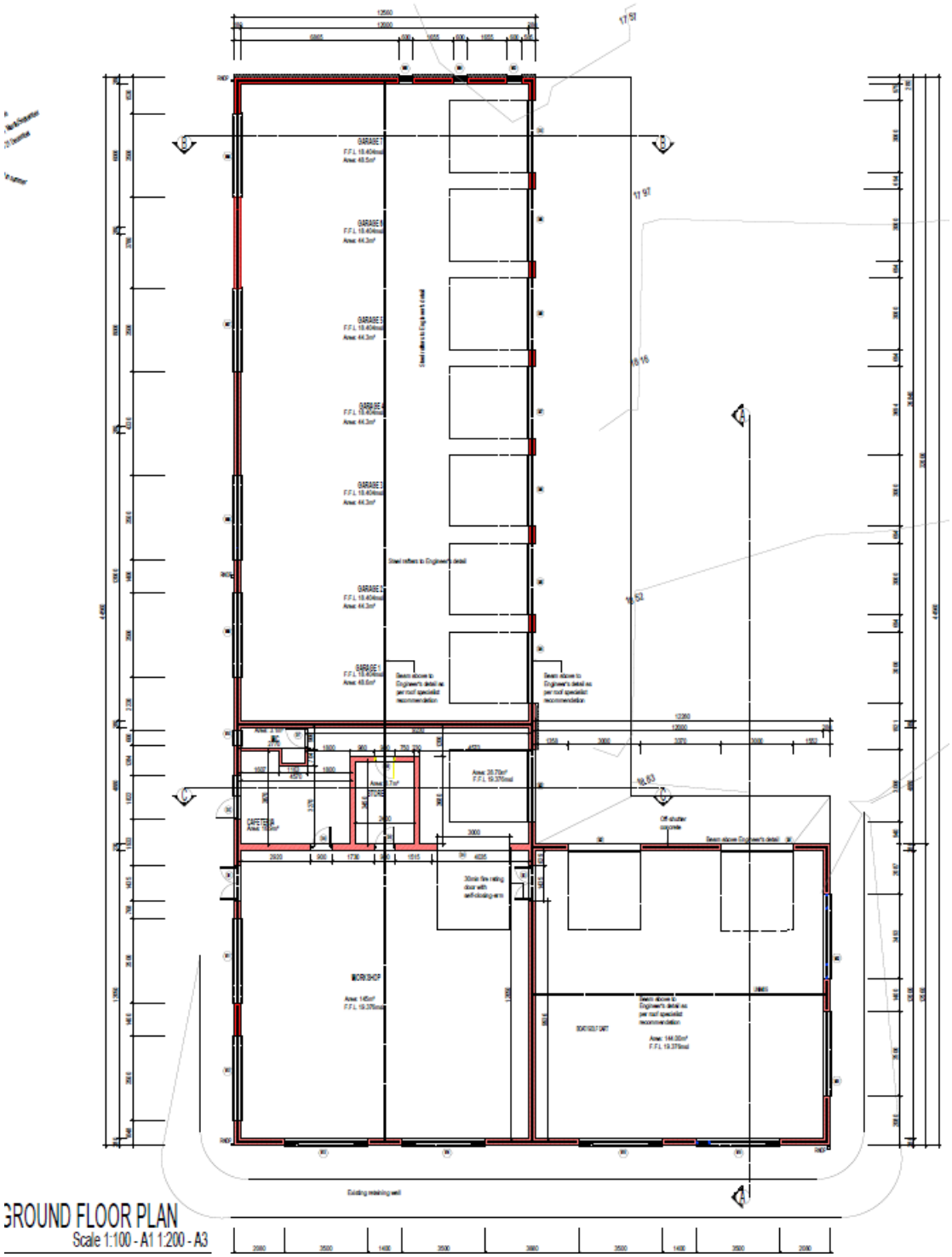

Figure 4: Proposed garage building.

The conference and tourist facility (approximately 1272,07 m^2) will be a double-storey and primarily includes: A conference area, a nature workshop area, three sleeping corners with ensuite bathrooms, double garages, three entertaining areas, several toilets, a laundry room, and swimming pool (Figure 5 and Figure 6).

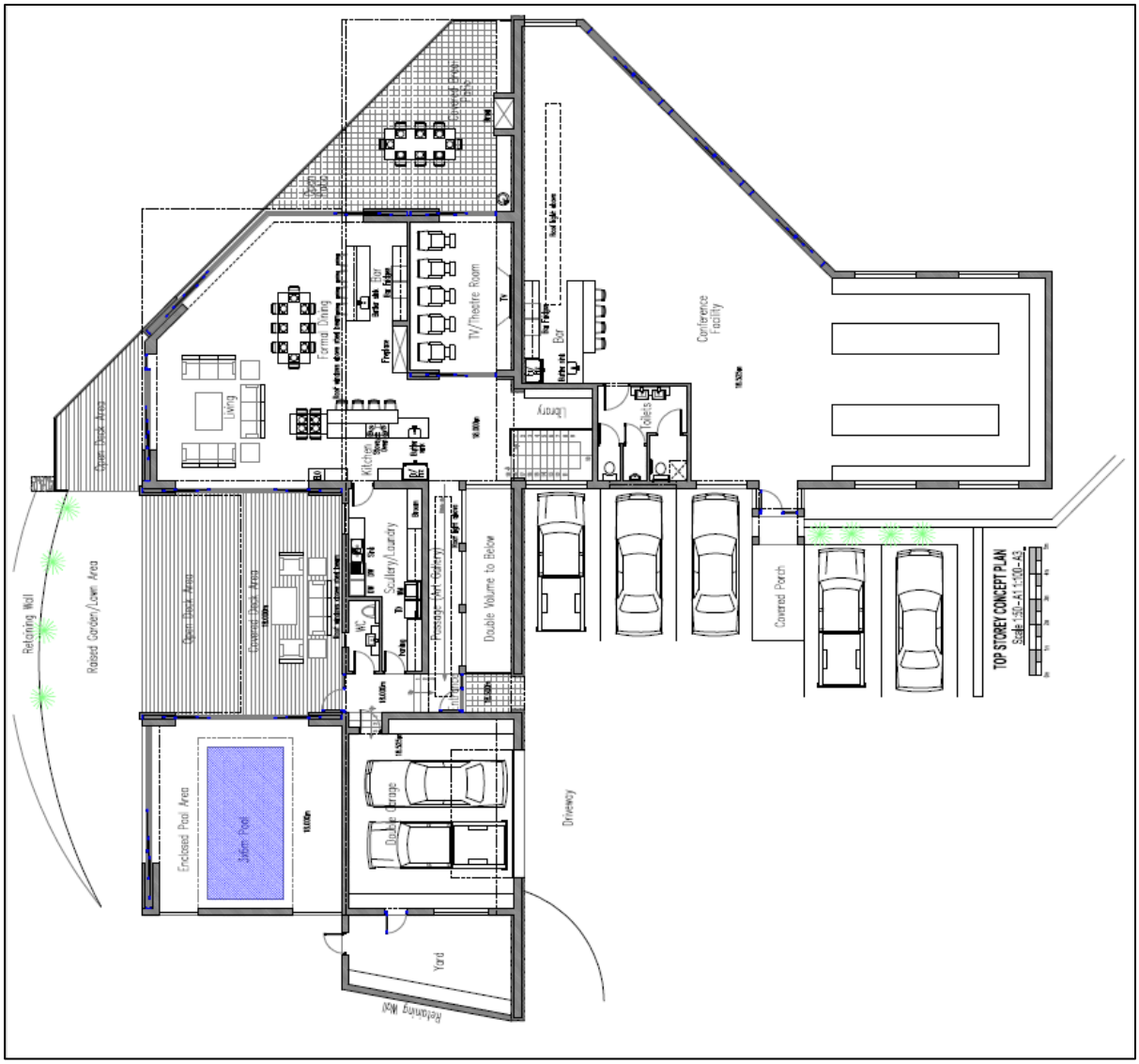

Figure 5: Proposed conference and tourist facility (ground floor).

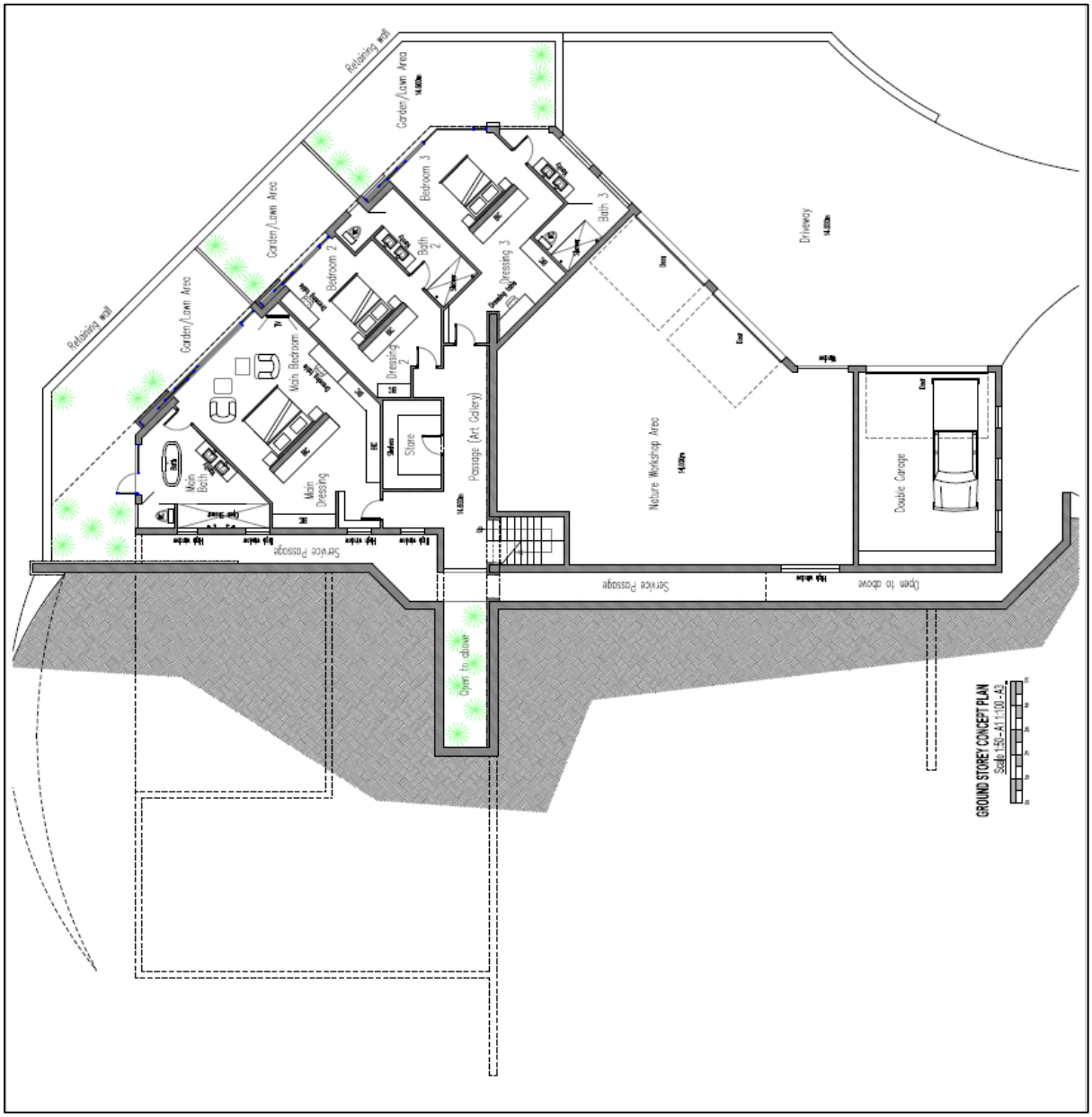

Figure 6: Proposed conference and tourist facility (top floor).

The manager's cottage (approximately 302,38 m^2) will be double-story and will consist of a double garage, staff room, 3 bathrooms, a laundry, 3 bathrooms, a pantry and an open plan kitchen connected to a dining room and living room (Figure 7).

Figure 7: Proposed manager cottage.

The entertainment facility (approximately 1185,59 m^2) is proposed to consist of two plant rooms, three bathrooms, lockers, a steam room, a sauna, a treatment room, footbaths, a squash court, a swimming pool, a chill area with a fruit bar, heat pumps, a store room, gym area, bar, scullery, large dining area and a timber deck with a fire pit (Figure 8).

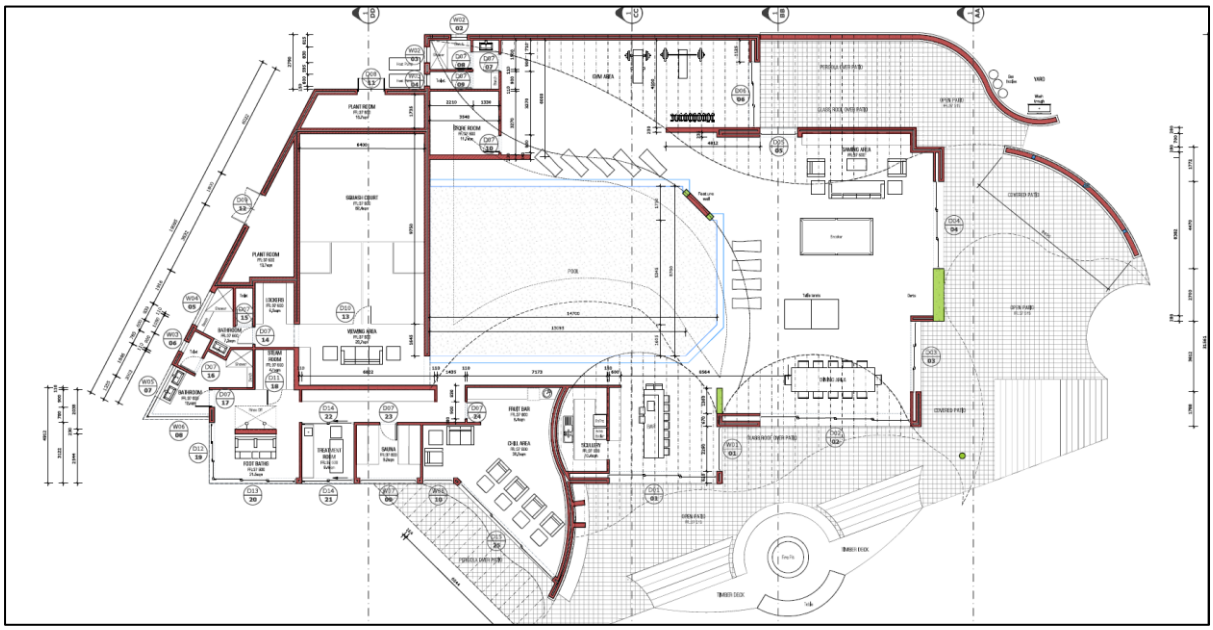

Figure 8: Proposed entertainment facility.

2. CATCHMENT CONTEXT

2.1 Catchment features

The proposed developments on Portion 59/216 Uitzigt are located in the quaternary catchment K50B in the catchment of the Knysna River (Figure 9). 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 is also as High (Table 1), 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 north. (Table 1, Figure 9 and Figure 10)

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	AT36: Goukamma Dune Thicket (Least Concern) and FFd10: Knysna Sand Fynbos (Critically Endangered)
Conservation	None

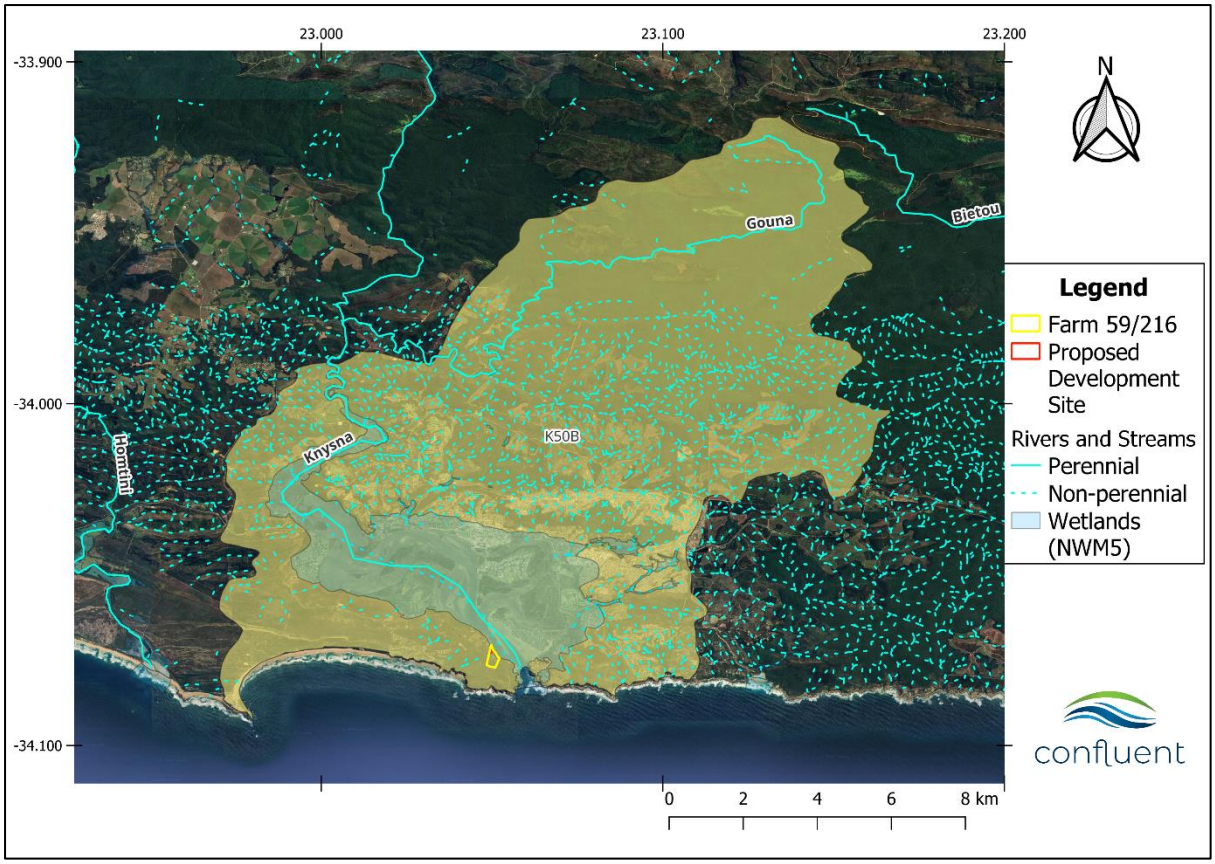

Figure 9. Farm 59/216 in the quaternary catchment K50B.

Figure 10: The proposed development sites in relation to mapped watercourses.

Rainfall occurs year-round with seasonal peaks in spring and autumn (Figure 11).

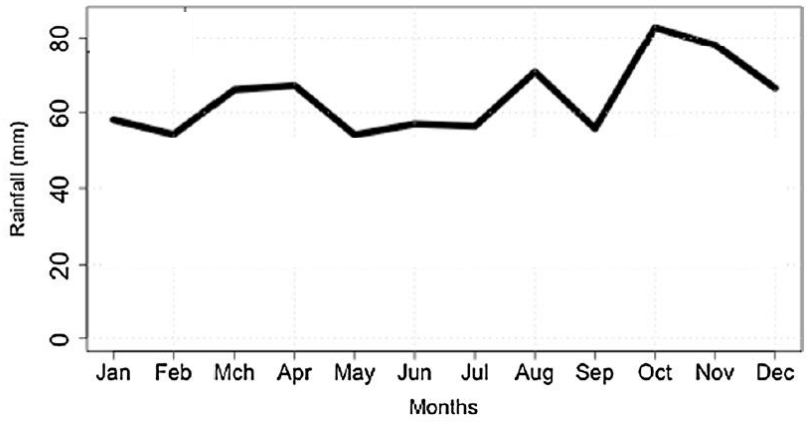

Figure 11. Area-averaged monthly rainfall for the coastal Southern Cape indicating peaks in Mar-Apr, Aug, and Oct. Data averaged between 1979 and 2011 (Engelbrecht et al., 2015).

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 Knysna Sand Fynbos (FFd10; Critically Endangered; NVM, 2018) and Goukamma Dune Thicket (AT36; Least concern; NVM, 2018), where the Knysna Sand Fynbos has been categorised to have very high sensitivity in the screening tool report.

The Knysna Sand Fynbos vegetation type was described and mapped as Endangered in 2006 by Mucina & Rutherford however, in the Revised National List of Threatened Ecosystems (GN 2747 of the NEM: BA, Act No. 10 of 2004) the vegetation type has been classified as Critically Endangered. The main reason for this classification is that a large area of this vegetation type has already been transformed (70%), together with the small distribution range of this vegetation type, covering only part of the Garden Route coastal flats from Wilderness, generally to the north of the system of lakes, several patches around the Knysna Lagoon, with more isolated patches eastwards to the Robberg peninsula near Plettenberg Bay (Figure 12). The Knysna Sand Fynbos vegetation type continues to be under threat as only 5% of this vegetation type is protected in statutory or private nature reserves, and the remaining is still threatened by pine and gum plantations, cultivation, Knysna urban sprawl, (building of roads) and alien vegetation (Rebelo et al., 2006).

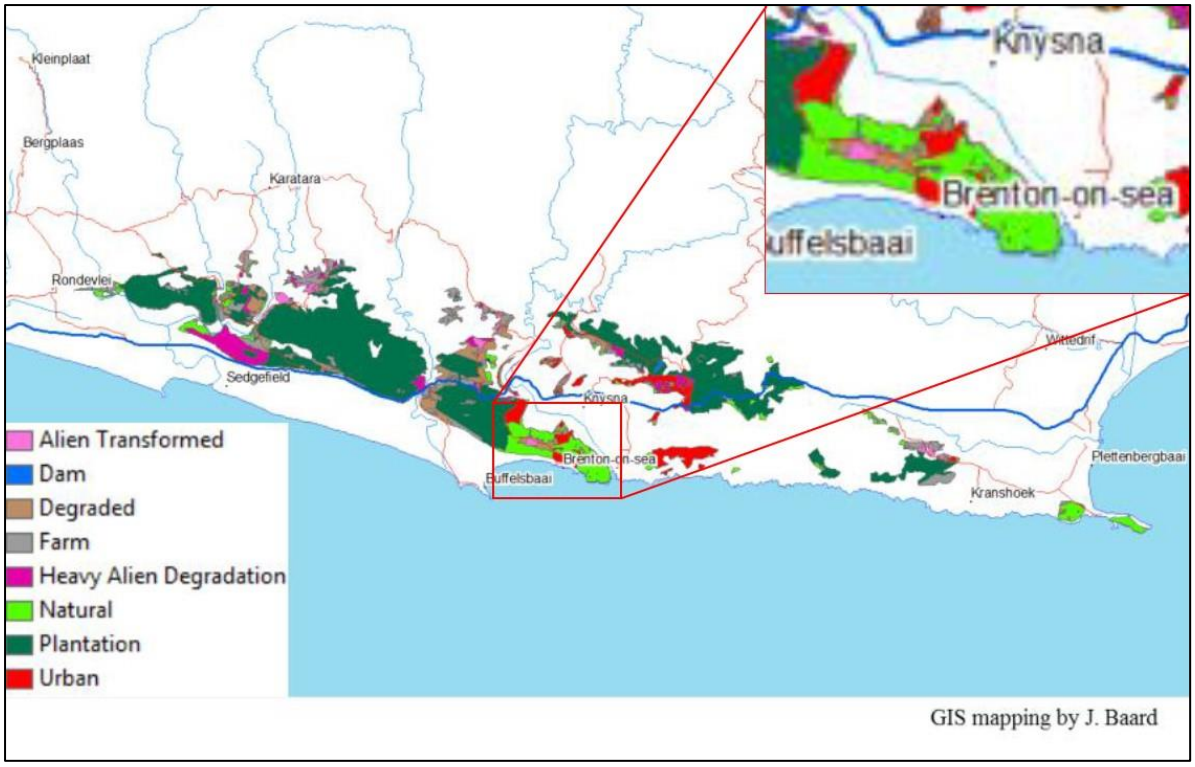

Figure 12: Distribution and transformed classification of the Knysna sand fynbos vegetation type (J. Baard, SANParks).

2.3 Conservation and catchment management

2.3.1 Western Cape Biodiversity Spatial Plan

The Western Cape Biodiversity Spatial Plan (WCBSP; 2017) indicated none of the categorised areas on the property itself but, does categorise the areas adjacent to the property as follows:

- An aquatic and terrestrial Critical Biodiversity Area 1 (CBA1) and
- A terrestrial Critical Biodiversity Area 2 (CBA 2).

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

- Knysna (Core) Estuary
- Water source protection- Knysna
- Watercourse protection- South Eastern Coastal Belt
- Coastal resource protection- Eden
- Knysna Sand Fynbos (CR) (Figure 13).

2.3.2 Protected areas

The property and the estuary are part of two separate protected areas. The Knysna Estuary is within the Garden Route National Park and the property itself is part of the Featherbed Private Nature Reserve. The property also falls under the Garden Route biosphere reserve.

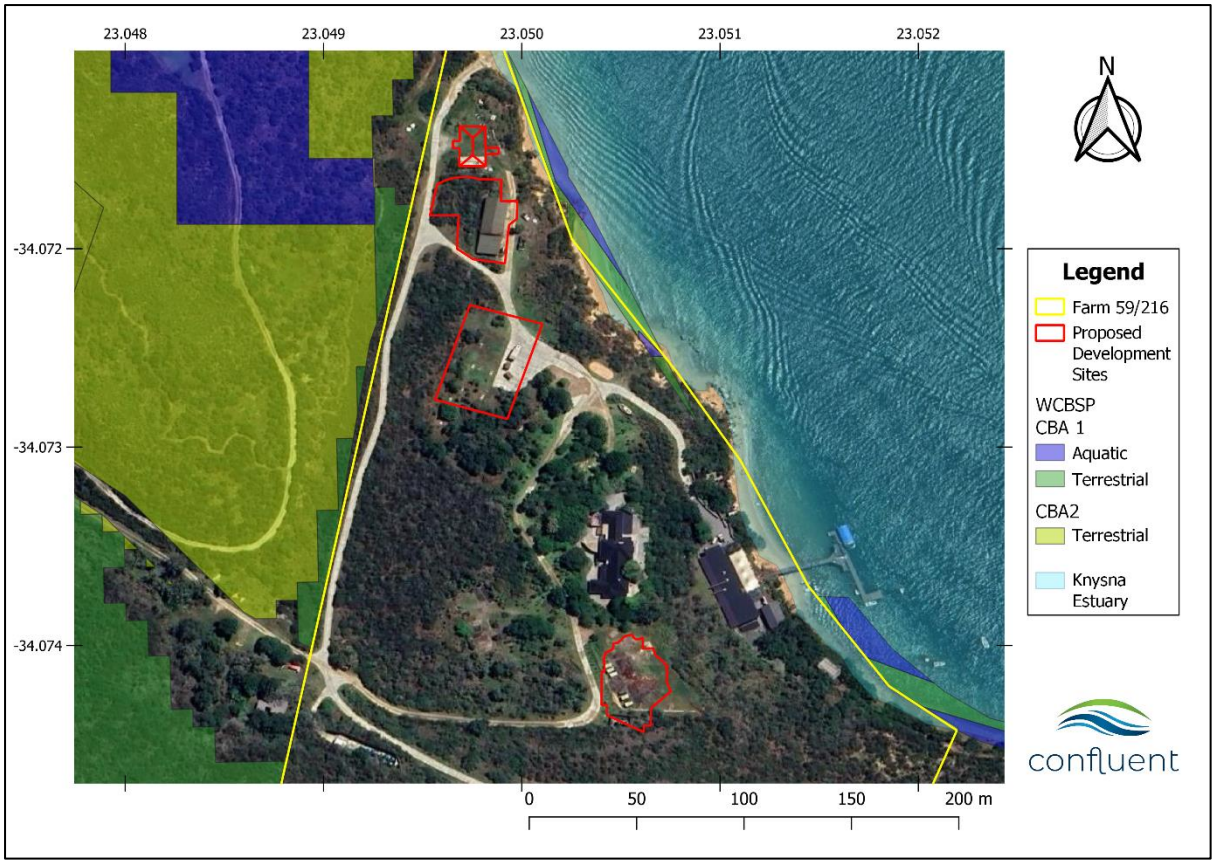

Figure 13. The proposed development area in relation to mapped conservation features of the Western Cape Biodiversity Spatial Plan (2017).

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 watercourses adjacent to and on to the site (Table 2).

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.
Critical Biodiversity Area 2 (CBA2)	Areas in a degraded or secondary 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 habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.

2.3.3 National Freshwater Ecosystem Priority Areas

According to the National Freshwater Ecosystem Priority Atlas (NFEPA; Nel *et al*., 2011) the sub-quaternary reach (SQR 9117) is classified as a Freshwater Ecosystem Priority Area (FEPA; Figure 14) (NFEPA; 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 River and Estuary. It is therefore important that development does not result in any deterioration of the river 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.

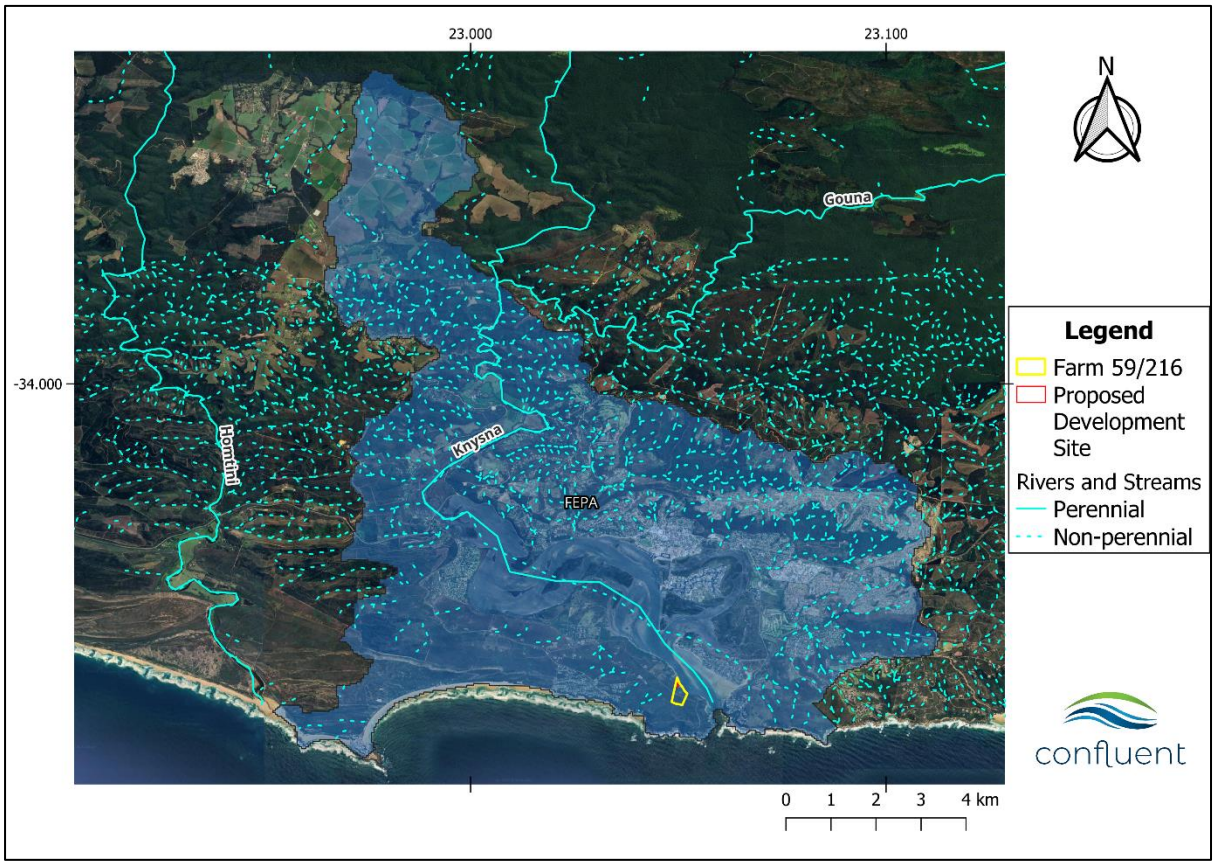

Figure 14: Map indicating the property location in relation to mapped Freshwater Ecosystem Priority Areas.

2.3.4 Knysna Estuary Management Plan

According to the Knysna River Estuary Management Plan (2017), a Development Control Area has been established to manage and regulate development within a specified buffer zone, ensuring that any proposed developments within 100 meters of the water's edge receive SANParks approval and are subject to Strategic or Environmental Impact Assessments. This ensures that the environmental impact of such developments is properly assessed and managed, maintaining the area's ecological integrity. The Knysna River Estuary Management Plan (2017) states the following regarding the Development Control

Area: “With 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” (Figure 15).

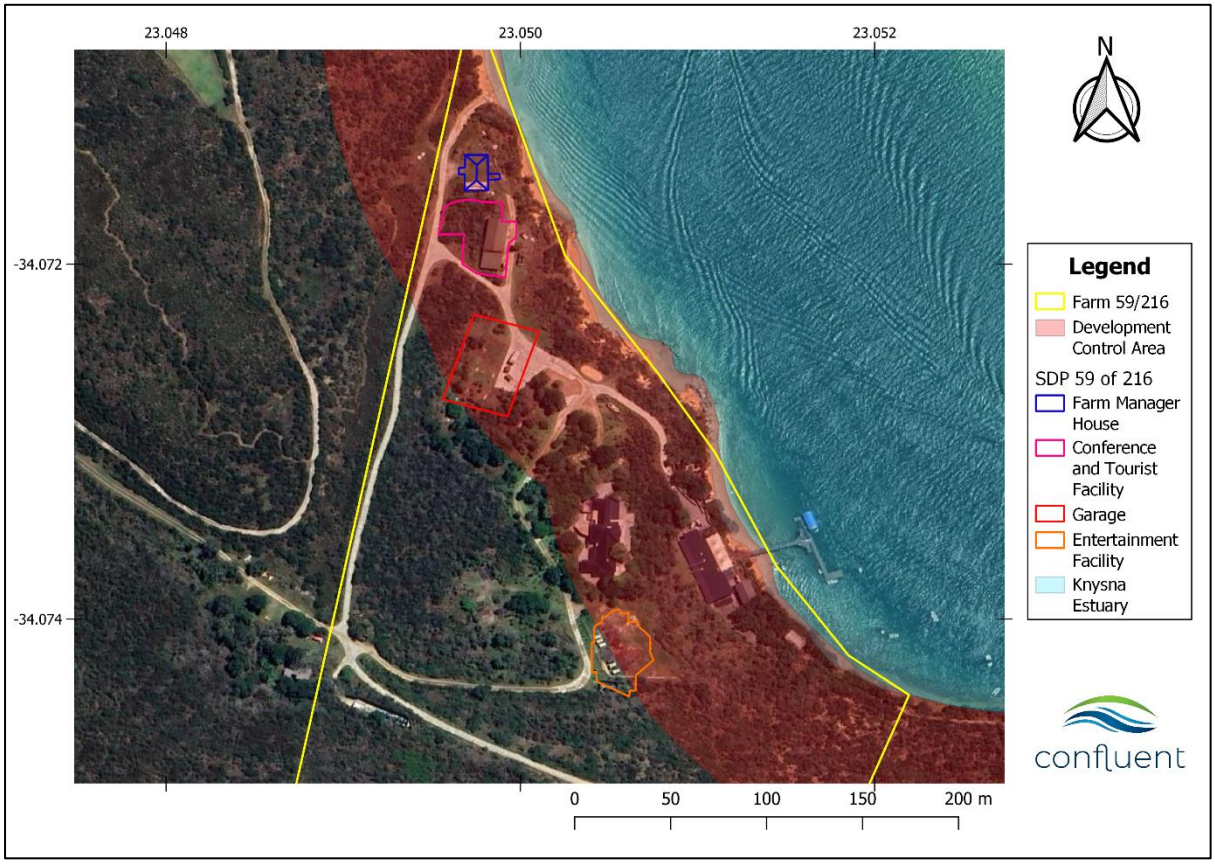

Figure 15: Proposed development in relation to the Development Control Area of the Knysna Estuary.

2.3.3 Strategic Water Source Area

Portion 59/216 Uitzigt is 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 developments 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 only the Knysna Estuary northeast of the site with no wetland or streams mapped on the proposed development site itself (Figure 10).

2.5 Historical Assessment

Historically Farm 59/216 has undergone minimal changes throughout the past 25 years from 1998 to 2023. The properties seem to have been covered by natural vegetation from 1998. All the structures on the property as well as roads seem to be present from 1998 with the construction of a large parking area and restaurant starting in 2017. The most notable disturbances on the property were the clearance of vegetation by the Knysna fires in 2017 (Figure 16). It is worth noting that the footprint of three of the camping areas was completely burnt in the 2017 fires, highlighting this factor as a significant risk that must be taken seriously and managed to reduce risks.

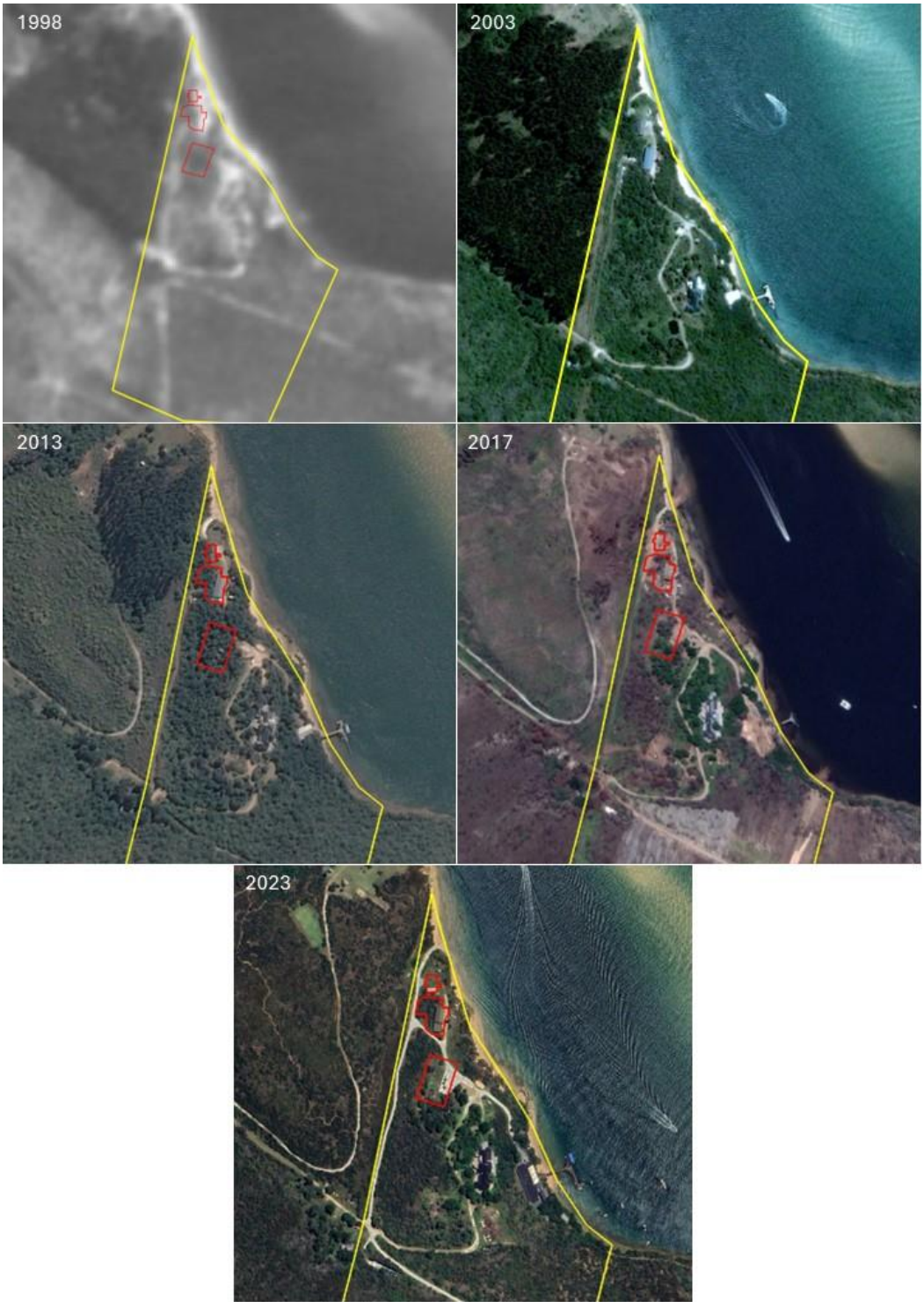

Figure 16. Historical photos showing Farm 59/216 through notable changes between 1958 and 2017 (CD:NGI & Google Earth imagery).

3. SITE ASSESSMENT

3.1 Site Visit

The site visit was conducted on the 30th of May 2024 during which time the entire extent of the proposed development footprint on the property was traversed by foot (Figure 18). At the time of the site visit the weather was overcast. The properties slope down to the northeast, sloping down very steeply to a cliff (Figure 10), towards the shore of the Knysna Estuary

(Figure 10). The cliff shows signs of erosion at some point, especially below the store/workshop (proposed site for the Manager cottage), this erosion is associated with the existing road (Figure 17: A & B). The soil on the properties is very sandy (Figure 17: 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. However, a natural flow path was observed with an associated culvert (Figure 17: D & E). The vegetation on the property is terrestrial, primarily fynbos (including but not limited to: *Felicia echinate*, *Osteospermum* sp., *Grewia occidentalis, Indigofera stricta*), with two small areas with minimal high-moisture adapted vegetation (*Helichrysum foetidum*, (Figure 17: F) and *Cyperus brevis*.) with one of the areas more north near the estuary dominated by alien invasive Kikuyu grass (*Cenchrus clandestinus*) (Figure 17: G & H).

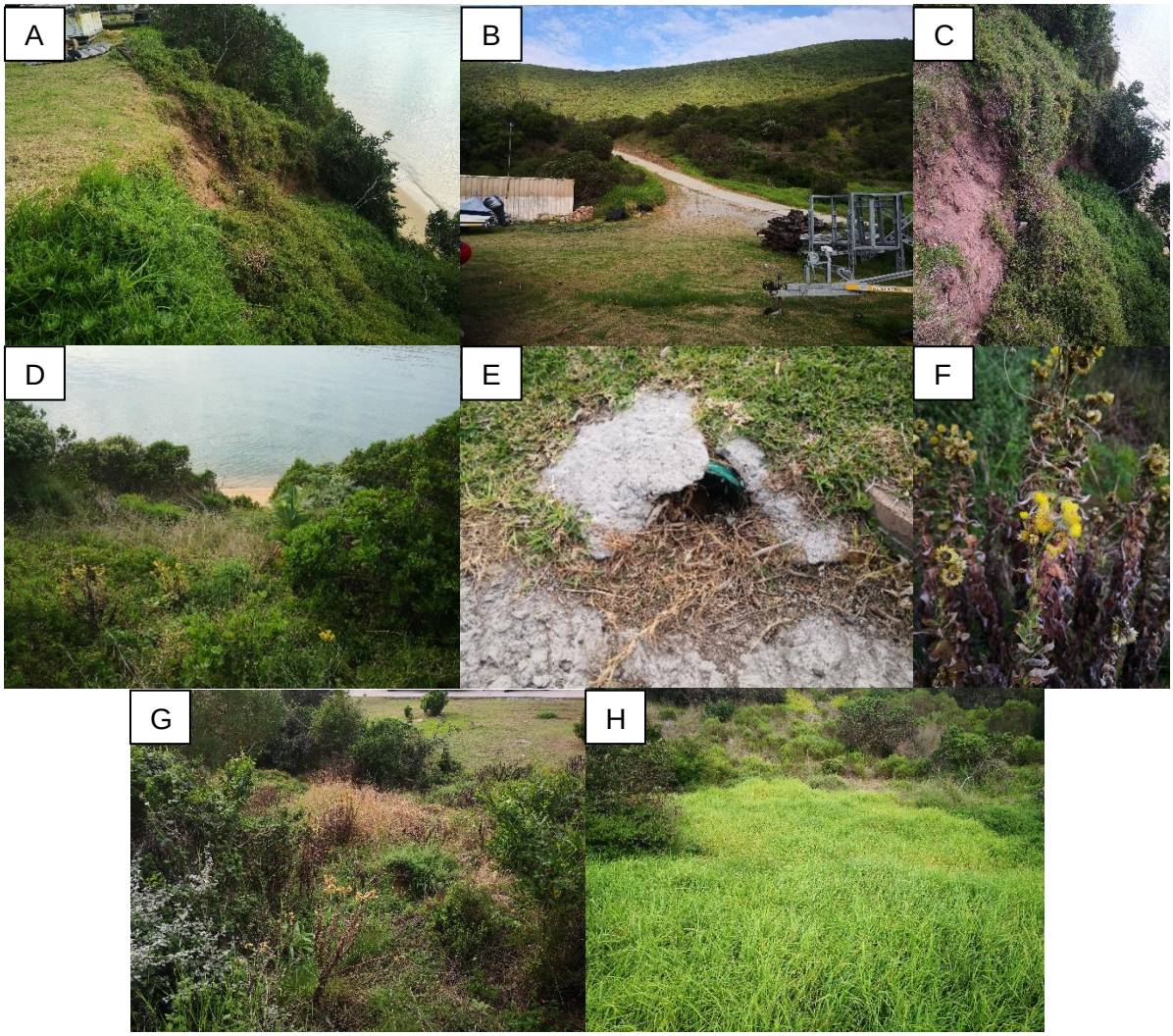

Figure 17: A – Erosion of sand cliff, B – Existing road, C – Sandy soil present on site, D – Flow path*, E – Culvert, F – Helichrysum foetidum, G – small areas with minimal wetland vegetation, H – Area with minimal wetland vegetation dominated by Kikuyu grass.*

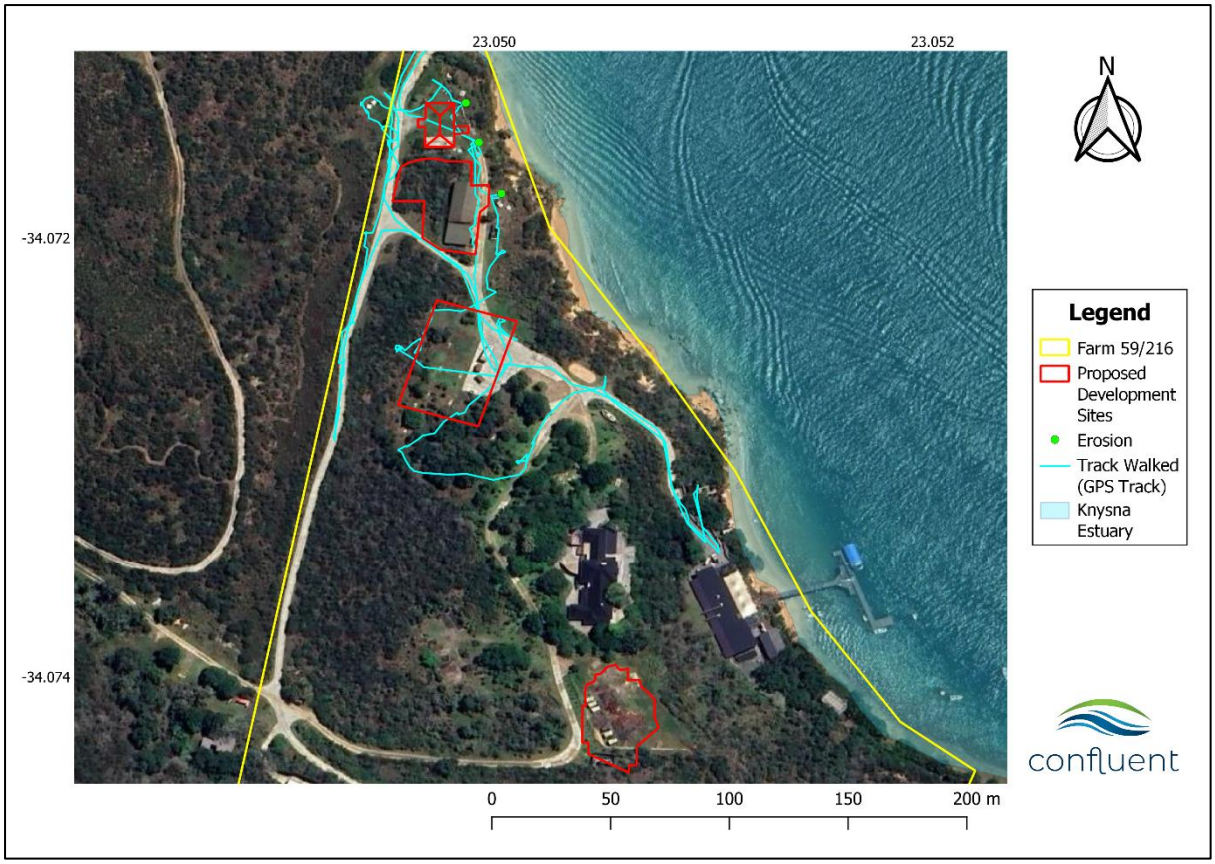

Figure 18: GPS track walked in relation to the Proposed Development site.

3.2 Buffer Determination

Buffer zones have been defined as a strip of land with a use, function, or zoning specifically designed to act as barriers between human activities and sensitive water resources with the aim of protecting these water resources from adverse negative impacts.

The location of the watercourses in a SWSA and FEPA catchments was also considered in the buffer determination. Buffer determination considered the implementation of mitigation measures specified in the impact assessment below and was determined based on the following catchment and buffer characteristics:

- Type of estuary: Estuarine bay.
- Name of estuary: Knysna
- Present Ecological State: B
- Mean Annual Precipitation Class: > 800 mm.
- Rainfall Intensity: Zone 4.
- Estuary size: > 1000 ha
- Estuary length: 10-20 km
- The inherent runoff potential of soil in the catchment area is moderate to high (C soils).
- The slope of the buffer area is steep (40.1 - 75 %).

- Interception characteristics of the vegetation in the buffer are considered to be poor (dominated by low-growing grasses that provide relatively dense ground coverage).

Based on these inputs the buffer for the Knysna Estuary is set to 36 m (Figure 19) and is considered to be an area of Very High sensitivity. However, taking into account that development has taken place within the buffer and that the proposed development is proposed in areas of existing disturbances, it is impractical to exclude development from the buffer.

To minimise the impact of the proposed development on the cliff a 3 m setback line has been established from the cliff edge (Figure 22).

Figure 19: 36 m Buffer in relation to the Proposed development site and the Knysna Estuary.

4. LEGISLATIVE IMPLICATIONS

4.1 National Environmental Management Act (NEMA)

The sensitivity of aquatic biodiversity on the property can be regarded as **High** considering that the proposed development is:

- immediately adjacent to the Knysna Estuary, separated from the estuary only by a steep cliff.
- Cliff is showing signs of moderate erosion, due to stormwater associated with the hardened surfaces (roads and roofs) on the property,

- and the development is proposed to take place within the Development Control Area of the Knysna Estuary.

Thus, an aquatic biodiversity impact assessment is required and will address both existing and future stormwater and erosion impacts on the property.

4.2 National Water Act (NWA)

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 (500 m from wetland; Figure 20).

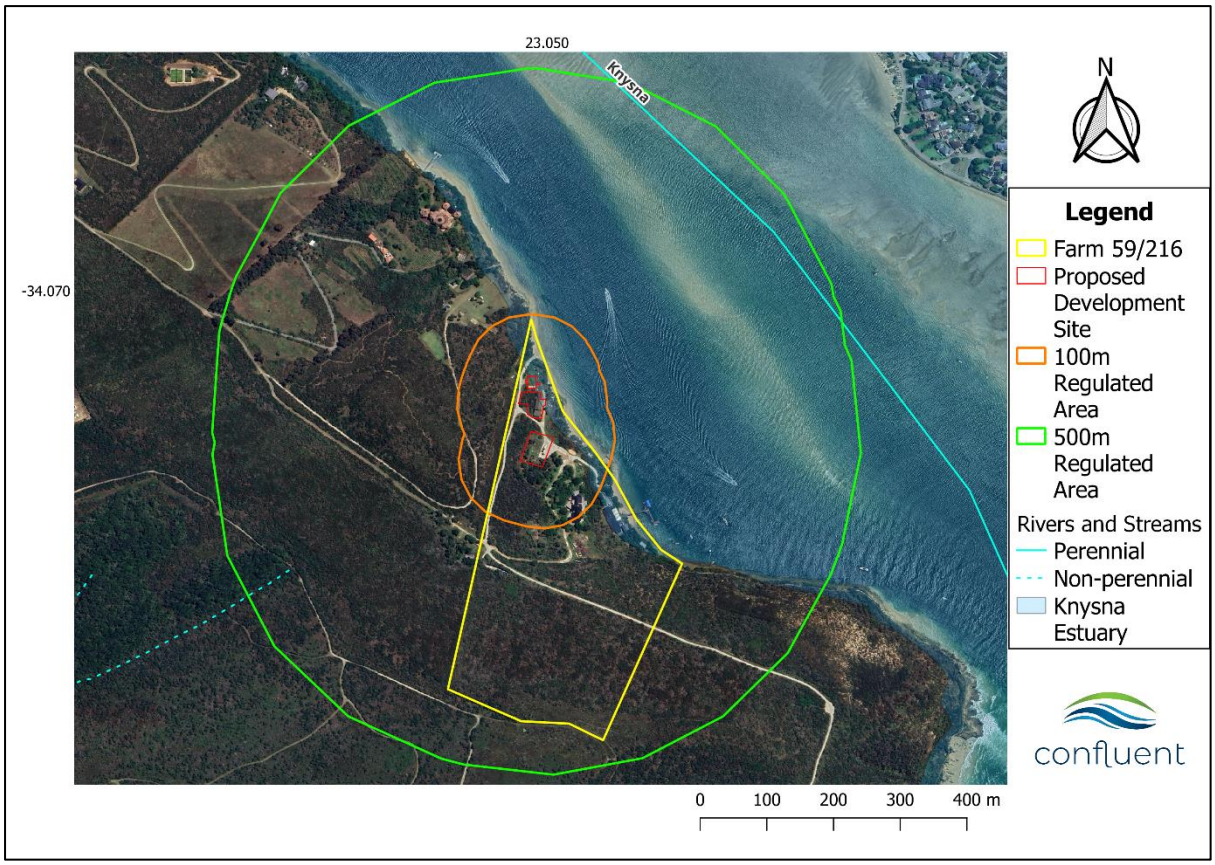

Figure 20: Proposed development sites in relation to the 500 m and 100 m regulated areas.

5. AQUATIC BIODIVERSITY IMPACT ASSESSMENT

The impact assessment is fundamentally guided by the mitigation hierarchy which seeks to avoid and minimise impacts as the first priority (Figure 21). Every effort must be made to avoid and minimise impacts and rehabilitate affected areas. Offsets are the final option in the mitigation hierarchy. The impact assessment includes not only direct and indirect impacts, but also cumulative impacts which are additive. Cumulative impacts in this instance must not cause irreversible decline to the conservation status of species and the presence of special habitats or cause a significant loss in ecosystem services. Residual impacts are negative impacts that remain after all reasonable and practical changes have been made to location, siting, scale, layout, technology, and design of the proposed development. Provided the residual impacts are Very Low or Low, no offset is required. However, if the residual impacts are Medium or High, then an offset is required. Very High residual impacts cannot be offset and are unlikely to be authorised.

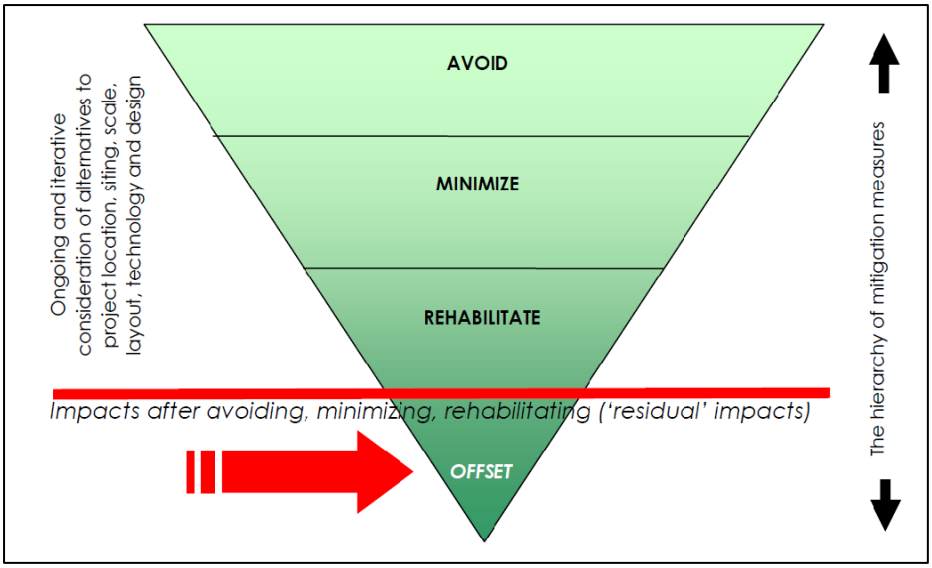

Figure 21: Mitigation hierarchy applied in the assessment of impacts.

Each of the impacts expected to occur during the design and layout phase, construction and operational phase have been assessed in terms of their significance. The main impact associated with the construction and operation of the proposed development is the increased risk of erosion of the sand cliffs into the Knysna Estuary increasing sedimentation and reducing stability of the cliffs. As well as the increased amount of stormwater associated with the increase of hardened and impermeable surfaces. It should be noted that at this point the erosion, while present, is rated as a fairly minor impact, but indicates a pre-existing impact that could be exacerbated without careful consideration of the development layout, construction and operation.

Taking into consideration that all the proposed development is set to occur within the 36 m buffer it is highly recommended that an alternative layout is to be proposed to reduce the impact on the Knysna Estuary. The current impact assessment is based on the site development plan provided and with mitigation measures the impact of this development is considered to be moderate.

5.1 Design and Layout Phase

Impact 1: Eroding of the sand cliff into the Knysna Estuary Currently, some of the soil is eroding into the estuary from the cliff. This causes the cliff to become more unstable and will eventually enter the estuary.		
	Current site development plan	
	Without Mitigation	**With Mitigation**
Intensity	High	Very low
Duration	Ongoing	Brief
Extent	Very limited	Very limited
Probability	Certain	Unlikely
Significance	**-84: Moderate**	**-15: Negligible**
Reversibility	High	High
Irreplaceability	Low	Low
Confidence	High	High
Mitigation:		

- Establish a 3 m setback line from the edge of the cliff for 160 m from the edge of the road in the north till 21.5 m past the corner of the proposed garage (as indicated on the map below; Figure 22).
- Rehabilitate two areas of lawn within the 3 m setback line with indigenous vegetation of the area by ceasing mowing the lawn and clearing sections for planting (one plant per 1m^2). Species can include but are not limited to species listed in Table 3 below.
- Replace the pavement with permeable paving at the northern section of the road that leads down to the estuary. From the estuary for approximately 42 m towards the south.
- Install gutters and rainwater harvesting tanks associated with the workshop/store in the northern corner of the property.

Significance:

The significance of the impact without mitigation is Moderate, implying that the impact is substantial and can be exacerbated by the addition of contributing factors (such as an increase in stormwater runoff), but can be mitigated.

The significance of the impact with mitigation is reduced to Negligible, implying that the impact has a possibility to be present but with good management of mitigation measures is unlike to be present.

Figure 22: Proposed development in relation to laydown areas and sensitive features.

Table 3: Indigenous plants local to the site and surrounds which are recommended for planting in the rehabilitation areas.

Species	Common Name	Growth Form
Aristida junciformis	Gongoni grass	Grass
Berzelia intermedia	Knopboss	Shrub
Carpobrotus edulis	Edible sourfig	Succulent ground cover
Cynodon dactylon	Bermuda grass	Grass

Metalasia muricata	White bristle bush	Small shrub
Osteospermum monoliferum	Bietou	Small tree
Passerina corymbosa	Common gonna	Shrub
Searsia crenata	Crowberry	Large shrub
Searsia laevigata	Dune currantrhus	Large shrub
Helichrysum petiolare	liquorice plant	Shrub
Leonotis leonurus	wild dagga	Large shrub

5.2 Construction Phase Impacts

Impact 1: Increase in the amount of stormwater runoff because of an increase of uncovered soil and hardened surfaces leading to erosion of the soil during construction

As vegetation is being cleared for construction more soil surface is exposed, and water will thus have less resistance, reducing the time the water has to infiltrate the soil. This will lead to an increase in the amount and velocity of surface water which will increase the likelihood of erosion, as the inherent erosion potential of soils (K-factor) is considered to be high and signs of erosion is present on site, and may carry pollutants and sediment into the estuary.

	Current site development plan	
	Without Mitigation	**With Mitigation**
Intensity	High	Moderate
Duration	Short term	Brief
Extent	Very limited	Very limited
Probability	Almost certain	Unlikely
Significance	**-54: Minor**	**-21: Negligible**
Reversibility	High	High
Irreplaceability	Low	Low
Confidence	High	High

Mitigation:

- Do not clear vegetation outside the project area of influence.
- Only use the existing access road for each development. Use the road adjacent to the western property boundary to enter the development sites (Green; Figure 23). Use the most northern road to access laydown areas 1 and 2, and all the development sites until the Farm manager house is completed (Turquoise; Figure 23). Use the road passing by the proposed conference and tourist facility, to the south, to access laydown areas 2 and 3, the proposed entertainment area, as well as to exit the property (Orange; Figure 23). (Note use all roads as one way in the direction of travel, as designated in the map below; Figure 23).
- All stockpiles must be covered at the end of the day.
- Install temporary drainage controls such as swales or berms to manage runoff where necessary.
- All materials used during construction must follow the best practice guidelines set out for each product.
- The laydown area must be constructed in the proposed areas (Figure 23).
- Check weather reports ahead and prepare the site when rainfall is predicted. Discontinue any earthworks on the site during rainfall.
- The 3 m setback line must be demarcated and marked as a no-go area.
- Install silt fences or sediment barriers around the perimeter of the construction site to trap sediment-laden runoff and prevent it from entering the estuary (Figure 24).
- Construct check dams or sediment basins for flooded construction areas to be drained into if need be, to trap sediment, and facilitate sediment settlement before runoff reaches the

estuary.

- Implement phased construction to minimise the area of exposed soil at any given time and reduce the potential for erosion (suggested order: farm manager house, conference and tourist facility, garage, entertainment facility).
- Apply mulch or erosion control mats on exposed slopes and disturbed areas to stabilise soils and reduce erosion rates.

Significance:

The significance of the impact without mitigation is minor, implying that the impact is real but can be mitigated.

The significance of the impact with mitigation is reduced to Negligible, implying that the impact has a possibility to be present but with good management of mitigation measures is unlike to be present.

Figure 23: Proposed developments in relation to access roads and Laydown areas.

Figure 24: Examples of silt fences (left) and coir logs (right) used to trap sediment mobilised from steep slopes.

5.3 Operational Phase Impacts

Impact 1: Increase in the amount of stormwater runoff because of an increase in hardened surfaces including: roofs, roads, and pavement associated with the proposed developments. An increase in stormwater runoff will increase the likelihood of erosion around the proposed developments.

The addition of hardened, impermeable surfaces will reduce the amount of water that will filter into the soil. This will lead to an increase in the amount and velocity of surface water which will increase the likelihood of erosion.

	Current site development plan	
	Without Mitigation	**With Mitigation**
Intensity	High	Low
Duration	Permanent	Permanent
Extent	Very limited	Very limited
Probability	Certain	Unlikely
Significance	**-91: Moderate**	**-33: Negligible**
Reversibility	High	High
Irreplaceability	Low	Low
Confidence	High	High

Mitigation:

- Rainwater harvesting tanks **must** be installed on the western side of the developments and stormwater runoff from the roof must be directed to the tanks.
- Rainwater harvesting tanks **must** be interconnected with the plumbing of the developments to reduce the likelihood of the tanks overflowing (can be limited to the bathrooms only).
- Use of permeable paving **must** be implemented in all new paving to encourage infiltration into the soil.
- Maintain present vegetation cover including rehabilitate areas around all development areas within the 36 m buffer.
- No landscaping or establishment of a new lawn may occur around any of the development areas within the 36 m buffer **only indigenous vegetation may be planted**.
- Maintain the 36 m buffer area.
- Control of alien invasive plant species must be carried out within buffer areas to encourage recolonisation by indigenous vegetation and improve the structural integrity of the buffer.
- Only use the existing access road for access to the developments.
- Only use the existing road to access the beach.
- Control of alien invasive plant species must be carried out within buffer areas to encourage

recolonisation by indigenous vegetation and improve the structural integrity of the buffer.
The significance of the impact without mitigation is Moderate, implying that the impact is substantial and can be exacerbated by the neglect of the mitigation or management of the impact, but can be mitigated. The significance of the impact with mitigation is reduced to Negligible, implying that the impact has a possibility to be present but with good management of mitigation measures is unlike to be present.

6. CONCLUSION

The assessment identified key impacts related to increased stormwater runoff and erosion potential in the proposed development areas. Without mitigation, the impacts are deemed to be of moderate significance, suggesting substantial effects on the environment, particularly concerning stormwater management and erosion. However, with effective implementation of recommended mitigation measures, these impacts can be reduced to negligible levels. Key mitigation strategies include the installation of rainwater harvesting tanks, the use of permeable paving for proposed paving, maintenance of existing vegetation, and control of invasive plant species within buffer areas. The proposed development, if managed correctly, is unlikely to pose significant long-term adverse effects on the Knysna Estuary. As no watercourses are present on the property any development is unlikely to negatively impact the FEPA and SWSA in which the property resides. Furthermore, the implementation of the proposed management recommendations, together with the implementation (and maintenance) of the recommended buffer and setback line, will further prevent impacts on aquatic biodiversity and the ability of the land to continue to produce high quantities of good quality water. However, these findings exclude the impacts related to sewer infrastructure and the source of water for domestic use as information regarding these impacts was unavailable at the time of writing this report.

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