Renovation of Milkwood Manor House and Expansion of the Public Car Park at Lookout Beach, Plettenberg Bay.

Aquatic Biodiversity – Specialist Assessment

Prepared For: Sharples Environmental Services

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EXECUTIVE SUMMARY

Confluent Environmental (Pty) Ltd was requested to conduct a specialist estuarine impact assessment for the proposed upgrade of the Milkwood Manor House (Erf 10190) and the construction of additional public and private parking bays (Remainder of Erf 2066 and Remainder of Erf 706), Plettenberg Bay, Western Cape. The Milkwood Manor House is situated at the south-western-most extent of the Keurbooms Estuary, at the transition between estuarine and coastal dune habitat. The north-western corner of the property remains undeveloped and extends into the estuary. The perimeter of the developed portion of the property is protected from tidal action and flooding by a rock revetment which extends around the entire the perimeter of the property. The public parking is located to the south of the property and provides access to the popular Lookout Beach to the west. The entire property and adjacent public parking is located with the Keurbooms Estuarine Functional Zone (EFZ). According to 2018 National Biodiversity Assessment (NBA), the PES of the Keurbooms Estuary is A/B (Near Natural), indicating that it is relatively good ecological condition and has not been significantly modified from its natural state. The ecological importance is therefore regarded as being high and is ranked as the 18th most important system in South Africa in terms of conservation importance.

Expansions to the existing manor house will take place within the existing footprint of the developed portion of the property (i.e. within the perimeter of the rock revetment) and will not encroach further into any estuarine habitat. Two alternatives were provided. The preferred site development plan has a reduced footprint of the south-western extension, bringing the building further back from the coast. The ablution block is situated further away from the Lookout Beach, next to an existing pump house. The alternative SDP has a larger building footprint for the south-western extension and places the ablution block on the western perimeter of the car park, closer to the Lookout Beach. The expansion of the car park is identical for both SDPs and will extend into an undeveloped area of the EFZ.

While renovations to the existing Milkwood Manor House will occur in close proximity to estuarine and coastal habitat, impacts are manageable and can be mitigated to result in low impact significance with no residual impact on biodiversity. The expansion to the car park will result in the permanent transformation of a small area of the EFZ (approximately 170 m^2 of seasonally saturated marginal vegetation outside of the open waterbody of the estuary) and is not aligned to Critical Biodiversity Area (CBA) management objectives and macrophyte Resource Quality Objectives (RQOs) for the estuary. The open water body of the estuary will remain well buffered by dense reed vegetation (ranging from 15 to 40 m in width) and construction activities are unlikely to affect any of the other RQOs for the estuary. Stormwater runoff from the existing car park has resulted in visible erosion of the bank of the estuary (currently being managed through use of sand bags) and expanding the car park will slightly increase the intensity of this impact.

The loss of the vegetation is acceptable and will result in low residual impacts on estuarine habitat and biodiversity. Furthermore, implementation of the proposed stormwater management plan will adequately address and mitigate stormwater flows from the car park and represents an improvement when compared to the current scenario. Based on these findings the proposed renovations and expansion of the car park are considered acceptable from an aquatic biodiversity perspective.

SPECIALIST DECLARATION

- 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.
- I confirm that this report contains all the necessary information required by GN 9 of 10 January 2020 and GN 320 of 20 March 2020 (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).
- All the particulars furnished by me in this document are true and correct.

Specialist: Dr. James Dabrowski

(Ph.D., Pr.Sci.Nat. Water Resources)

Date: 2 August 2024

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1.1 Background

Confluent Environmental (Pty) Ltd was requested to conduct a specialist estuarine impact assessment for the proposed upgrade of the Milkwood Manor House (Erf 10190) and the construction of additional public and private parking bays (Remainder of Erf 2066 and Remainder of Erf 706), Plettenberg Bay, Western Cape. 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).

1.2 Key Legislative Requirements

According to the protocols specified in GN 9 of 10 January 2020 and GN 320 of 20 March 2020 (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 aquatic biodiversity are associated with a level of environmental sensitivity identified by the national web-based environmental screening tool (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 identified the site as being of **Very High** aquatic biodiversity as the proposed works will take place within:

a) An estuary that has been categorised as a Critical Biodiversity Area (CBA); and

b) A quinary catchment that has been categorised as a Freshwater Ecosystem Priority Area (FEPA).

A detailed site verification visit was therefore undertaken to confirm the site sensitivity and report accordingly.

1.3 Terms of Reference

The scope of work for this assessment includes the following:

- Undertake a desktop study of relevant aquatic biodiversity information for the site;
- Undertake a site visit to the study area to verify the sensitivity of the site as reported by the screening tool;
- Classify and delineate the aquatic ecosystems potentially affected by the proposed activities;
- Determine the present ecological state, functional importance and conservation value of the aquatic ecosystems that will be potentially affected by the development; and
- Describe and assess the significance of the potential impacts of the agricultural expansion on aquatic biodiversity.

1.4 Study Area

The Milkwood Manor House is situated at the south-western-most extent of the Keurbooms Estuary, at the transition between estuarine and coastal dune habitat (Figure 1). The north-western corner of the property remains undeveloped and extends into the estuary. The perimeter of the developed portion of the property is protected from tidal action and flooding by a rock revetment which extends around the entire the perimeter of the property. The public parking is located to the south of the property and provides access to the popular Lookout Beach to the west. The entire property and adjacent public parking is located with the Keurbooms Estuarine Functional Zone (EFZ).

In South Africa, the EFZ is defined as the area that not only delineates the boundaries of the estuarine waterbody, but also the supporting physical and biological processes and adjacent habitats necessary for estuarine function and health (Van Niekerk et al., 2019a). It includes all dynamic areas influenced by long-term estuarine sedimentary processes, multiple ecotones of floodplain and estuarine vegetation that contribute organic material and provide refuge from strong currents during high flow events. EFZs are currently delineated by the 5 m contour line and therefore include large areas of land (much of which has been developed) that border the actual open estuarine water body. The EFZ is now commonly used to delineate the spatial extent of the entire estuary. Large sections of the Keurbooms EFZ have been developed into residential and agricultural properties.

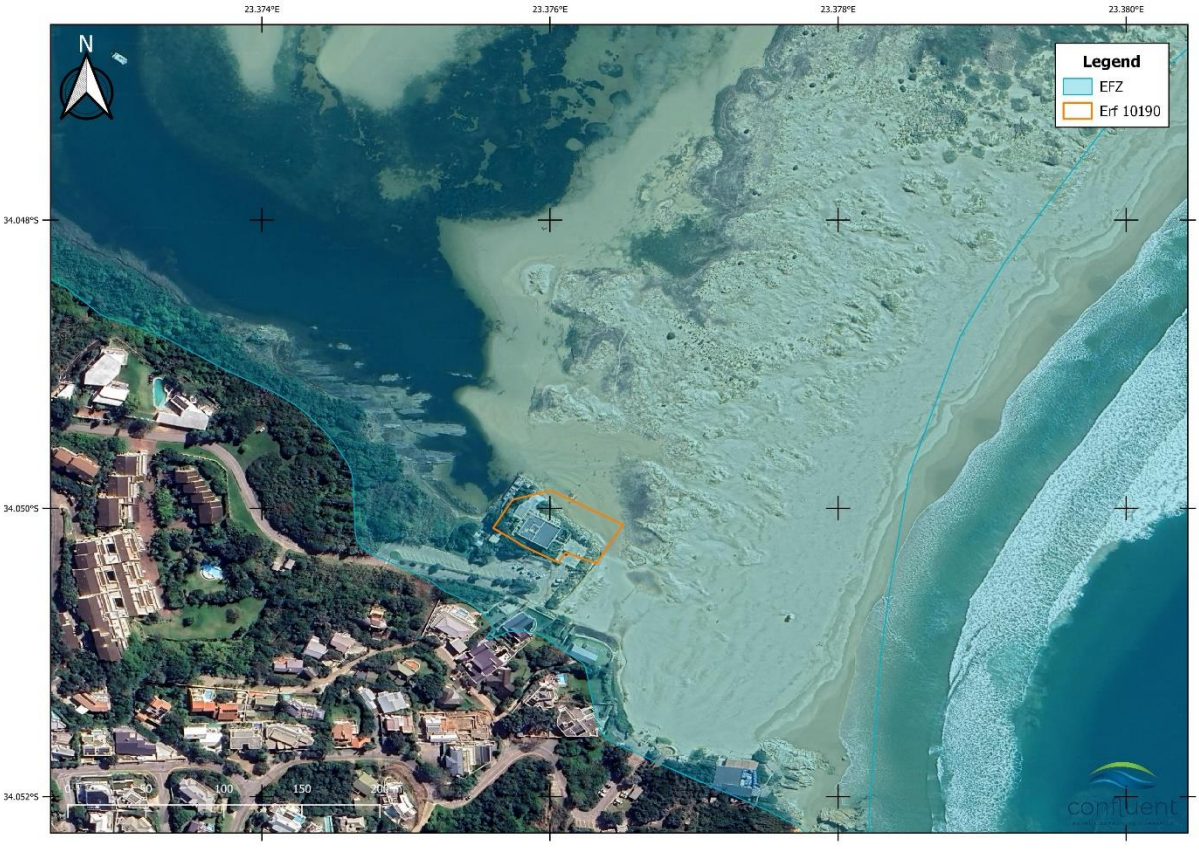

Figure 1: Map indicating the property boundary relative to the Keurbooms Estuarine Functional Zone.

1.5 Development Plans

The proposed development will involve the following:

- Expanding the existing Milkwood Manor House (8.5m height restriction).
- Adding 32 parking bays to public parking area.
- Construction of a new public ablution block and beach showers.
- New stone wall and signage.
- New deck.

Expansions to the existing manor house will take place within the existing footprint of the developed portion of the property (i.e. within the perimeter of the rock revetment) and will not encroach further into any estuarine habitat. Two alternatives were provided. The preferred site development plan (SDP - Figure 2) has a reduced footprint of the south-western extension, bringing the building further back from the coast. The ablution block is situated further away from the Lookout Beach, next to an existing pump house. The alternative SDP (Figure 3) has a larger building footprint for the south-western extension and places the ablution block on the western perimeter of the car park, closer to the Lookout Beach. The expansion of the car park is identical for both SDPs and will extend into an undeveloped area of the EFZ (Figure 4).

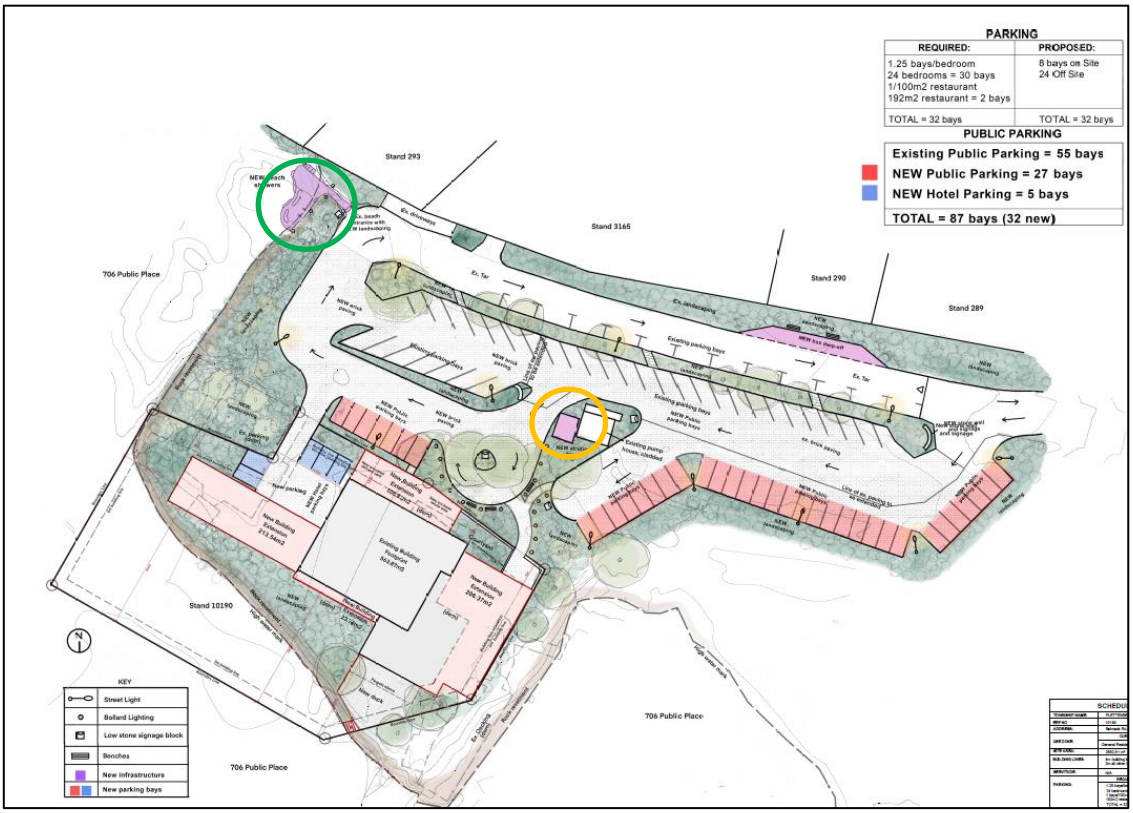

Figure 2: Preferred SDP (beach showers circled in green and ablution block circled in orange).

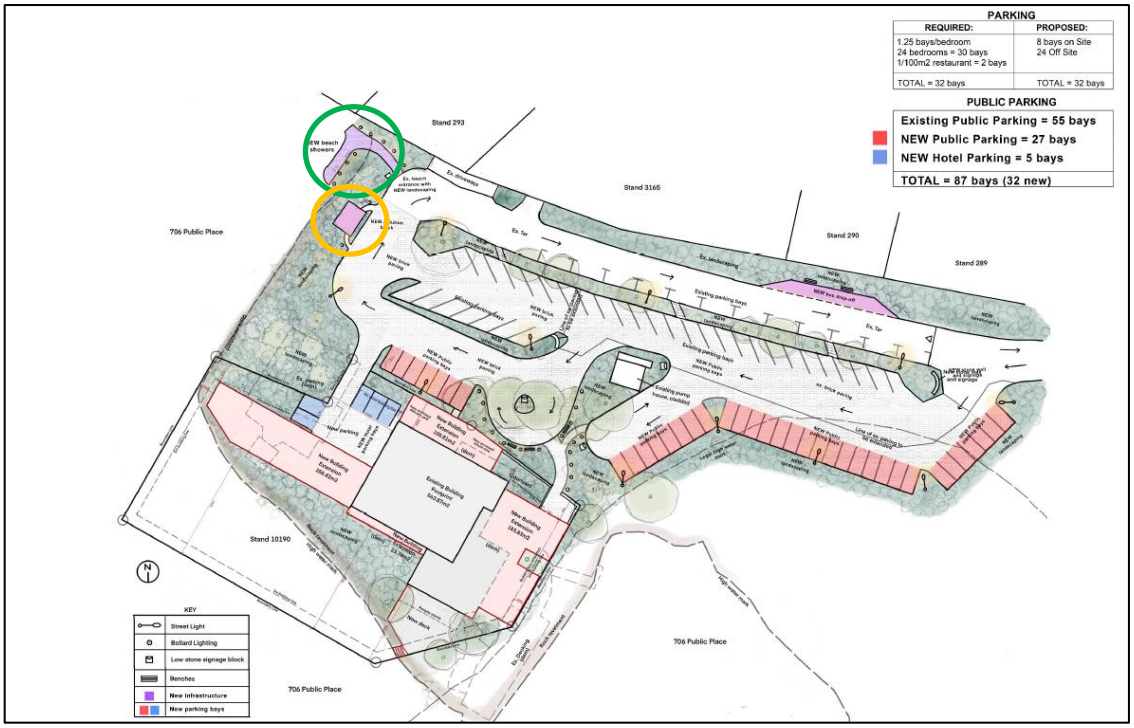

Figure 3: Alternative SDP (beach showers circled in green and ablution block circled in orange).

Figure 4: Map indicating the expanded car park areas relative to the mapped Keurbooms EFZ.

1.6 Stormwater Management Plan

The stormwater management plan (see Figure 5) includes the following relevant design aspects:

- The expanded car park area will be paved using grass brick paving to facilitate infiltration of water and reduce surface runoff from the expanded section of the car park;
- Existing stormwater outlets will be upgraded to include a silt and interception trap, headwall outlets and reno mattress for erosion protection; and
- The number of stormwater outlets will be increased to spread stormwater runoff from the car park across a wider area and prevent concentrated, higher energy stormwater runoff discharging from fewer outlets.

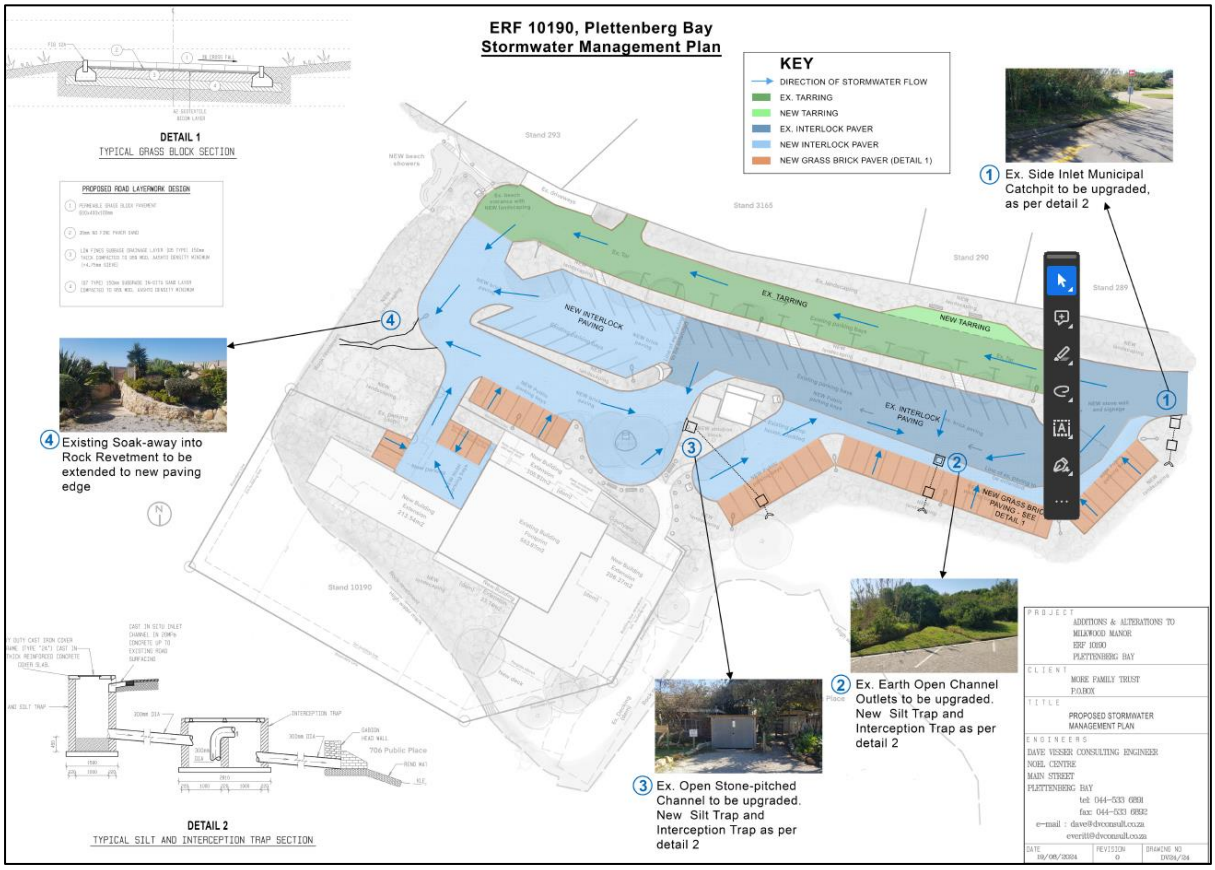

Figure 5: Proposed stormwater management plan.

2. ASSUMPTIONS AND LIMITATIONS

2.1 Estuarine Assessment

- Estuaries are complex, dynamic systems influenced by multiple environmental and anthropogenic variables. A comprehensive assessment that considers all of these variables did not form part of the scope of work. Assessments of the ecological state of the estuary were therefore derived using appropriate desktop resources.
- The dynamic nature of estuaries means that the structure of physical habitat and associated estuarine fauna and flora can change rapidly in response to tidal and hydrological (e.g. flooding events) influences. This assessment is based on a single site visit that took place in June 2024 and represents a ‘snapshot’ in time.
- No sampling of biota was undertaken (e.g. fish, invertebrates, microphytes, etc.) and all biotic data was derived from desktop sources.

3. METHODS

3.1 Estuarine Assessment

3.1.1 Present Ecological State of the Keurbooms Estuary

The 2018 National Biodiversity Assessment (NBA) evaluated the ecological health of all estuaries in South Africa (Van Niekerk et al., 2019b). This assessment considered both abiotic and biotic components, namely hydrology, hydrodynamics and mouth condition, water chemistry, sediment processes, microalgae, macrophytes, invertebrates, fish and birds. Each estuary was assigned a condition score based on the similarity to natural for these various abiotic and biotic components. For each of the components, a panel of experts estimated the change in health as a percentage (0 – 100 %) of the natural state. Scores were weighted (25 % for each abiotic and 20 % for each biotic component) and aggregated (to provide an overall score that reflects the present health of the system as a percentage of that under natural conditions.

Table 1: Estuary health scoring system indicating the relationship between the six Ecological Categories and the loss of ecosystem condition and functionality.

Category	Description
A	**Natural:** The natural biotic processes should not be modified. The characteristics of the resource should be determined by unmodified natural disturbance regimes. There should be no human induced risks to the abiotic and biotic processes and function.
B	**Largely Natural:** A small change in natural habitats and biota may have taken place, but the ecosystem functions are essentially unchanged.
C	**Moderately Modified:** A loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged
D	**Largely Modified:** A large loss of natural habitat, biota, and basic ecosystem function has occurred.
E	**Seriously Modified:** The loss of natural habitat, biota and basic ecosystem function is extensive.
F	**Critically Modified:** Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural abiotic processes and associated biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible.

Van Niekerk et al. (2019a) assessed the overall ecological importance and sensitivity of estuaries based on several criteria including the size (i.e. surface area), habitat importance, zonal rarity type and biodiversity importance. These criteria were each rated (out of a score of 100) and the average of all criteria was used as the final EIS Score (Table 2).

Table 2: Description of EIS Scores for estuaries derived by Van Niekerk et al. (2019b).

EIS Score	Description
0 – 60	Average Importance
61 – 80	Important
80 – 100	High Importance

4. ATTRIBUTES OF THE AFFECTED SYSTEM

4.1 Catchment

The Keurbooms and Bitou estuaries (collectively referred to as the Keurbooms) are located close to Plettenberg Bay and both feed into what is known as the Keurbooms Lagoon, which

is separated from the sea by a prominent berm, prior to it flowing out to sea. The confluence of the Bitou and Keurbooms estuaries is approximately 3.5 km from the mouth. The Bitou River is 23 km long, with its source at Buffelsnek, and is tidal for 7.2 km from the confluence to the causeway at Wittedrift. The Keurbooms River is approximately 85 km long, with its source at Spitskop in the Outeniqua Mountains, and is tidal for approximately 8.5 km from the confluence (CAPE Estuaries Programme, 2010).

The affected portion of the Keurbooms Estuary falls in quaternary catchment K60G (Figure 6) which covers the entire catchment of the Piesangs River and the lower most reaches of the Bietou and Keurbooms estuaries. The estuary falls within level 22.02 of the Southern Coastal Belt ecoregion, which is characterised by moderately undulating plains of moderate relief with altitude ranging from 0 to 500 m above mean sea level. Mean annual precipitation for the catchment area is relatively high (between 300 and 700 mm per annum), and occurs year-round, with peaks in late winter and early spring (August to October).

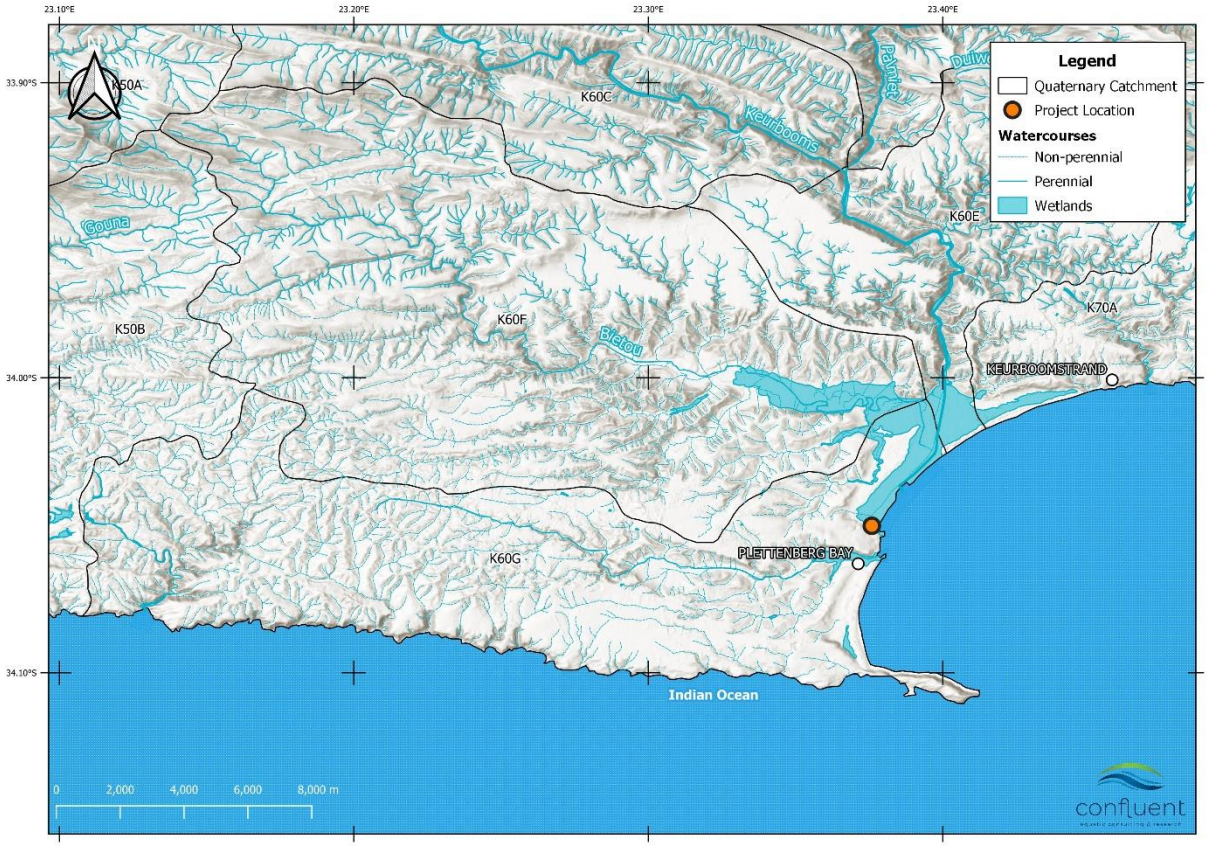

Figure 6: Figure illustrating the location of the project area in relation to quaternary catchment K60G.

4.2 Estuary Classification

The Keurbooms Estuary is classified as a Predominantly Open estuary which is characterised by the following (Van Niekerk et al., 2019c):

- They are open to the sea for more than 90 % of the time.
- They are linear systems in which mixing processes are dominated by both fluvial inputs and tidal action creating vertical and horizontal salinity gradients.
- They usually support wetlands, salt marshes, macrophyte beds and marine and estuarine fauna.

- They vary in size from as little as 10 ha to as much as 7 500 ha.

4.3 Conservation & Biodiversity Planning

4.3.1 National Freshwater Ecosystem Priority Areas

The property falls within sub-quaternary catchment (SQC) 9188, which, according to the National Freshwater Ecosystem Priority Atlas (NFEPA, Nel et al., 2011), has been classified as a Freshwater Ecosystem Priority Area (FEPA) (Figure 7). 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 indicates 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 SQC is identified as a FEPA, although the FEPA status applies to the actual river reach within such a sub-quaternary catchment. The shading of the whole sub-quaternary catchment indicates that the surrounding land and catchment area needs to be managed in a way that maintains the good ecological condition of the river reach, which in this case, is the lower reaches of the Bietou and Keurbooms rivers. It is therefore important that development does not result in any deterioration of the river or its catchment area. Similarly, the Keurbooms Estuary and adjacent wetland areas have 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.

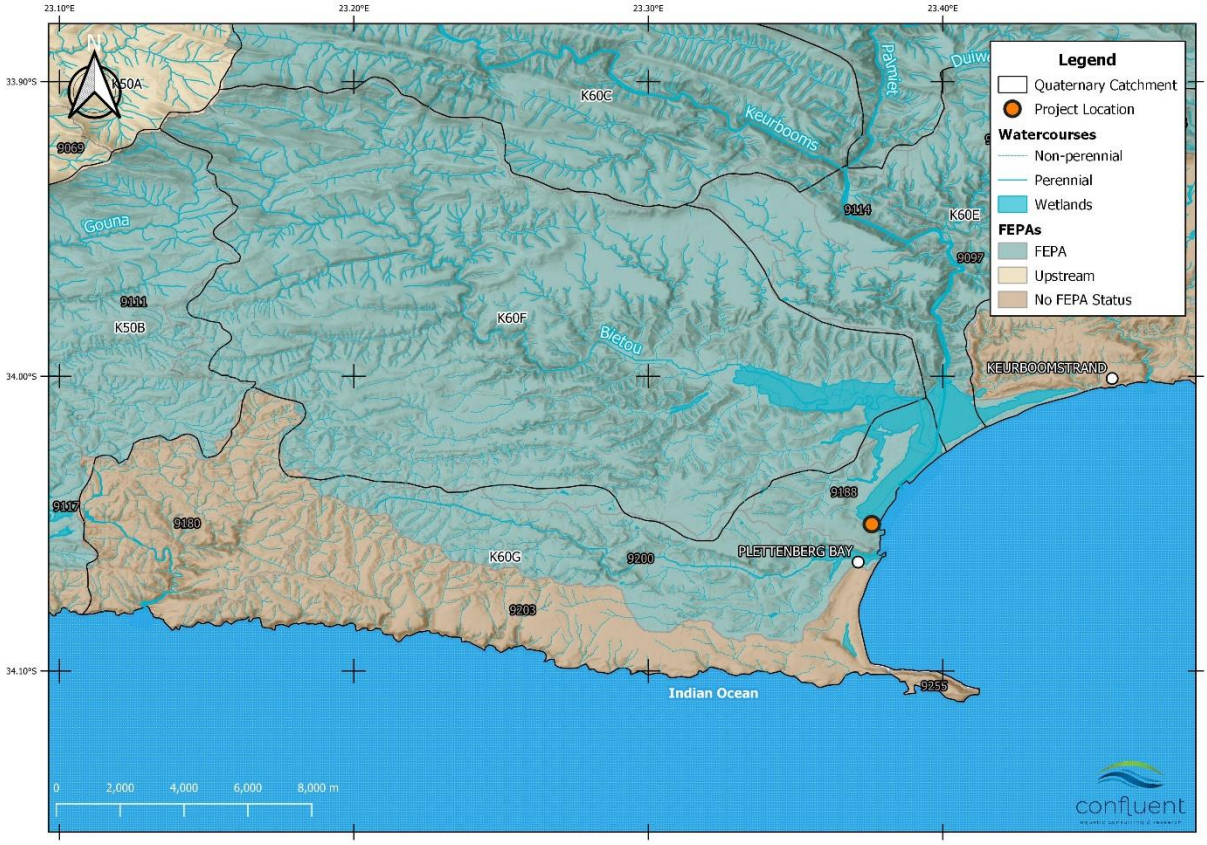

Figure 7: Map illustrating the loaction of the project area in relation to FEPA sub-quaternary catchments.

4.3.2 Western Cape Biodiversity Spatial Plan

According to the Western Cape Spatial Biodiversity Plan, portions of the Milkwood Manor property and the area to be covered by the expanded car park fall within an aquatic Critical Biodiversity Area 1 (CBA1) (Figure 8). It is also important to note that the part of the Milkwood Manor property does fall within and is immediately adjacent to a Protected Area (Keurbooms River Nature Reserve). Management objectives associated with CBAs are provided in Table 3 and expansion of the car park is not aligned to these objectives. Inclusion of a part of the existing Milkwood Manor House as a CBA is not an accurate representation of habitat on site and is most likely a result of coarse-scale mapping conducted during development of the WCBSP.

Table 3: Definitions and management objectives of the Western Cape Biodiversity Spatial Plan.

Category	Description	Management Objective
CBA 1 (Estuaries)	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.

Figure 8: Map indicating the area of development in relation to the Western Cape Spatial Biodiversity Plan (WCBSP).

4.4 National Biodiversity Assessment

According to 2018 National Biodiversity Assessment (NBA) (Van Niekerk et al., 2019a), the PES of the Keurbooms Estuary is A/B (**Near Natural**), indicating that it is relatively good ecological condition and has not been significantly modified from its natural state (Table 4). Most of the abiotic indices used to derive the overall PES are in fact in a natural condition (A). Modifications to fish assemblages and bird populations are the most important drivers of change from the natural state. The ecological importance is therefore regarded as being high and Turpie (2004) ranked the Keurbooms estuary as the 18th most important system in South Africa in terms of conservation importance. According to Van Niekerk et al. (2019d) the ecosystem threat status of the Keurbooms Estuary, is **Vulnerable**. These systems are poorly protected in South Africa.

Table 4: Summary of the Present Ecological Status (PES) and Ecological Importance of the Keurbooms Estuary (Van Niekerk et al., 2019b).

Index	Category
Hydrology	*A*
Hydro-dynamics	*A*
Physical Habitat	*B*
Water Quality	*A*
Microalgae	*B*
Macrophytes	*C*
Invertebrates	*A*
Fish	*C*
Birds	*B*
Overall PES	**A/B**
Ecological Importance	**High**

4.5 Resource Quality Objectives

The classification of water resources and development of Resource Quality Objectives (RQOs) for the Breede-Gouritz Catchment Management Area was finalised in 2018. Quaternary catchment K60F, falls within the G15 Coastal Integrated Unit of Analysis (IUA). The Water Resource Class for this IUA is II, indicating moderate protection and moderate utilisation. The Target Ecological Category (TEC) for the Keurbooms Estuary has been set as an A (Natural), which indicates that the estuary must be managed to achieve a pristine state. Specific RQOs have been produced for the estuary in alignment with the TEC. These include specific limits at which indicators of water quantity and quality, habitat and biota must be maintained (Table 5). The scale of the proposed activities is unlikely to affect the hydrodynamics, water quality, habitat or biota RQOs for such a large system. Expansion of the car park will result in a small loss of vegetation and is not aligned to the RQO for macrophytes.

Table 5: Numeric RQOs for the Keurbooms Estuary

Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
Quantity	Flow	MMR/MAR (% Nat)	Maintain flow regime as close to natural as possible	
Quality	Nutrients	DIN	Inorganic nutrient concentrations not to exceed TPCs for macrophytes and microalgae	DIN not >100 µg/L once-off.
		DIP		DIP not >20 µg/L once-off.

Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
	Salinity	Salinity	Salinity distribution not to exceed TPCs for fish, invertebrates, macrophytes and microalgae	Average salinity >10 at the top of the estuary in the Keurbooms and/or Bitou Arm, average salinity >20 along the length of the system
	System variables	Turbidity	System variables not to exceed TPCs for biota	>10 NTU in low flow
		Dissolved oxygen		>5 mg/L in estuary.
		Enterococci	Concentrations of waterborne pathogens should be maintained in an Acceptable category for full contact recreation	≤185 Enterococci/100 ml) (90th percentile)
		Escherichia coli		≤500 E. coli/100 ml (90th percentile)
Habitat	Hydrodynamics	Mouth state	Maintain connectivity with marine environment at a level that ensures water quality and habitat remains suitable for biota typically found in the estuary	Estuary mouth permanently open
		Tidal variation	Flood regime is sufficient to maintain natural Bathymetry and sediment characteristics	Average tidal amplitude near the mouth during low flows (summer) must not change by >10% from established baseline.
	Sediment	Sediment characteristics, Channel shape/size	Flood regime to maintain natural bathymetry and the sediment characteristics	Channel shape/size, sediment grain size and organic matter must not change by >30% from established baseline
Biota	Microalgae	Biomass and community composition of phytoplankton and benthic microalgae community	Maintain the composition and richness of phytoplankton and benthic microalgae groups and medium-low biomass	Maintain low/median phytoplankton/benthic microalgae biomass: phytoplankton not to exceed 3.5 µg/ℓ (median), phytoplankton not to exceed 20 µg/ℓ and/or cell density not to exceed 10 000 cells/ml (once-off); benthic microalgae not to exceed 23 mg/m2 (median); prevent formation of phytoplankton blooms
	Macrophytes	Extent, distribution and richness of macrophytes	Maintain extent, distribution and richness of macrophyte groups, limit colonisation/spread of the EFZ by alien species	Maintain the distribution of sensitive macrophyte habitats (e.g. salt marsh, submerged macrophytes, reeds and sedges) (of special importance are the submerged macrophytes in the Bitou Arms as habitat for the endangered seahorses *H. capensis*); rehabilitate the Bitou wetlands by removing weirs, berms, old bridges; limit the spread of invasive plants; maintain the integrity of the riparian zone
	Invertebrates	Macrofauna Community composition, abundance and richness	Maintain composition, richness and abundance of different groups of benthic macrofauna and zooplankton	Maintain high biomass and diversity of benthic invertebrates in the lagoon area in the lower estuary; maintain rich invertebrate communities associated with the REI zone in the upper estuary (zooplankton and benthos).
	Fish	Fish community composition, abundance and richness	Maintain composition, richness and abundance of different groups of fish, prevent colonisation/increase of alien species	Fish assemblage should comprise the 5 estuarine association categories in similar proportions (diversity and abundance) to that under the reference (see 2015 EWR report); numerically assemblage should comprise: Ia estuarine residents (50-80% of total abundance), Ib marine and estuarine breeders (10-20%), IIa obligate estuarine dependent (10-20%), IIb estuarine associated species (5-15%), IIc marine opportunists (20-80%), III marine vagrants (not more than 5%), IV indigenous fish (1-5%), V catadromous species (1-5%); Category Ia species should contain viable populations of at least 4 species ; Category IIa obligate dependents should be well represented by large exploited species
	Birds	Avifauna Community composition, abundance and richness	Maintain composition, richness and abundance of different avifauna groups	Maintain population of original groups of birds present on the estuary; number of birds in any group, other than species that are increasing regionally such as Egyptian geese, should not drop below the baseline median (determined by past data and or initial surveys) number of species and/or birds counted for three consecutive summer or winter counts

4.6 Keurbooms-Bitou Estuary Management Plan

Estuaries are recognised as particularly sensitive and dynamic ecosystems and the National Environmental Management: Integrated Coastal Management Act (No. 24 of 2008, as amended by Act 36 of 2014) (ICMA), via the prescriptions of the South African National Estuarine Management Protocol (the Protocol), require Estuary Management Plans (EMPs) to be prepared for estuaries in order to create informed platforms for efficient and coordinated estuarine management. To this end, the Keurbooms EMP was compiled in 2017 (DEADP, 2018) and provides a detailed situation assessment of the estuary as well as management objects aimed at achieving an agreed upon vision for the estuary which is as follows:

"From catchment to coast, the Keurbooms and Bitou systems will be harmoniously managed through active participation to maintain their biodiversity in order to attract visitors, promote education, create awareness, and preserve the cultural, natural and recreational heritage for (the benefit of) all (South Africans)."

Management objectives that are relevant to the proposed development include the following:

- Development and land use in the catchment and estuarine area should not lower water quality or interfere with normal hydrodynamic or sedimentary processes and cycles;
- Planning should allow for the maintenance of a riparian zone along the length of the estuary where sensitive habitats (e.g. wetlands, supratidal saltmarsh and indigenous vegetation) occur. The application of the Coastal Protection Zone, floodlines and inclusion of Critical Biodiversity Areas in all planning schemes should allow for this.

4.7 Species of Conservation Concern

4.7.1 Knysna Seahorse (Hippocampus capensis)

The Knysna seahorse (*Hippocampus capensis*) occurs only in the Keurbooms, Knysna and Swartvlei estuaries (Lockyear et al., 2006) and is listed as an endangered species on the IUCN Red List due to its fragmented distribution, small area of occupancy, the vulnerability of its habitat and susceptibility to high mortality due to freshwater flooding (Pollom, 2017). *Hippocampus capensis* is restricted to sub-tidal areas (Teske, 2003) and is usually found at depths between 0.5-20 m in association with submerged aquatic plants (Bell et al. 2003). Bell (2003) and Teske (2007) found the species to associate with *Zostera capensis*, *Caulerpa filiformis*, *Codium extricatum*, *Halophila ovalis* and *Ruppia cirrhosa.* While Teske (2007) did not report on any preference for a specific species of macrophyte, Bell (2003) did indicate a preference for *Z. capensis.* Both studies showed contrasting preference for percentage of cover ranging from dense (> 75 %; Teske, 2007) to sparse (< 20 % cover). More recent studies indicate that the species also use artificial habitats (including reno mattress) extensively (Claassens, 2017) and that constructed artificial habitats such as marinas and boat harbours using reno mattresses within the estuaries have increased population numbers and increased the range of the species. *Hippocampus capensis* can also tolerate a wide range of environmental conditions (Lockyear et al. 2006). Increased boat activity and associated noise has been show to significantly decrease activity within suitable habitats (Claassens and Hodgson, 2018).

4.7.2 Eelgrass (Zostera capensis)

While endangered, this species is abundant in the estuary. Globally, seagrasses provide important ecological services in estuaries, including stabilizing sediment, preventing erosion, reducing water flow, trapping nutrients and organic materials and providing sheltered habitat for fish and invertebrates. Because of these ecological services they provide to coastal zones they are ranked among the most productive and valuable ecosystems on Earth (Adams, 2016). As a result of coastal development, habitat destruction and its continued decline, *Z. capensis* is listed as vulnerable in the Red Data List of Species (Short et al., 2010). Studies in South Africa have shown that *Z. capensis* beds support a more diverse and abundant invertebrate and fish community than unvegetated benthic habitats (Whitfield et al., 1989). Furthermore *Z. capensis* provides critical habitat for *H. capensis* (Lockyear et al., 2006). *Zostera capensis* is the dominant submerged aquatic macrophyte in the Keurbooms estuary (CAPE Estuaries Programme, 2010). Although in South Africa abundant, *Z. capensis* is considered an endangered (EN) species and has the following description on SANBI's Red List website:

> *"The species experiences extreme fluctuations in population size due to dynamic changes in cover abundance in response to floods, droughts, sedimentation, and freshwater abstraction (Adams, 2016; Adams & Talbot, 1992; Cyrus et al., 2008; Pillay et al., 2010; Talbot et al., 1990; Talbot & Bate, 1987). The number of known subpopulations have been reduced, as two subpopulations have been lost from Durban Bay and the St Lucia system. The subpopulation in the uMhlathuze system is variable due to partial protection by Ezemvelo KwaZulu-Natal Wildlife, and the threat of increased turbidity and silt smothering from dredging. It is a concern that the next largest eelgrass subpopulation occurs approximately 850 km south of uMhlathuze at the Keiskamma Estuary, making recolonization difficult, if a subpopulation is lost, however propagules could still come from the Kosi system. Of the 62 subpopulations of eelgrass, there are only thirteen large subpopulations (Kosi, uMhlathuze, Qora, Keiskamma, Kariega, Bushmans, Swartkops, Kromme, Keurbooms, Knysna, Langebaan, Berg and Olifants) and these have shown varying changes in extent over time, with increases and decreases caused by similar activities such as disturbance from boats, bait digging and trampling. Further investigation is necessary to understand the dynamic responses of this species to environmental changes and habitat disturbance, to improve predictions of future distribution and status (Adams, 2016)."*

5. FIELD ASSESSMENT

Renovations at the manor house and expansion of the public car park will occur in very close proximity to the estuary but is limited to the existing developed area of the property that is contained within the rock revetment border. This area is presently covered by buildings, car park, landscaped rock gardens (Figure 9) and outdoor dining and recreational areas (i.e. raised decks overlooking the estuary). The renovations will therefore not result in any additional loss of area of estuarine (or coastal) habitat.

Figure 9: View of the manor house from the top of the rock revetment (left) and wooden decks (right).

The proposed expansion of the public car park will however extend slightly north into an undeveloped area of the EFZ. The western expansion of the car park will overlap with an area dominated *Arrundo donnax* interspersed with *Phragmites australis.* Both of these species occur in areas that typically experience extended periods of saturation. Soil is very sandy and did not show typical indicators of soil saturation (e.g. mottling and gleying) which is typical of very sandy soils. While *A. donnax* is invasive, the habitat is typical of what would be expected to occur within the EFZ along the margins of estuary, where soils would experience periodic saturation and, under extreme events, inundation. Biota that may utilise the habitat will most likely be limited to terrestrial bird species and some small mammals (e.g. rodent species). The eastern expansion of the car park will overlap with a more modified section of the EFZ that includes existing out buildings and transformed vegetation (e.g. kikuyu lawn and other invasives including *Myoporum insulare*).

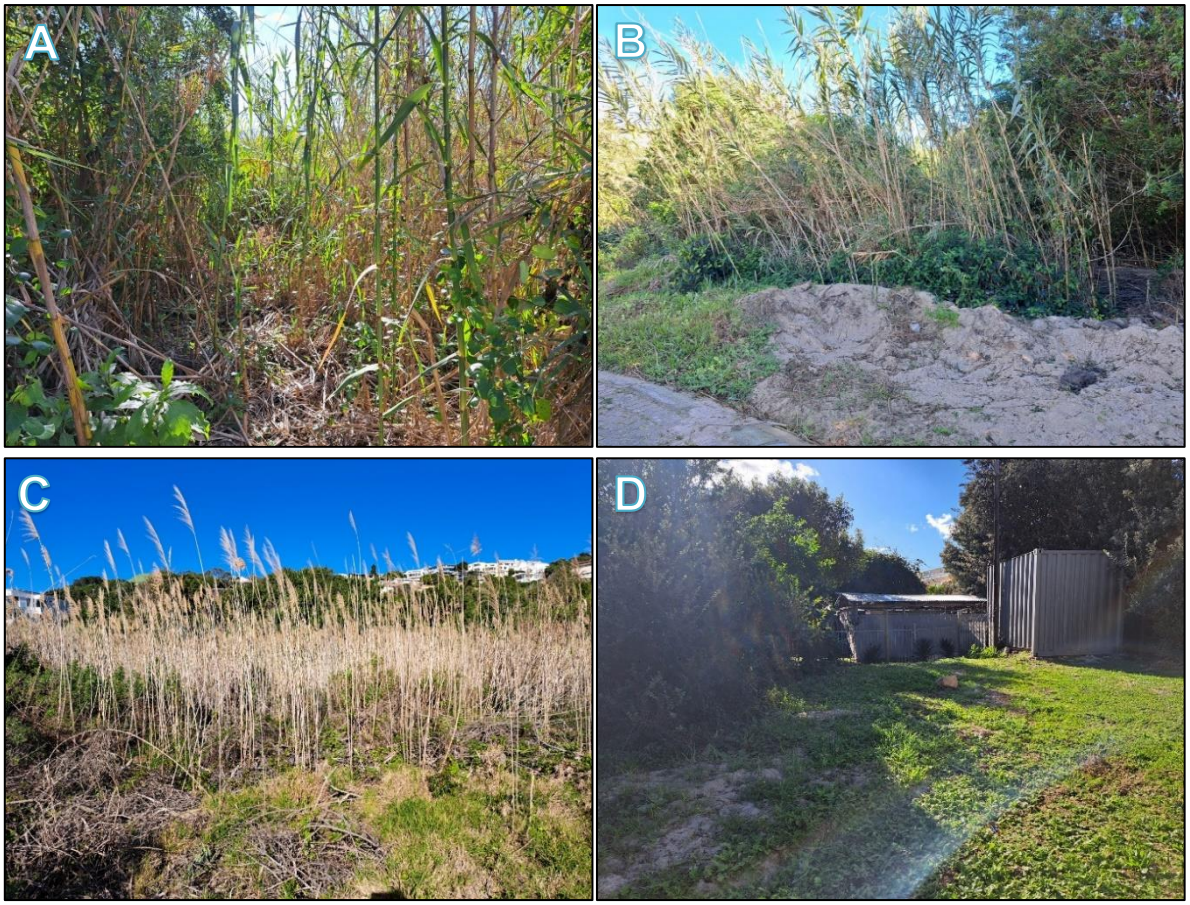

Figure 10: Photographs illustrating stands of A. donnax in the area into which the car park will extend (A & B); stands of P. australis closer to the estuary (C) and a grassed area and out-buildings into which the car park will extend (D).

The narrow shoreline of the estuary is further to the north and is characterised by typical salt marsh species (Figure 11). A single-track footpath runs through the salt marsh habitat, long the shoreline. This habitat falls well outside of the proposed car park expansion area. Rocky outcrops extend from the western shoreline and open water in the estuary is dominated by extensive patches of *Zostera capenis*. Stormwater runoff is directed from the car park into this patch and appears to have caused a small area of erosion along the shoreline, which is currently being stabilised using sand-bags.

Figure 11: Photographs of plant species in the inter-tidal salt marsh, including Tetragonia decumbens (A); Chenolea diffusa (B); Salicornia sp (C); and Cyperus laevigatus (D); stormwater channels extending from the car park into the EFZ (E); and sandbags placed to protect the banks of the estuary (F).

5.1 Historical Assessment

As is typical of permanently open estuaries, the mouth of the Keurbooms Estuary has shifted over time (Figure 12). Historically the mouth opened at its present location (2004). Coastal dunes to the south of the mouth were well vegetated, right up to the perimeter of the Milkwood Manor property. Flooding resulted in the mouth shifting further south (2010), immediately adjacent to the Milkwood Manor property. Coastal vegetation was washed away by the flooding, resulting in the formation of a large unvegetated sandbank. By 2016 the mouth had shifted further north, back to its original position. A coastal dune/sand bank area has re-

established immediately north of the property. This area remains largely unvegetated, although there are signs that vegetation is starting to re-establish (2024).

Figure 12: Google Earth images showing movement of the position of the estuary mouth.

6. IMPACTS ASSOCIATED WITH THE DEVELOPMENT

The proposed activities will not result in any additional development of infrastructure within the dynamic, tidal extent of the estuary and construction and operational phase activities will not impact on the base flows or hydrological regime (i.e. timing and magnitude of surface flows) of the estuary and are of such a scale that will in no way impact on the frequency of estuary mouth closure.

6.1 Construction Phase Impacts

A summary of ratings for each impact associated with the construction phase can be viewed in the impact tables below. While two alternative SDPs were provided, the differences in the layout are not significant enough to result in any qualitative difference in impact. Construction of the ablution block will occur within a transformed area of the EFZ and will not result in any loss or disturbance to estuarine habitat. Construction of beach showers occurs on an undeveloped section of the coastal dune section of the EFZ, at the access point to the Lookout Beach.

6.1.1 Impact 1: Loss of EFZ habitat (estuarine) caused by the expansion of the public car park.

Expansion of the car park will result in the permanent transformation of a narrow undeveloped band of the EFZ. Approximately 170 m^2 of this habitat is natural and the remainder (approximately 180 m^2) is transformed (kikuyu lawns and other invasives – e.g. *M. insulare*). While the natural habitat is invaded by *A. donnax,* it does nevertheless provide functional habitat for a limited diversity of predominantly terrestrial biota – mainly nesting and foraging habitat for bird species (e.g. weavers, bishops and warblers). No aquatic estuarine biota are

expected to be adversely impacted. The extent of habitat lost is very limited in extent and a natural reedbed buffer (ranging between 15 and 40 m) will remain between the car park and the shoreline of the estuary. It is thus unlikely that this loss of habitat will significantly affect the ecological or functional attributes of the broader estuarine system.

6.1.1.1 Mitigation

- Working areas must be clearly demarcated. Estuarine habitat outside of the working area must be designated as No-Go and no disturbance (i.e. trampling, smothering etc.) of estuarine habitat in this area is permitted.
- No excavated material must be dumped or stockpiled in the No-Go area.
- A comprehensive method statement must be drawn up which provides a clear step by step plan of the sequence of construction activities that will be undertaken. The method statement must aim to minimise the length of time that cleared areas remain exposed and vulnerable to erosion.
- Clearing of vegetation in the EFZ should ideally take place during the winter (May to July) months when the presence of nesting bird species is likely to be minimal.
- Alien invasive trees and shrubs must be removed from the remaining buffer (i.e. undeveloped portion of the EFZ).

	Preferred SDP	Alternative SDP
Nature of impact:	Expansion of public car park	Expansion of public car park
Extent and duration of impact:	Site-Specific & Permanent	Site-Specific & Permanent
Consequence of impact or risk:	Loss of estuarine habitat	Loss of estuarine habitat
Probability of occurrence:	Definite	Definite
Degree to which the impact may cause irreplaceable loss of resources:	Marginal Loss	Marginal Loss
Degree to which the impact can be reversed:	Irreversible	Irreversible
Indirect impacts:	None	None
Cumulative impact prior to mitigation:	Low	Low
Significance rating of impact prior to mitigation:	**Medium Negative**	**Medium Negative**
Degree to which the impact can be avoided:	Low	Low
Degree to which the impact can be managed:	High	High
Degree to which the impact can be mitigated:	Moderate	Moderate
Proposed mitigation:	See Section 6.1.1.1	See Section 6.1.1.1
Residual impacts:	Low	Low
Cumulative impact post mitigation:	Low	Low
Significance rating of impact after mitigation	**Low Negative**	**Low Negative**

6.1.2 Impact 2: Loss of EFZ habitat (coastal) caused by the construction of beach showers.

Construction of public beach showers is planned at the public access point to the Lookout Beach. While this area falls within the EFZ of the estuary, habitat is definitely coastal, consisting of beach sand, well above the tidal mark. The area is not vegetated and no aquatic estuarine biota (dependant on tidal exchange) inhabit the area. The area experiences high volumes of pedestrian traffic and is unlikely to be an important nesting, roosting or feeding area for coastal bird species.

Figure 13: Photographs showing the access point to Lookout Beach (left) and the proposed location of the beach showers (right).

6.1.2.1 Mitigation

- Working areas must be clearly demarcated. Coastal estuarine habitat outside of the working area must be designated as No-Go and no disturbance (i.e. trampling, smothering etc.) of estuarine habitat in this area is permitted.
- No excavated material must be dumped or stockpiled in the No-Go area.

	Preferred SDP	Alternative SDP
Nature of impact:	Construction of beach showers	
Extent and duration of impact:	Site-Specific & Permanent	Site-Specific & Permanent
Consequence of impact or risk:	Loss of coastal dune habitat in the EFZ	
Probability of occurrence:	Definite	Definite
Degree to which the impact may cause irreplaceable loss of resources:	Marginal Loss	Marginal Loss
Degree to which the impact can be reversed:	Fully reversible	Fully reversible
Indirect impacts:	None	None
Cumulative impact prior to mitigation:	Negligible	Negligible
Significance rating of impact prior to mitigation:	**Low Negative**	**Low Negative**
Degree to which the impact can be avoided:	Unmanageable	Unmanageable
Degree to which the impact can be managed:	High	High
Degree to which the impact can be mitigated:	Moderate	Moderate
Proposed mitigation:	See Section 6.1.2.1	See Section 6.1.2.1
Residual impacts:	Very Low	Very Low
Cumulative impact post mitigation:	Negligible	Negligible
Significance rating of impact after mitigation	**Low Negative**	**Low Negative**

6.1.3 Impact 3: Erosion and sedimentation caused by clearing of vegetation during construction of car park.

Clearing of vegetation will expose soil which may be vulnerable to erosion resulting in sediment input into the estuary and smothering and die-back of estuarine vegetation (e.g. low growing salt marsh species).

6.1.3.1 Mitigation

- Working areas must be clearly demarcated to avoid unnecessary clearing of vegetation. Estuarine habitat outside of the working area must be designated as No-Go and no disturbance (i.e. trampling, smothering etc.) of estuarine habitat in this area is permitted.
- Construction of the car park must be planned for the dry season (May to July).
- A comprehensive method statement must be drawn up which provides a clear step by step plan of the sequence of construction activities that will be undertaken. The method statement must aim to minimise the length of time that cleared areas remain exposed and vulnerable to erosion.
- Silt fencing must be placed along the outer perimeter of the expanded park area to prevent sediment input in the event of a rainfall even.
- Any disturbed, exposed areas must be reprofiled to natural contours and re-vegetated.

	Preferred SDP	Alternative SDP
Nature of impact:	Erosion of exposed soil	
Extent and duration of impact:	Site-Specific & Permanent	Site-Specific & Permanent
Consequence of impact or risk:	Sediment runoff and smothering of estuarine habitat	
Probability of occurrence:	Probable	Probable
Degree to which the impact may cause irreplaceable loss of resources:	No Loss	No Loss
Degree to which the impact can be reversed:	Fully reversible	Fully reversible
Indirect impacts:	None	None
Cumulative impact prior to mitigation:	Low	Low
Significance rating of impact prior to mitigation:	**Medium Negative**	**Medium Negative**
Degree to which the impact can be avoided:	High	High
Degree to which the impact can be managed:	High	High
Degree to which the impact can be mitigated:	High	High
Proposed mitigation:	See Section 6.1.3.1	See Section 6.1.3.1
Residual impacts:	Low	Low
Cumulative impact post mitigation:	Low	Low
Significance rating of impact after mitigation	**Low Negative**	**Low Negative**

6.1.4 Impact 4: Disturbance of estuarine and coastal habitat caused by general construction activities.

The Milkwood Manor House is located immediately adjacent to sensitive estuarine and coastal habitat. Failure to adequately manage activities on the construction site (e.g. access to construction areas, location and management of laydown and stockpile areas, waste management etc.) could lead to physical disturbance, solid waste pollution (e.g. general litter, building rubble, construction materials, cement etc.) and chemical pollution (e.g. hydrocarbons from vehicles and machinery and wastewater from cement mixing and temporary ablution facilities) of estuarine and coastal habitat.

6.1.4.1 Mitigation

- Undeveloped areas of the EFZ (i.e. estuarine and coastal habitat) within the property boundary (i.e. outside of the rock revetment) and outside of the property boundary must be designated as No-Go areas.
- Access to the property via the beach/estuary is not permitted. Only the existing access from the car park can be used.
- No construction materials to be stored or stockpiled outside of the area delineated by the rock revetment or in any part of the undeveloped areas of the EFZ.
- Rubble and waste materials must be managed on site and must not be dumped or stockpiled within undeveloped areas of the EFZ.
- Chemical toilets should be provided on-site at 1 toilet per 10 persons.
- Waste from chemical toilets must be disposed of regularly (at least once a week) in a responsible manner by a registered waste contractor.

	Preferred SDP	Alternative SDP
Nature of impact:	Construction activities, including stockpile and laydown areas, waste management, site access, refuelling of construction vehicles and machinery	
Extent and duration of impact:	Site-Specific & Permanent	Site-Specific & Permanent
Consequence of impact or risk:	Physical disturbance and pollution (chemical and solid waste) of sensitive estuarine coastal and estuarine habitat	
Probability of occurrence:	Probable	Probable
Degree to which the impact may cause irreplaceable loss of resources:	No Loss	No Loss
Degree to which the impact can be reversed:	Fully reversible	Fully reversible
Indirect impacts:	None	None
Cumulative impact prior to mitigation:	Low	Low
Significance rating of impact prior to mitigation:	**Medium Negative**	**Medium Negative**
Degree to which the impact can be avoided:	High	High
Degree to which the impact can be managed:	High	High
Degree to which the impact can be mitigated:	High	High
Proposed mitigation:	See Section 6.1.4.1	See Section 6.1.4.1
Residual impacts:	None (no additional loss of estuarine habitat)	None (no additional loss of estuarine habitat)
Cumulative impact post mitigation:	Low	Low
Significance rating of impact after mitigation	**Low Negative**	**Low Negative**

6.2 Operational Phase Impacts

6.2.1 Impact 5: Erosion of estuarine habitat caused by increased stormwater runoff from the expanded car park

The existing car park has resulted in some erosion of the banks of the estuary (which is currently being stabilised by sand-bags). The expanded car park will result in an increase in the area of hardened surfaces, which will increase volumes of stormwater runoff and therefore increase the risk of erosion. Appropriate stormwater management measures must therefore be implemented in order to mitigate this risk.

6.2.1.1 Mitigation

- The stormwater management plan must be implemented as specified in Section 1.6; and
- Silt and interception traps must be routinely inspected and cleared to ensure that they continue to operate as designed.

	Preferred SDP	Alternative SDP
Nature of impact:	Increased stormwater runoff from the expanded car park.	
Extent and duration of impact:	Site-Specific & Permanent	Site-Specific & Permanent
Consequence of impact or risk:	Erosion of estuarine habitat	
Probability of occurrence:	Highly Probable	Highly Probable
Degree to which the impact may cause irreplaceable loss of resources:	Marginal Loss	Marginal Loss
Degree to which the impact can be reversed:	Fully reversible	Fully reversible
Indirect impacts:	None	None
Cumulative impact prior to mitigation:	Low	Low
Significance rating of impact prior to mitigation:	**Medium Negative**	**Medium Negative**
Degree to which the impact can be avoided:	High	High
Degree to which the impact can be managed:	High	High
Degree to which the impact can be mitigated:	High	High
Proposed mitigation:	See Section 6.2.1.1	See Section 6.2.1.1
Residual impacts:	Low	Low
Cumulative impact post mitigation:	Low	Low
Significance rating of impact after mitigation	**Low Negative**	**Low Negative**

7. CONCLUSION

Renovations to the existing Milkwood Manor House will occur in close proximity to estuarine and coastal habitat. Impacts associated with the renovations to the house are however manageable and can be mitigated to result in low impacts and no residual impact on biodiversity. The expansion to the car park will result in the permanent transformation of a small area of the EFZ (seasonally saturated marginal vegetation outside of the open waterbody of the estuary) and is not aligned to CBA management objectives and macrophyte RQOs for the estuary. The open water body of the estuary will remain well buffered by dense reed vegetation (approximately 30 m in width) and construction activities are unlikely to affect any of the other RQOs for the estuary. Stormwater runoff from the existing car park has resulted in erosion of the bank of the estuary and expanding the car park will slightly increase the intensity of this impact. The loss of the vegetation is acceptable and will result in low residual impacts on estuarine habitat and biodiversity. Furthermore, implementation of the proposed stormwater management plan will adequately address and mitigate stormwater flows from the car park and represents an improvement when compared to the current scenario. Based on these findings the proposed renovations and expansion of the car park are considered acceptable from an aquatic biodiversity perspective.

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