Aquatic Biodiversity Impact Assessment

Proposed Residential Development for Portion 91 / 304 Matjesfontein, Plettenberg Bay

Drone photos courtesy of Mr. C. Delport

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Date: March 2024
Version: Version 3 (Updated SDPs)

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DECLARATION OF CONSULTANTS INDEPENDANCE

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.

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

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

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1. INTRODUCTION

Confluent Environmental (Pty) Ltd was appointed by EcoRoute to undertake an Aquatic Biodiversity Site Sensitivity Verification and Assessment for the proposed residential development being planned for Portion 91/304 Matjesfontein Farm, on Keurboomstrand, Plettenberg Bay, Western Cape (Figure 1). The property is located on the northern side of the MR395 access road to Keurboomstrand. At the time of the first site visit no detailed Site Development Plan (SDP) was available, but inputs based on understanding of the site sensitivity have been highlighted in several discussions with the development team over subsequent months. The proposed development is approximately 5.5 ha in extent while the entire farm portion covers an area of

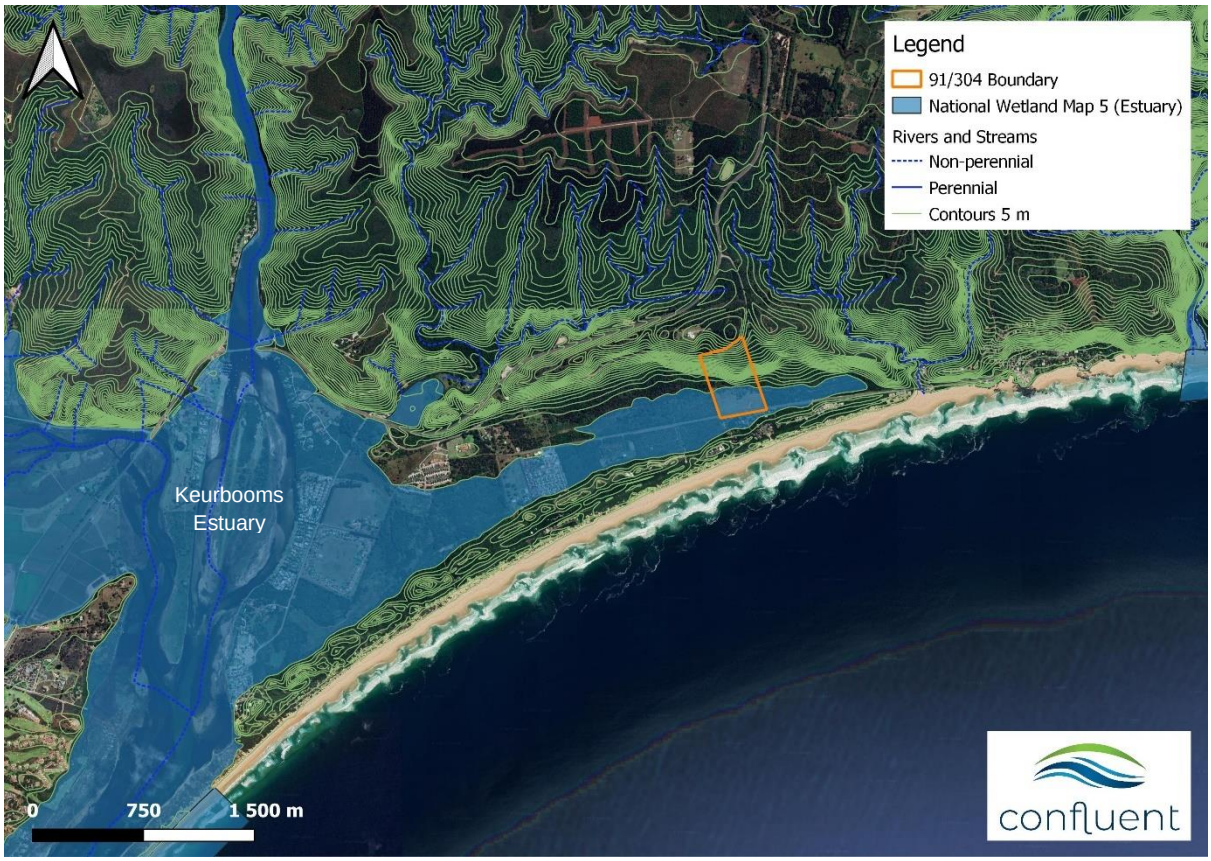


Figure 1. Location of 91/304 Matjesfontein in relation to the mapped Keurbooms Estuarine Functional Zone, contours and other watercourses.

1.1 Proposed Development

Two alternative development layouts were provided for assessment. A higher density alternative development and a lower density preferred development. The alternative layout is group housing with 73 erven (Figure 2), while the preferred layout is slightly lower density with 60 residential 2 erven with an average size of 475 sqm (Figure 3).

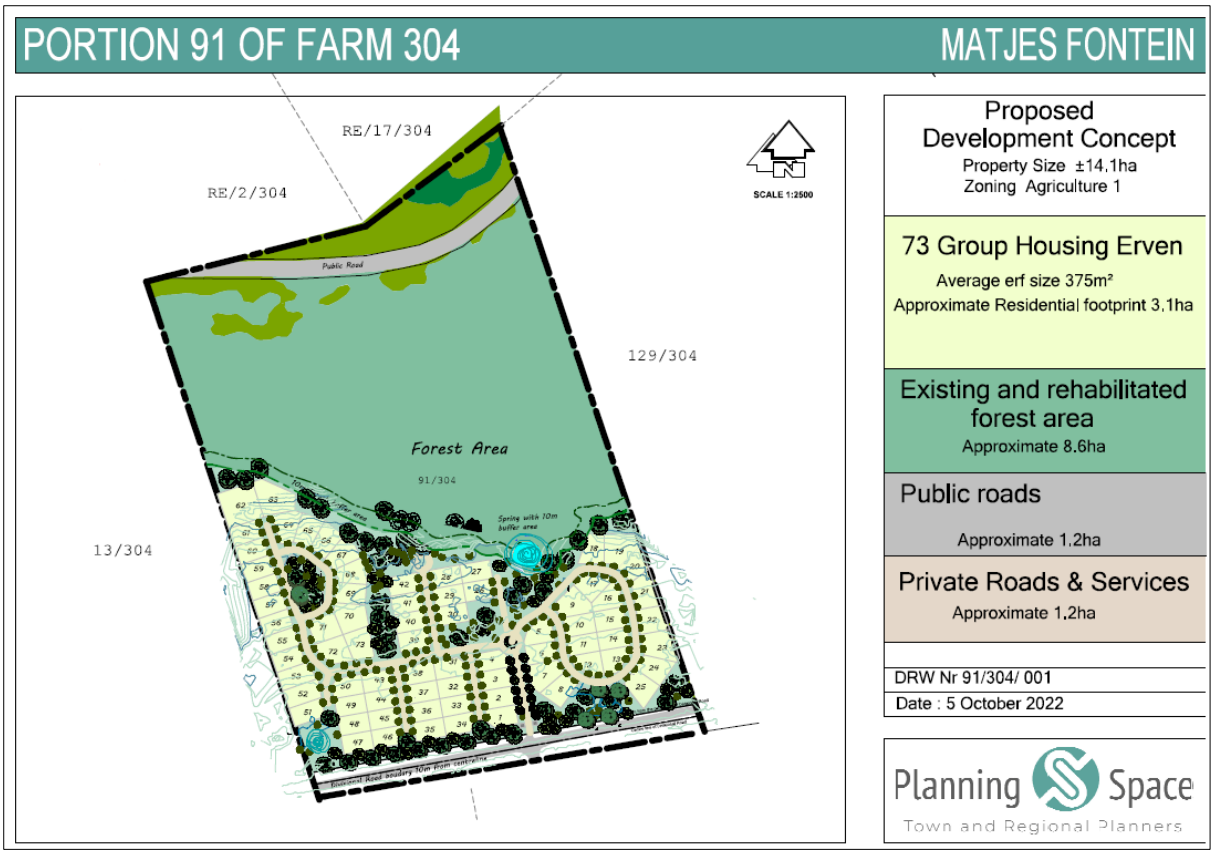


Figure 2. Alternative higher density development (October 2022).

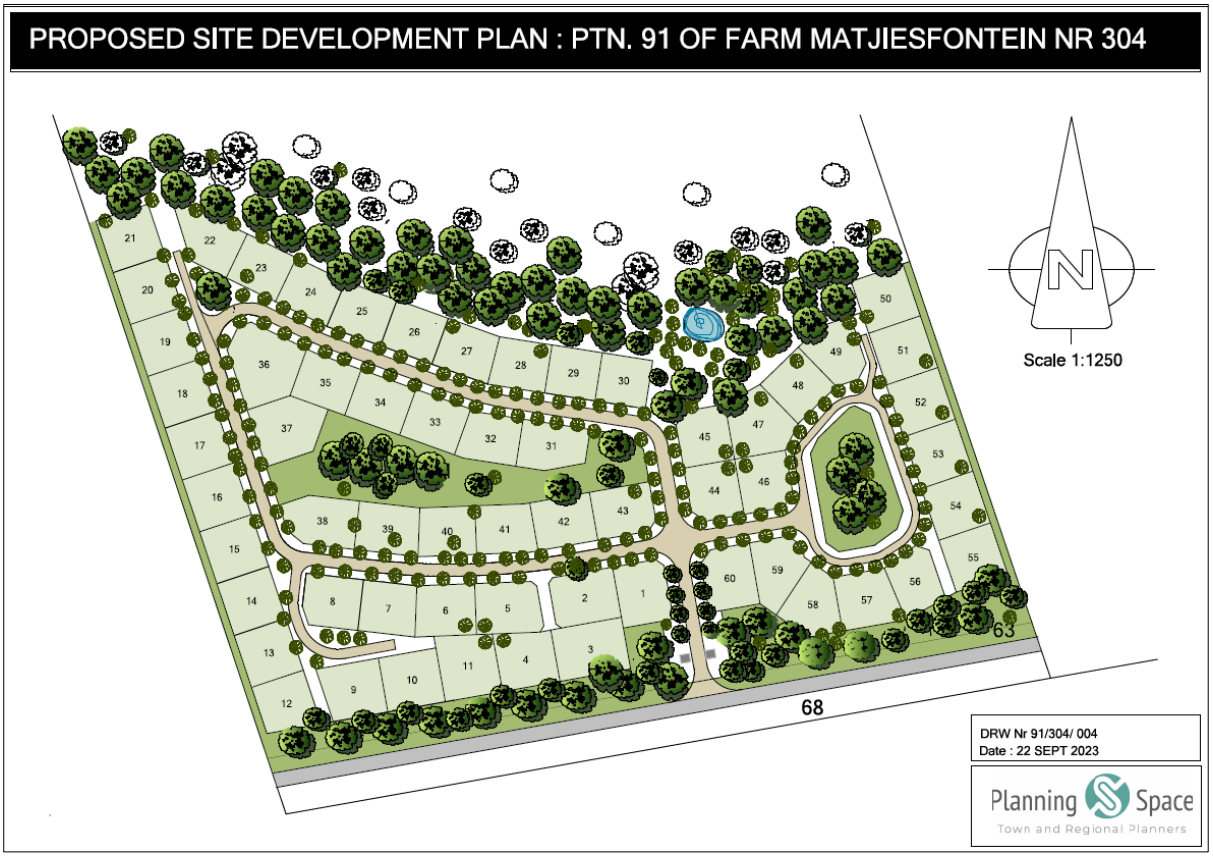


Figure 3. Preferred lower density development (September 2023).

The total area of the property is approximately 14 ha, and the development will focus on the southern extent of the property covering 4.86 ha. The remainder is relatively steep, densely vegetated forest / thicket which will remain untransformed.

1.1.1 Engineering Services

Refer to Appendix 1 for the plan of services discussed in this section and provided by Poise Consulting Engineers (June, 2024). The proposed potable water supply will be the existing municipal connection via the water main on Keurboomstrand road.

At present there is insufficient capacity at the Ganze Valley Wastewater Treatment Works (WWTW) to treat sewage from the proposed development. While plans to upgrade the plant are in place, the proposal is to install an onsite sewerage package plant as an interim measure. Details of the proposed plant are provided in the engineering services report prepared for the site by Poise Consulting Engineers (June, 2024). In brief, the plant is containerised and the anaerobic tank will be constructed of reinforced concrete underground underlain by impermeable liners to prevent leakage which is returned to the tank.

Treated effluent from the plant will be piped to a holding reservoir to be constructed in the northwest corner of the development. Each erf will have a connection to this water source for the use of garden irrigation and / or toilet flushing. The remainder of the water will be irrigated across an area of approximately 1.12 ha at a rate of approximately 2 mm/m^2/day. Excess effluent will be discharged to stormwater and is understood to meet the DWAS special limits in terms of quality.

Stormwater runoff from the steep vegetated slopes is expected to infiltrate at high rates due to the sandy soil and high permeability of the site. The state of the slopes is not proposed to change, and the dense vegetation will further reduce the velocity of runoff reaching the development area. The proposal within the development is to direct stormwater to three retention ponds to be located within the development area.

As per earlier versions of this report, and in discussions with the development team, the recommendation is that ***no treated sewage OR stormwater be discharged to the natural spring and dam as this water is of high quality and must be preserved for access by wildlife.***

1.2 Legislation: National Environmental Management Act

1.2.1 DFFE Screening Tool

The site has been classified as having '**Very High**' aquatic biodiversity by the Department of Environment, Forestry and Fisheries (DFFE) screening tool. This classification is based on the site being located within the mapped Estuarine Functional Zone (EFZ) for Keurbooms Estuary (Figure 1) and small areas indicated by the Western Cape Biodiversity Spatial Plan (WCBSP) as Aquatic Critical Biodiversity Areas (CBA1; Figure 4).

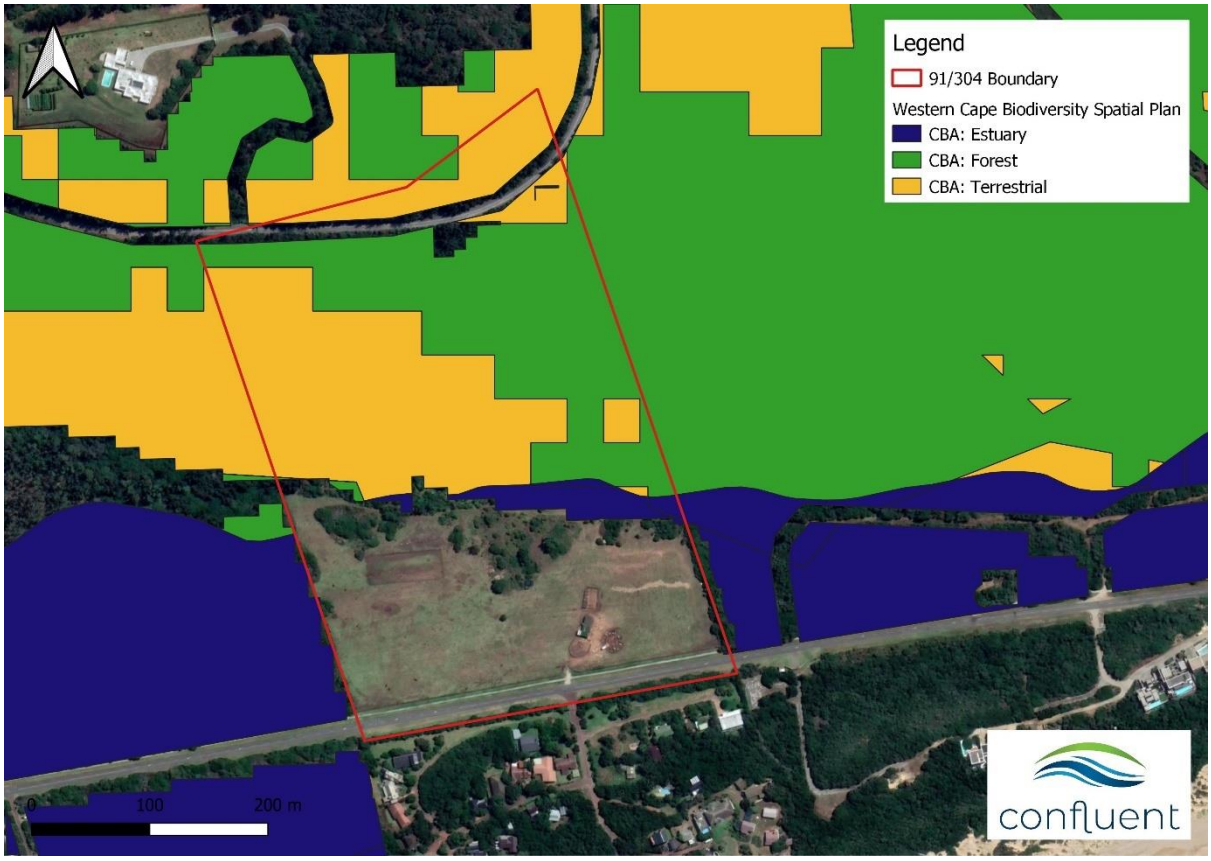


Figure 4. Critical Biodiversity Areas indicated in the Western Cape Biodiversity Spatial Plan (2017).

1.2.2 Scope of Work

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).

According to the protocols specified in GN 320 (Protocol for the specialist assessment and minimum report content requirements for environmental impacts on aquatic biodiversity) of the National Environmental Management Act (NEMA; Act No. 107 of 1998), assessment and reporting requirements for 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 objectives of this assessment included the following:

- To undertake a desktop analysis and site inspection to verify the sensitivity of aquatic biodiversity as **Very High** or **Low**; and
- Compile an Aquatic Biodiversity Compliance Statement or Aquatic Biodiversity Specialist Assessment based on the site verification of the sensitivity of the site. This includes an assessment of the following:

Interrogation of available desktop resources including:

- DWS spatial layers (1:50 000 rivers)
- National Freshwater Ecosystem Priority Areas (NFEPA) spatial layers (Nel *et al.,* 2011)
- National Wetland Map 5 and Confidence Map (CSIR, 2018)
- Western Cape Biodiversity Spatial Plan (WCBSP, 2017).

Conduct a site visit to determine the site sensitivity:

- Verify the presence of aquatic features on site including freshwater and estuarine habitats;
- Classification of aquatic features within and adjacent to the site according to methods detailed by Ollis *et al*. (2013);
- If present, determine the watercourse Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) using an appropriate method (if watercourses are present).
- Delineate wetland / riparian areas following methods prescribed by DWAF (2015).
- Determine an appropriate buffer for wetland areas using the site-specific buffer tool developed by Macfarlane and Bredin (2016).

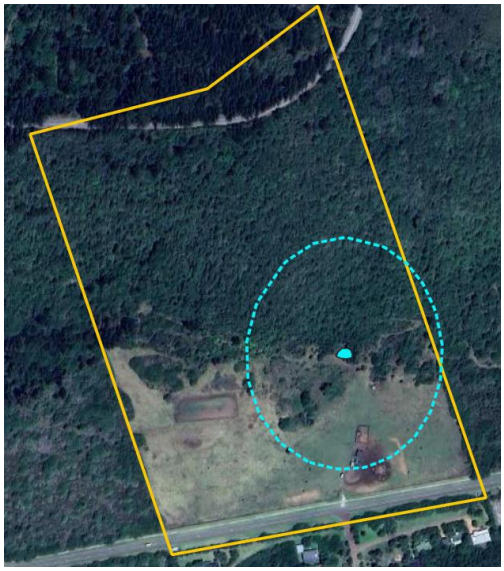
1.3 Legislation: National Water Act

The National Water Act (NWA; Act No. 36 of 1998) defines a watercourse as:

a) a river or spring;
b) a natural channel in which water flows regularly or intermittently;
c) a wetland, lake or dam into which, or from which, water flows; and
d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

This definition excludes estuaries which are regulated in terms of the Integrated Coastal Management Act. However, if freshwater features are present on the site then they would be covered by the NWA.

In terms of Section 21 c) and i) water uses this report will also need to comply with GN4167 of 2023 of the National Water Act (NWA; Act 36 of 1998) if the proposed development will take place in the area defined as the Regulated Area of a watercourse. If the development is taking place within the regulated area of a watercourse, then a Risk Matrix must be compiled by a SACNASP-registered aquatic scientist to determine the level of risk posed by the development to the wetland assuming full implementation of all mitigation measures. If the risk is ‘Low’ then the development can be Generally Authorised, but if the risk is ‘Medium’ or ‘High’ then a Water Use License Application will be required.



The regulated area of a spring is defined as the outer edge of the 1:100 year floodline or delineated riparian habitat, whichever is the greatest distance, measured from the middle of a river, spring, natural channel, dams and lakes. In the absence of a determined 1:100 year floodline or riparian area, the area within 100m distance from the edge of a watercourse where the edge of the watercourse is defined by the extent of open water in this case.

The image on the left shows a delineated pond excavated in front of a spring on the site and a 100m buffer indicating the development area (clear of vegetation) is within the regulated area of the watercourse.

The type of system used to transfer or treat sewage may also require authorisation. Details on the type of system were not available at the time of writing and this must be clarified in the engineering services report.

1.4 Assumptions and Limitations

- The southern portion of the site has been historically used for grazing, most recently for horses, resulting in extensive modification of vegetation from the original condition.
- The nature of site assessments is they are undertaken on a once-off basis which means there is the possibility that sensitive biota, vegetation or habitats which may be seasonal or cryptic by nature could be missed. The full extent of the proposed development site was fully inspected on two occasions to reduce the possibility of missing these features.
- Watercourse delineations and buffer determinations are site and land use specific and cannot be extrapolated beyond the area assessed in this report.

2. DESKTOP SURVEY

The site is quaternary catchment K60E. No freshwater features such as drainage lines, rivers or wetlands are indicated to occur within the footprint of the property or within close proximity to the property (Figure 5). The only mapped aquatic feature is the Estuarine Functional Zone (EFZ) which is identified as any area below 5 m.a.m.s.l. (metres above mean sea level). It must be stressed that the 5 m contour is a desktop delineation of estuarine habitat intended to indicate likely areas of estuarine habitat. However, this must always be groundtruthed to confirm the presence / absence of estuarine conditions. The northern portion of the property is fairly steep and forested, while the southern portion is very flat with pasture currently grazed by horses (Figure 5). The development will be focussed on the southern, flatter portion of the property where historical clearing of vegetation has taken place. This area is also aligned with the lower-lying contours of the site mapped as the EFZ.

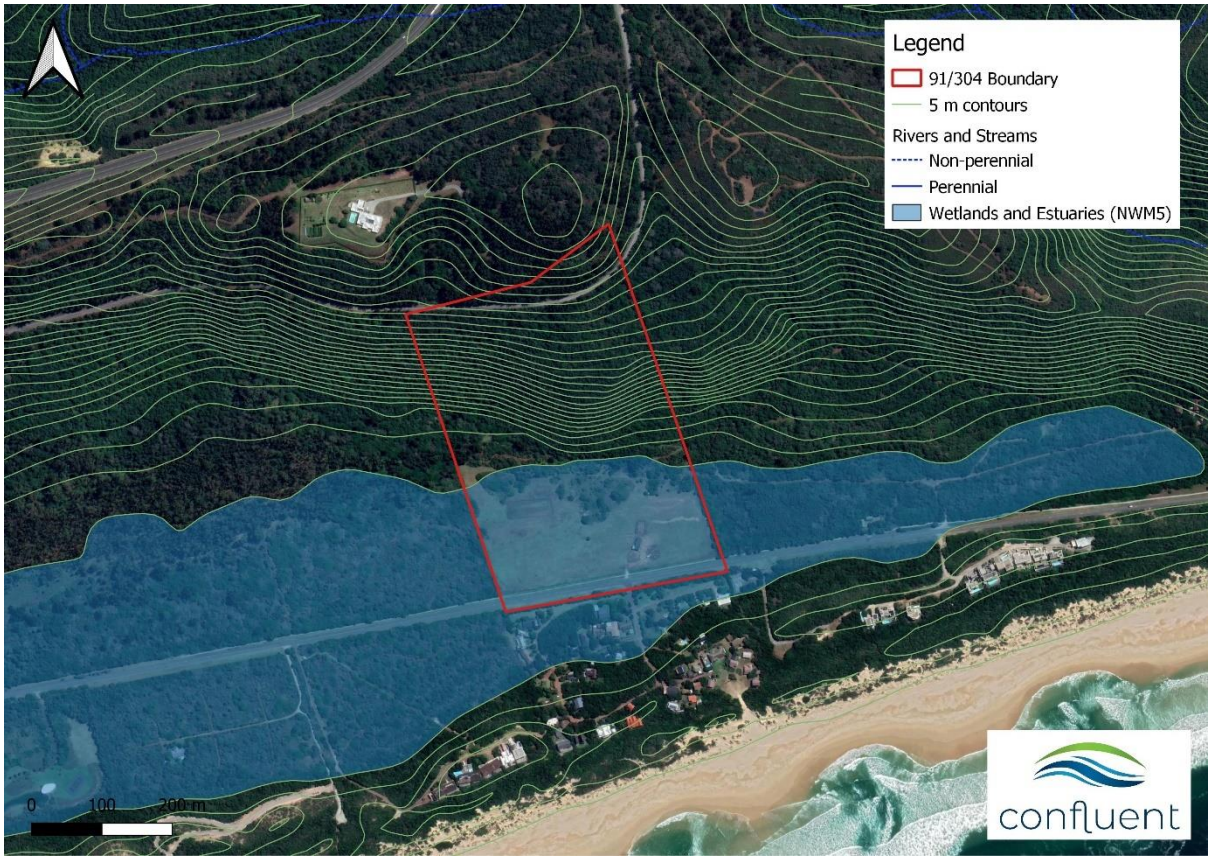


Figure 5: Location of the property in relation to mapped aquatic features. The blue shaded section indicates the Estuarine Functional Zone which is defined as any area below the 5 m contour.

2.1 Historical Assessment

The historical assessment used aerial imagery provided by the CD:NGI (National Geo-spatial Information) and satellite imagery available from Google Earth. Early images of the site in 1960 and 1989 show that vegetation clearing on the southern section of the site has been undertaken for many decades. The vegetation that was present consisted of dense thicket / forest, and the cleared area appears to be pasture. The 1960 image indicates that clearing was widespread across the original Matjesfontein Farm, and the present vegetation cover has recovered substantially on adjacent farm portions, but Portion 91 was never allowed to revegetate and was maintained in an open condition.

Minimal vegetation cover on the southern section has remained consistent at the site since at least 1960 and was probably cleared before that although images were not obtained from pre-1960.

Note the main road into Keurboomstrand is only evident from 1989 along the southern boundary. Prior to this the road intersected the property along the base of the slope.

No typical wetness/wetland indicators (dark areas and more dense vegetation in wet areas) are evident on the southern portion of the site in any of the aerial photos. As the dominant vegetation cover was historically forest / thicket this also suggests that there was no estuarine or wetland habitat on the site either, as this typically presents as open vegetation.

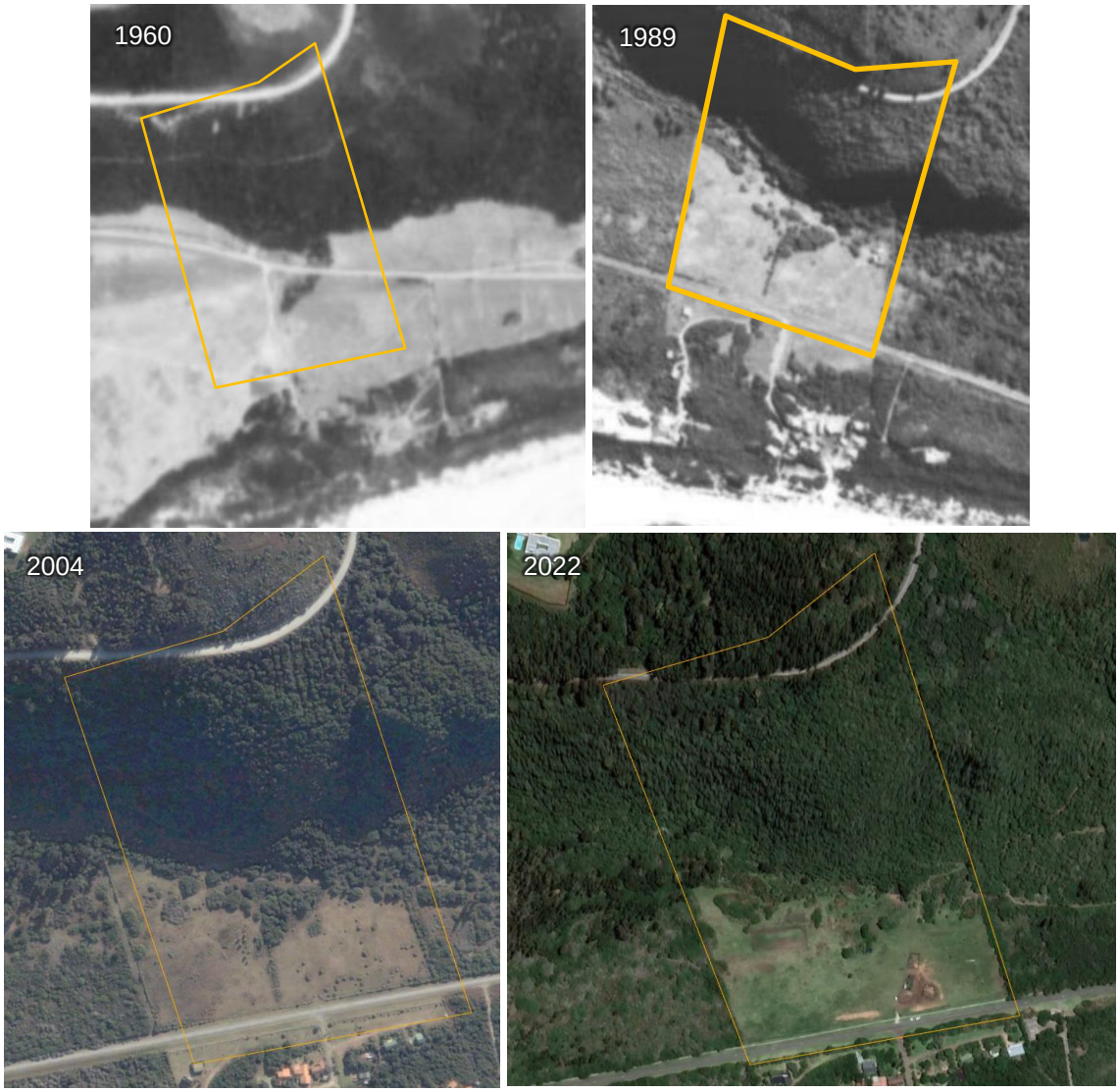
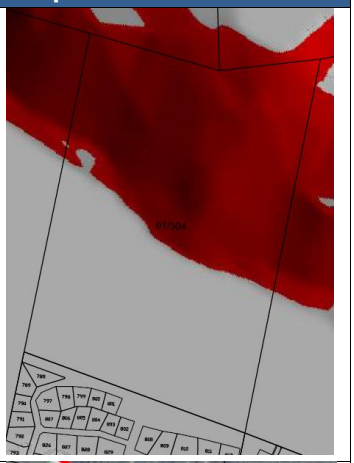
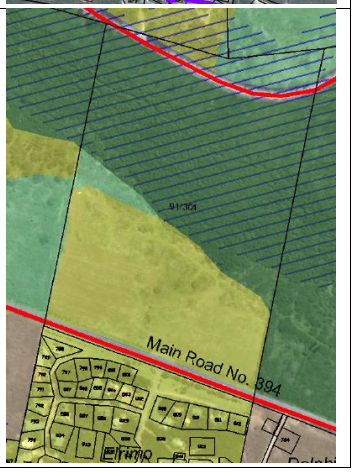


Figure 6. Historical aerial imagery of the property compared to the most recent Google Earth image in 2022.

2.2 Keurbooms and Environs Local Area Spatial Plan (KELASP)

The KELASP (2013) was reviewed from the perspective of the proposed development area. This report includes a thorough assessment of the Tshokwane Wetlands including various classifications of different wetland units, delineation of wetland areas, and development recommendations (Freshwater Consulting Group, 2013). Findings in the report relevant to proposed development at the site are summarised in Table 1.

Table 1. Summary of relevant features from the KELASP.

KELASP recommendations and guidelines	Graphic
Development on steep slopes with a gradient > 1:4 is not supported. The area highlighted in red represents the steeply sloping land on 91/304. *The development has been planned to avoid the steeply sloping areas.*	
Development is not supported in areas below the 1:50 and 1:100 year floodline. Lines indicated are: dark blue = 1:100 year floodline, and light blue area is an 'island' below the 1:50 year floodline. The purple line is the 100m urban coastal setback line. *The proposed development area is located outside of all these features, and is therefore not flagged from a heightened flood risk perspective.*	
Development is supported in transformed areas. The related graphic maps the southern portion of the site (proposed for development) as a 'Transformed Area' less sensitive to disturbance with opportunities for development and no natural habitat remaining. The relevant area is mapped in light green.	

2.3 Geotechnical Report

The lower portion of the property where development is proposed was also assessed in a geotechnical report (Outeniqua Labs, 2023). The report provides more detailed information on the soil drainage features and level of groundwater at the site. Test pit locations are indicated in Figure 7. Soil at the site was described as dominated by estuarine sandy soils with moderate permeability and drainage characteristics. Surface water is expected to accumulate

temporarily following heavy rainfall events. Groundwater was detected in 2 of the test pits at an average depth of 2 m (Outeniqua Geotechnical Report, 2023). This represents a perched water table over a portion of the site. While the associated water levels can rise and fall, there would need to be a very large volume of water (extremely high rainfall) for the water table to rise from 2 m to within 50 cm of the soil surface where wetland features (wetland plants and changes to soil morphology) typically occur. Furthermore, the rise and fall of the water table is transient in nature and would not persist long enough for wetland conditions to occur (*pers. comm*. I. Paton, Outeniqua Labs).

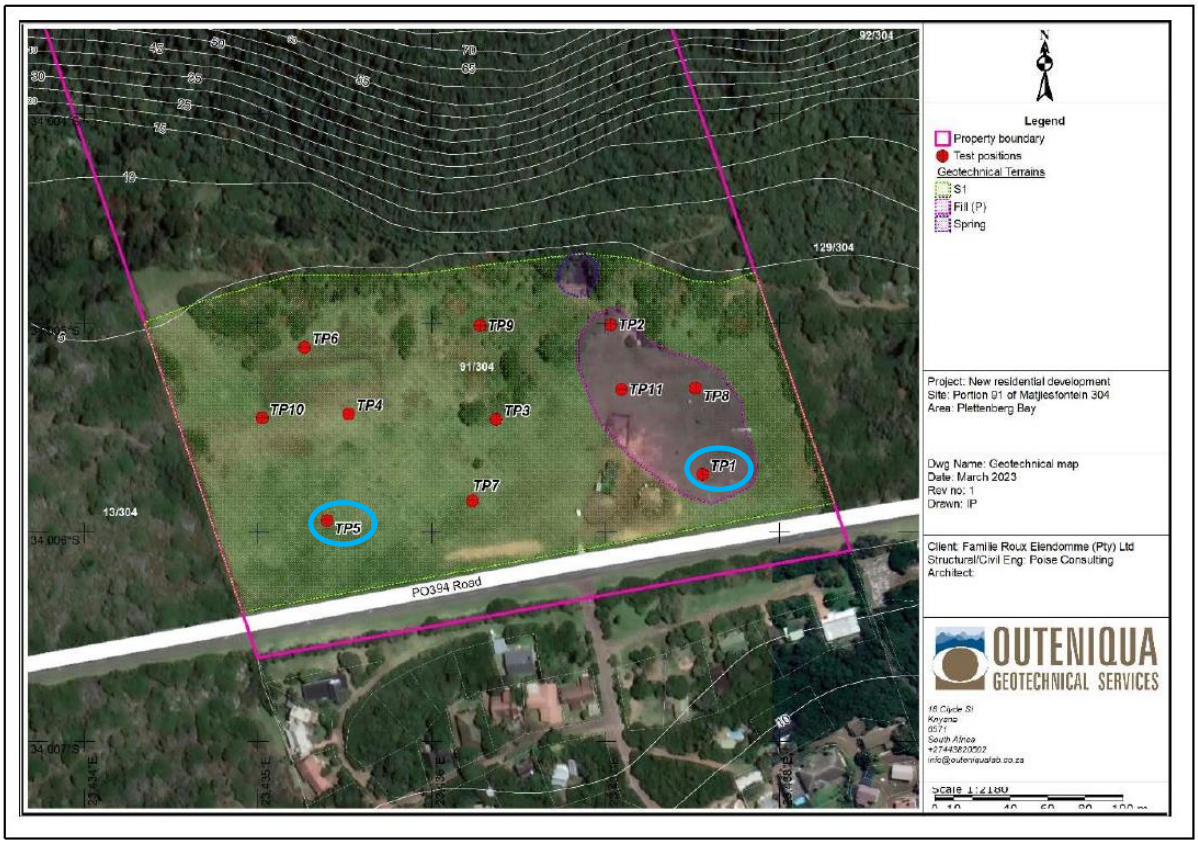


Figure 7. Location of test pits (TP1 - 11) from the Geotechnical study (Outeniqua Labs, 2023). Test pits where groundwater was detected between 2.0m and 2.3m are circled in blue.

3. SITE VISIT

The site was visited on 28 June 2022 and again in March 2024 which is considered mid-winter and late summer respectively. During the winter period the area had received good rainfall, and therefore any surface aquatic features at the site would be expected to be apparent. The entire site was inspected for evidence of estuarine habitat, wetlands, drainage lines, or any other watercourse.

3.1 Spring

A small natural spring is present on the site and was identified by the landowner. Water flowing from the spring is stored to a minor extent in a small, excavated pond measuring approximately 2-3 square metres (Figure 8).

Soil is very sandy on the site and should therefore be relatively well drained. The pond is roughly circular, and measures approximately 90 square metres in extent.

The pond and associated spring are identified as a watercourse as defined in the National Water Act. A buffer of 10 m for this feature is recommended. Development should be planned to exclude this buffer area during the construction and operational phase.

Figure 8. Photographs indicating the location of the spring and associated pond (28 June 2022).

Figure 9. Photos taken during the site visit in March 2024.

During the site visit in March 2024 additional augering was undertaken in the horse paddock area as indications from Interested and Affected Parties were that the area becomes waterlogged under very heavy rainfall (Figure 9). Soil augering indicated no mottling features in the upper 50 cm of the profile, and zero wetland plants were present in the area of the horse paddocks. To the contrary the plants that have escaped grazing in this area are indicative of terrestrial habitats and do not reflect waterlogging associated with wetland or estuarine conditions. Compaction of the soil by horses combined with addition of layers such as bark chips could reduce permeability of the soil surface exacerbating standing water during periods of very high rainfall.

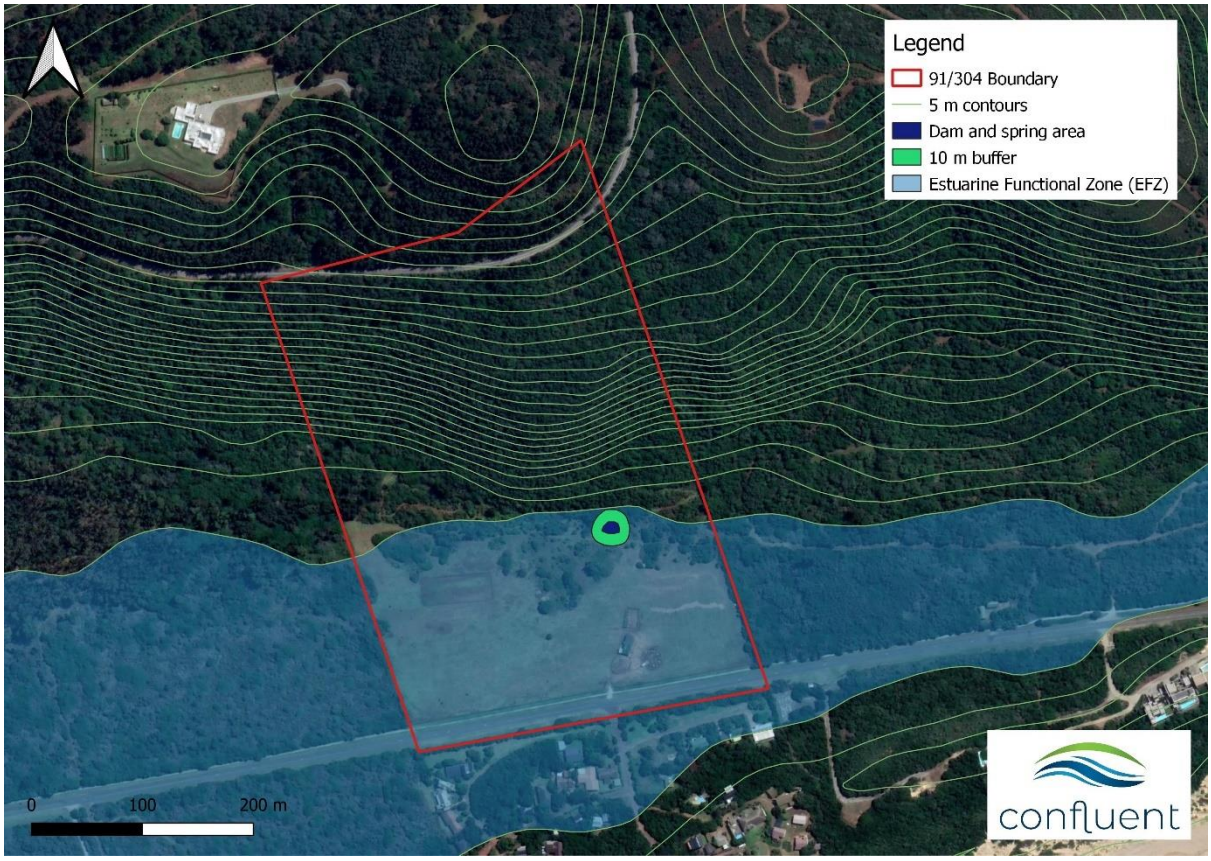


Figure 10. Location of the small, excavated pond and spring along with the mapped 10 m buffer.

3.2 Estuarine Functional Zone (EFZ)

Only remnant patches of indigenous vegetation were present on 91/304 and these contained a couple of large specimens of Milkwood trees (*Sideroxylon inermeis*) intermingled with *Searsia* sp. Shrubs which make up thicket areas. In the grazed open area which corresponds with the mapped EFZ, the dominant plant species are numerous candelabra flowers (*Brusvigia orientalis*), *Stenotaphrum secundatum* (Buffalo Grass), *Mesembryanthemum* spp. (ice plants), *Romulea* spp. (Froetangs), *Carprobrotus* sp., *Searsia crenata* (Dunekraaibessie), *Salvia aurea* (brown sage), and *Massonia longipes* (coastal hedgehog lily).

Figure 11. Typical vegetation in the grazed open area.

While these species are typically associated with coastal, sandy habitats, they are not strictly associated with estuarine systems including the upper extent of the tidal zone. Furthermore, no estuarine species from any of the tidal habitats including saltmarsh or supra-tidal vegetation were identified at the site. These species would typically include rushes and sedges such as *Juncus kraussii*, *Cyperus laevigatus*, *Ficinia nodosa* or *Phragmites australis*.

Soil augering at the site indicated deep, sandy, well drained soil with no textural change at 50 cm which could promote the development of wetland habitat (Figure 12). This is consistent with the mapped soil type in the area which is described as soils with limited pedological development (young soils with minimal organic matter), and a low clay content (< 15%).

Figure 12. Sandy soils present at the site with no indicators of permanent or seasonal saturation (28 June 2022).

Findings that the site is largely terrestrial are consistent with the spatial assessment provided in the Keurbooms-Bitou Estuary Management Plan (K-BEMP; Figure 13). This figure excludes the floodplain area from the 1 000 m buffer around the Keurbooms-Bitou estuary. The EFZ as defined by the 2014 EIA Regulations (GNR985) under the NEMA as "*the area in and around an estuary which includes the open water area, estuarine habitat (such as sand and mudflats, rock and plant communities) and the surrounding floodplain area…".*

One of the development risks within the EFZ relates to flooding which can be exacerbated by climate change and associated sea level rise. The K-BEMP (2018) includes mapped 1:50 and 1:100 year floodlines which are shown in Figure 14. The property is located on the edge of the 1:100 year floodline, which is not mapped to extend beyond the boundary of the property. In reality, the frequency of 100-year flood events is increasing due to climate change, and when coincident with sea-level rise and high tide events, it is not impossible that minor flooding could affect the low-lying area of the property in future. This should be considered in the design and layout of the property, and stormwater management should not further exacerbate the flood risk. To this end, Sustainable Drainage Systems (SuDS) should be fully implemented should the development proceed.

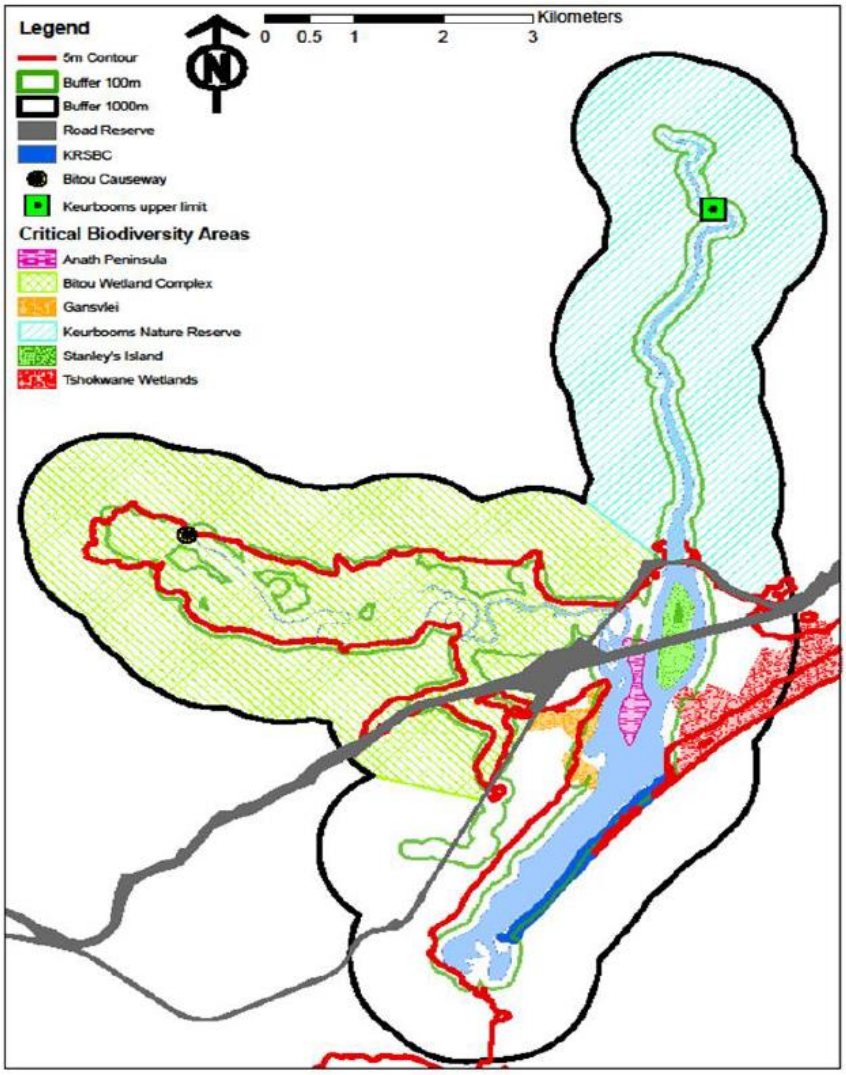


Figure 13. Mapped geographical boundaries, buffer zones, and Critical Biodiversity Areas of the Keurbooms-Bitou system (Estuarine Management Plan, 2018).

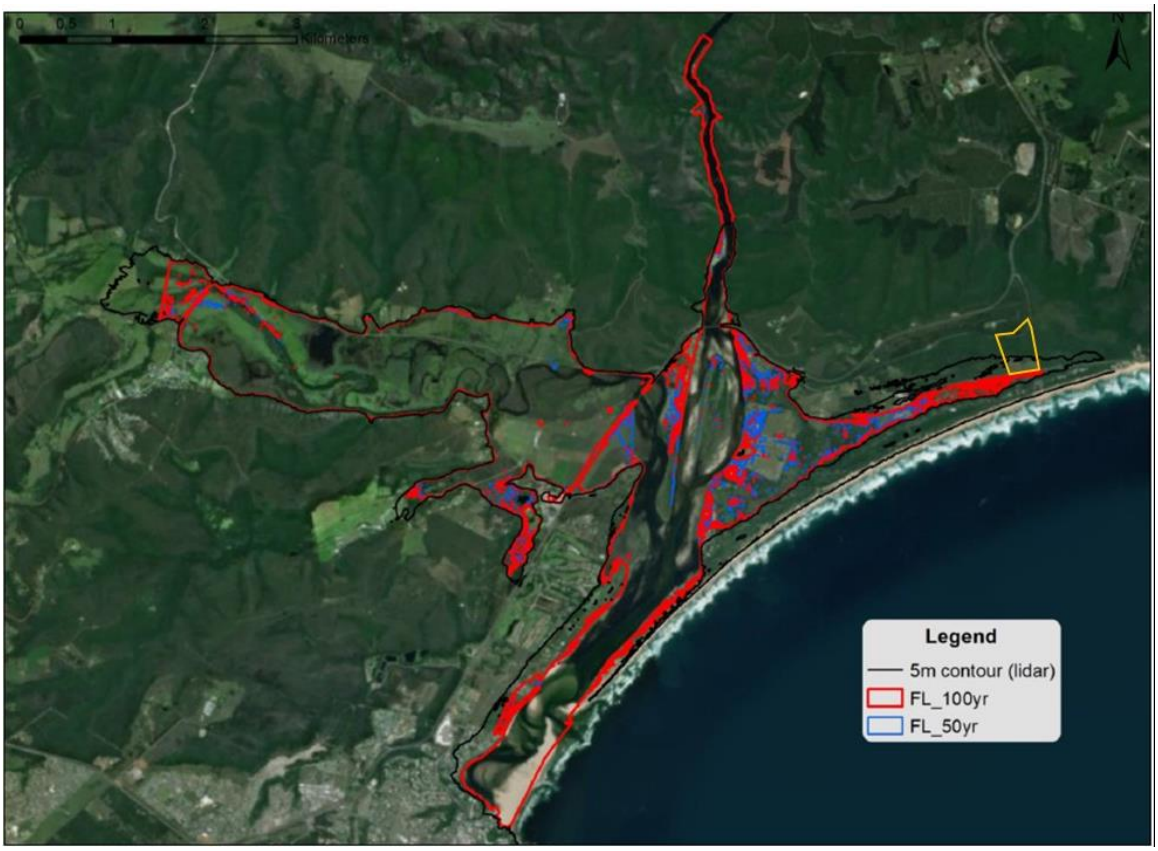


Figure 14. Mapped floodlines according to the Keurbooms-Bitou Estuary Management Plan indicating the proposed development site.

4. DEVELOPMENT SETBACK LINES

During site assessments for this property as well as adjacent properties to the east (unrelated to this project), it is evident that surface water features, such as the spring on this property, occur at the base of the steep slope. For wildlife at the site, this provides a source of fresh water. In most cases development is not proposed nor supported on the steep slopes but focusses on maximizing density on the flatter areas. The risk of this is that water sources become isolated 'islands' within developed areas which cannot be accessed by wildlife, and animals must adapt to life on steep slopes as level land is all developed.

This issue was highlighted with the development team and it was suggested that in addition to the 10m buffer around the pond, a 20 m wildlife corridor be established along the base of the steep slope which is continuous with neighbouring properties and remains unfenced. The purpose is to provide animals with sustained access to water and opportunities for movement in areas of low gradient. This also protects the slope base in terms of groundwater recharge which is an important function of this zone.

The abovementioned features are all plotted in relation to the preferred layout and presented in Figure 15. In most cases the layout provides a greater corridor than 20 m and the area around the pond is more extensive than the 10 m buffer. The only major 'pinch point' is the erf located on the north-east of the development indicated as **plot no. 50** in Figure 3.

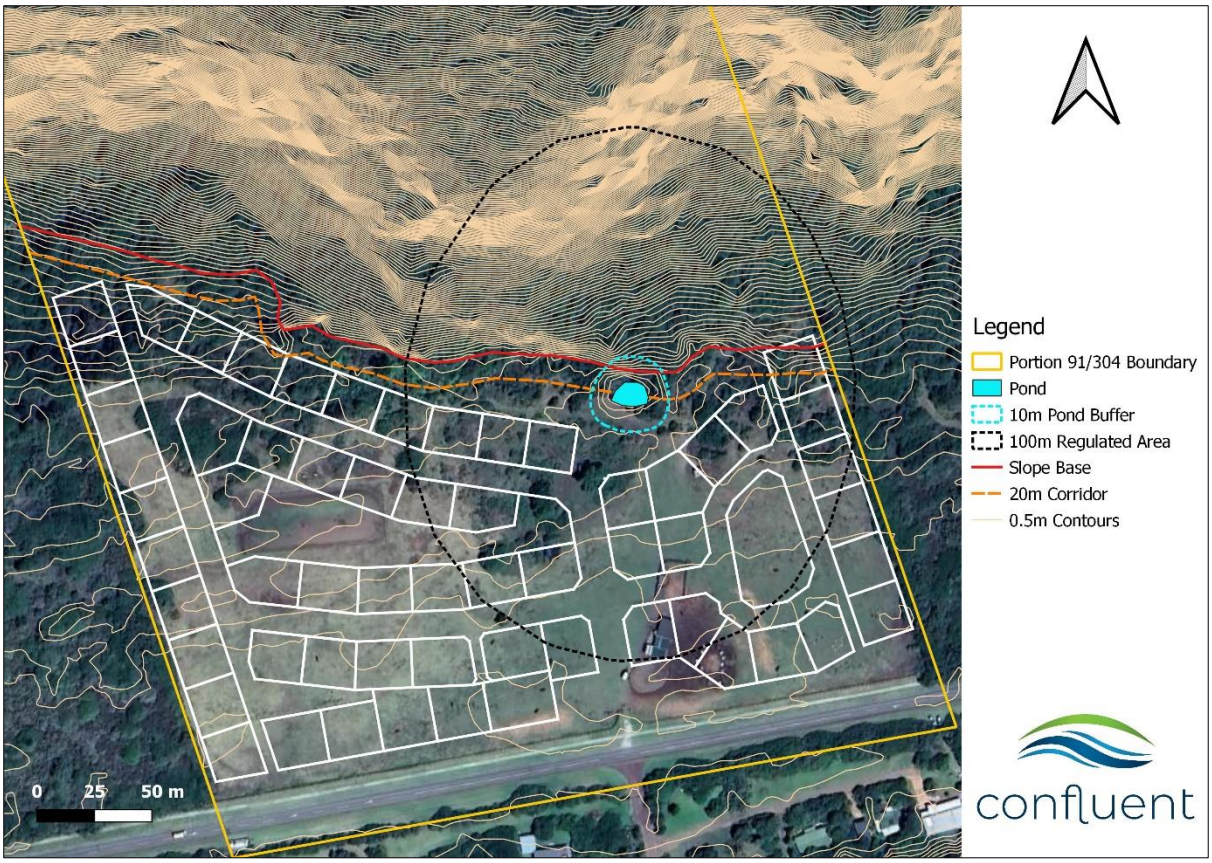


Figure 15. Preferred site development plan overlaid with 0.5 m contours, indicating the pond and buffer, the 100m regulated area of the spring, and the 20m wildlife corridor at the base of the slope.

5. NEMA: AQUATIC BIODIVERSITY COMPLIANCE STATEMENT

Based on the results of the desktop review and the site survey, the sensitivity of aquatic biodiversity on Portion 91/304 can be regarded as **Low**. The main factors influencing the statement include the following:

- The mapped aquatic features at the site are associated with estuarine habitat which is mapped according to the contours (5 m.a.m.s.l.) and not the actual habitat present. Ground-truthing of the site by the aquatic specialist confirmed no estuarine habitat present in remnant vegetation at the site, and no hydromorphic indicators in the soil that would indicate wetland conditions;
- While a natural spring and pond are present on the site, they are very small in extent and can be adequately protected from the development by implementing the 10m buffer during the construction and operational phases as indicated in this report. The presence of this feature is not sufficient to increase the sensitivity of the site to Very High, and it has been excluded from the development area in both SDP options. **No stormwater should be put into this pond as the water is of high quality**.
- According to the Keurbooms-Bitou Estuarine Management Plan the property and proposed development area are located above the 100-year floodline and outside of any ecologically sensitive areas associated with the estuary or Tshokwane wetlands. The latter point was confirmed during the site assessment.

- Following feedback received from DEA&DP querying the level of groundwater at the site, a geotechnical study was compiled. Groundwater was only present in 2 of the test pits at an average depth of 2 m. For wetland or estuarine conditions to form, the soil profile must be periodically saturated in the plant root zone (upper 50 cm). This would need to happen for at least several months of the year to influence vegetation composition. As the groundwater level was substantially deeper than this, and no wetland / estuarine vegetation was observed at the soil surface, it is concluded that no estuarine or wetland habitat could form at the site.

6. NWA: RISK MATRIX

The supply of potable water to the development is anticipated to be sourced from the Bitou Municipality. For the disposal of wastewater the proposal is to install a package plant for this purpose, which may result in Section 21 e) and g) water uses which are defined as follows:

Section 21 e): Engaging in a controlled activity identified as such in Section 37(I) or declared under Section 38;

> Section 37 a): Irrigation of any land with waste or water containing waste generated through any industrial activity or by any waterwork.

Section 21 g): Disposing of waste in a manner which may detrimentally impact on a water resource;

While the above water uses may be applicable in terms of authorisation of the development, their assessment does not form part of this report given that the water resource potentially impacted by the activity is groundwater and not surface water. However, elsewhere in Plettenberg Bay where similar circumstances have arisen (ie. Residential development with no municipal wastewater treatment capacity available, with proposed irrigation of treated wastewater) the recommendation has been to:

- **Install two groundwater spikes or wells at 8-10m depth to monitor groundwater quality. These should be located at least 200 m apart and provide easy access during construction and operational phases of the development.**
- **Wells must not be located in any areas of natural vegetation, rather opting for locations in previously disturbed grassy areas.**
- **Samples must be collected pre-development to determine baseline water quality (at least once/month over 3 months), to monitor possible impacts over time. Samples should be analysed from the start of construction onwards and be submitted for analysis on a monthly basis. Parameters for analysis should be aligned with those indicated in the DWS general limits.**
- **Water chemistry must not vary by 10% of the background levels established through baseline sampling. If sampling shows indications that eutrophication of the groundwater is occurring for 3 months consecutively, then an alternative to irrigation with treated wastewater must be found.**
- **Water samples must be submitted to BOCMA, the Bitou Municipality and reviewed by an aquatic ecologist on a quarterly basis for at least two years from commencement of the development.**

The proposed residential development is located in the Regulated Area of the spring as defined in GN4167 (Figure 15). The development is therefore classified as a water use in terms of Section 21 c) and i) of the NWA. The Risk Assessment Matrix was applied to determine the level of risk posed by the development to the spring and pond provided all listed control measures are applied. The outcome of the Risk Matrix was a Low Risk (Table 2), and the control measures applicable are listed in Table 3.

Table 2. Risk Assessment Matrix for anticipated Construction and Operational Phase impact for the proposed housing development on Portion 91/304.

Phase	Activity	Impact	Risk Ratings
Construction Phase (Site Preparation)	Earthworks and vegetation clearing for construction activities	Sedimentation of the pond resulting in poor water quality.	**LOW**
		Destruction of vegetation around the pond and spring.	**LOW**
Operational Phase	Inputs of stormwater from roofs and roads into the pond	Reduced physico-chemical water quality including the introduction of litter.	**LOW**
	Landscaping, gardening and maintenance extending into the pond and buffer area	Transformation of indigenous vegetation through planting, removal and / or dumping.	**LOW**

Table 3. Recommended control (impact mitigation) measures for protection of the spring, pond and buffer area during the construction and operational phase of the development.

Phase	Activity	Controls
Construction Phase (Site Preparation)	Earthworks and vegetation clearing for construction activities	• Pre-construction erect temporary fencing along the entire green corridor and open space to protect the pond as well as the corridor from impact during construction. • Add signage to the fence indicating the area as No-Go. • Site inductions for all staff must ensure contractors and works area aware they may not enter the pond and spring area.
Operational Phase	Inputs of stormwater from roofs and roads into the pond	• No stormwater infrastructure to be directed towards the pond. • Routine maintenance inspections to clear windblow / discarded litter from the pond and spring. • Stormwater should be diverted to detention ponds on the site which are indicated on various SDP layouts and are consistent with the SUDS approach to stormwater management.
	Landscaping, gardening and maintenance extending into the pond and buffer area	The purpose of the pond and spring is to provide a sustained water source for wildlife in the green corridor. • Landscaping and gardening staff must not undertake any clearing of vegetation inside of the 10m buffer.

		• A bird hide in the buffer to spot wildlife would be acceptable, but no additional recreational activities. The point is to create a quiet habitat with suitable vegetation cover for continued use by animals, birds etc. • Indigenous plants found in adjacent thickets may be planted around the pond. Only indigenous plants found in the immediate surrounding area may be planted. • A list of recommended wetland plants for that can be used to improve vegetation cover of muddy areas and marginal areas of the pond is provided in this report. • Do not place any fish into the pond as only alien invasive fish to the area would survive and could be transferred to other waterbodies on the feet of animals or birds. • The only plants that should be removed from the area are listed alien invasive species.

6.1 Plant Species

A list of wetland plant species is provided which can be planted around the margins of the pond to improve habitat for amphibians and water quality for wildlife making use of the pond. These plants can also be used in the stormwater ponds and are strongly recommended as alternatives to *Typha capensis* or *Phragmites australis*, both of which can become dominant and weedy, although they are indigenous.

Isolepis prolifera; Eleocharis limosa; Persicaria decipiens; Wachendorfia thyrsiflora; Falkia repens; Juncus lomatophyllus; Juncus effusus.

7. CONCLUSIONS & RECOMMENDATIONS

The proposed residential development on Portion 91/304 is likely to have minimal to no impact on surface water resources or watercourses as defined in the NEMA and NWA. From the perspective of the DFFE screening tool the site has Low Sensitivity, and from the perspective of the NWA a Risk Matrix was completed with a Low Risk outcome. This is because the only definable watercourse on the site is a natural spring which overflows to an excavated pond which has been used for livestock watering for many decades.

A buffer of 10m around the pond is recommended and has been incorporated in the preferred SDP presented in this report. With reduced frequency of use by horses it is likely that the pond will revegetate with a combination of passive and active revegetation (the latter involving active planting as opposed to self-establishment).

The preferred SDP layout has accommodated an area larger than 10m around the pond, and includes a green corridor of 20m of relatively flat ground at the base of steep slopes. It is necessary to maintain these areas in their natural state and limit human use and disturbance. The purpose of retaining the pond and buffer, along with the green corridor is to maintain some open space for use by wildlife in an interconnecting corridor between properties that wish to develop.

It is recommended that **fencing** does not intersect the corridor between properties. Security is unlikely to be a concern along the base of the slope and it is therefore not necessary to fence off the area. If considered absolutely necessary however, it is feasible to fence the development off from the 20m corridor, while keeping the corridor as a continuous habitat between adjacent properties. Preferable fencing would be palisade because it allows the movement of small mammals between bars whereas clearvu type fencing prohibits all movement barring very small animals like frogs.

Of the two development layouts, the preferred SDP is supported due to lower density and less associated impacts to wildlife utilising the green corridor and areas beyond. However, this has more relevance for the sustained use of the spring for wildlife, as opposed to protecting the spring from development-associated impacts.

It is recommended that **Unit 50 be removed** to improve connectivity along the green corridor as this unit currently blocks the area with the adjacent property to the east.

8. REFERENCES

Council for Scientific and Industrial Research (CSIR; 2018). National Wetland Map 5 and Confidence Map [Vector] 2018. Available from the Biodiversity GIS website, downloaded on 30 September 2020.

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9. APPENDICES

9.1 Engineering Services Plan

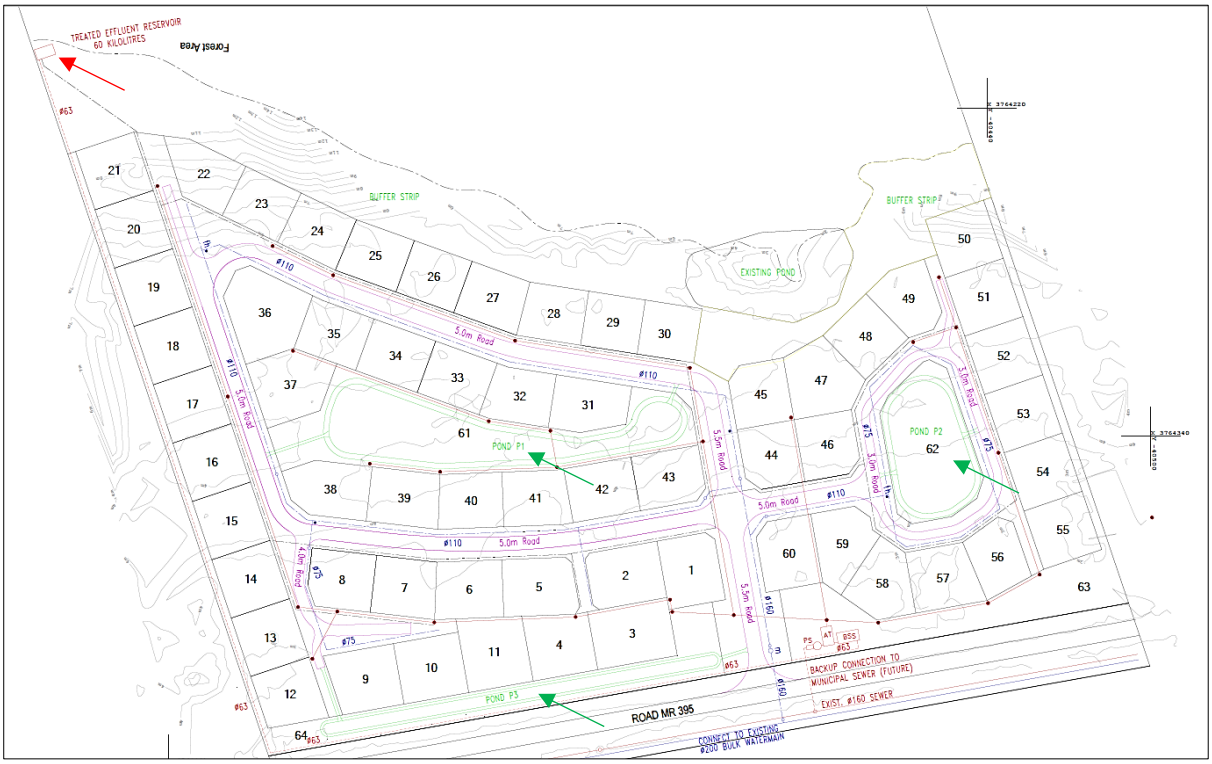

Figure 16. Engineering services plan DWG23G210S01 indicating the location of the reservoir for treated effluent (red) and the three stormwater retention ponds (green).