Aquatic Biodiversity Screening

Erf 438 Stanford
Western Cape

For: Lornay Environmental Consulting

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Report Information

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Joshua Gericke is an aquatic biodiversity specialist with over 12 years of experience. He has undertaken over 100 aquatic biodiversity screenings, assessments, and plans. In addition to his honours degree, he has completed several relevant short courses on a variety of topics including hydrophytic vegetation identification, wetland assessment methodologies, SASS5 river health assessments, and hydropedology. Prior to his consulting career, Joshua worked for the City of Cape Town's Biodiversity Management Branch for almost 9 years and received the Mayoral Outstanding Service Award for work in the field of urban wetland and estuary management. A full CV can be provided on request.

A signed statement of independence will be provided as a separate document.

1. Introduction

The owner of Erf 438, Standford (the proponent), is investigating the feasibility of establishing a residential "Eco-Lifestyle" estate on the property that will be known as the Stanford Green. The proposed site is approximately 5.25 ha in extent and is adjacent to the R43 (see **Figure 1-1**). The Mill Stream, a small tributary of the Klein River, runs across the western corner of the erf.

The project is at an early stage and no layout has yet been drafted. The proponent has appointed Lornay Environmental Consulting to undertake an environmental constraints assessment to inform the development concept and layout. Delta Ecology was appointed by Lornay Environmental Consulting to clarify aquatic biodiversity constraints on the property related to the Mill Stream and any other relevant watercourses.

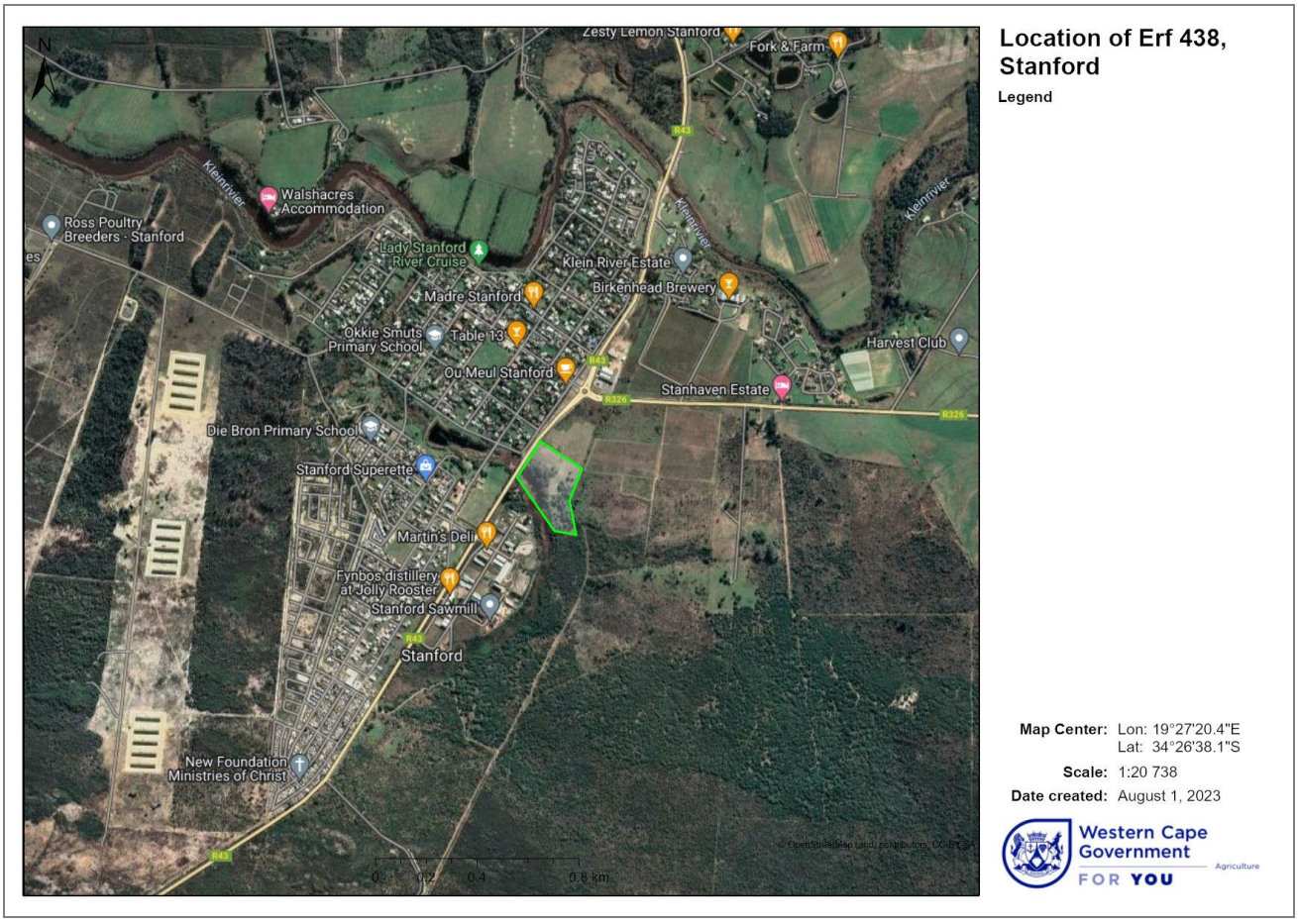

Figure 1-1: Location of the proposed development site, Hout Bay, Cape Town.

Terms of Reference

The terms of reference agreed upon for this aquatic biodiversity constraints study include:

- A desktop background assessment to identify potential aquatic biodiversity constraints within the proposed site, as well as within the 100 m regulated proximity for rivers/streams, and the 500 m regulated proximity for wetlands.
- A site assessment to confirm potential aquatic biodiversity constraints within the proposed site.
- Delineation of all watercourses within the proposed site using a combination of site-based and desktop methodologies as appropriate.
- Drafting of an aquatic biodiversity constraints report including the following:
    - Site description.
    - Site sensitivity verification.
    - Description of the drivers and key components of all watercourses within the site.
    - Clarification of the legislative implications and authorisation processes required for various development scenarios; and
    - Aquatic biodiversity impact mitigation recommendations.

Limitations and Assumptions

The following limitations and assumptions apply to the screening study:

- A single site visit was conducted on the 25th of July 2023 during the winter rainfall season. This does not cover the complete seasonal variation in conditions experienced onsite. This will however not have an impact on the aquatic screening outcome since hydrology and soil indicators were present and adequate for the delineation and assessment of the onsite watercourses.
- The agricultural portion of the site was highly disturbed, compacted and heavily irrigated. This combination of factors can cause wetland soil indicators and vegetation communities to form artificially and delineation of natural wetland in this area was therefore difficult.
- Watercourses were delineated using a Garmin E-trex 20 handheld GPS with an expected accuracy of 3 m or less at the 95% confidence interval. In the opinion of the specialist, this limitation is of no material significance to the assessment and all aquatic biodiversity constraints have been adequately identified. Accuracy can be improved by working in conjunction with a land surveyor at a later date if required for precise placement of infrastructure.

Notwithstanding the above limitations, the specialist is of the opinion that the aquatic biodiversity constraints for the site have been adequately identified for the purposes of this aquatic biodiversity constraints assessment.

2. Site Sensitivity Verification

The national web-based environmental screening tool considers any development site that contains a wetland to be of "Very High" sensitivity in terms of the Combined Aquatic Biodiversity Theme Sensitivity (DEFF, 2021). During the site assessment, the presence of wetlands within the proposed development site was confirmed. Furthermore, the wetland associated with the Mill Stream is a locally significant feature, providing a variety of ecosystem goods and services. A Concept Master Plan for the proposed Mill Stream Village Park and Greenway has been drafted for the Overstrand Municipality to maximise recreational, historical and ecological value of the stream and it's associated wetlands. The overall site sensitivity was therefore found to be "Very High".

This does not prevent development from taking place within the proposed site, but if an Environmental Authorisation is required for any development on site in terms of Aquatic Biodiversity Constraints, a full Aquatic Biodiversity Impact Assessment as contemplated in the National Environmental Management Act (NEMA) (Act No. 107 of 1998) Regulations of 2020 (as amended) (GN R. 320 of 2020), must be submitted with the application.

3. Methodology

The methodology used in this screening report, including a desktop background assessment, one site visit, and the delineation and classification of the watercourse(s) associated with the proposed development site, is outlined in the subsections below.

Desktop Assessment

A brief review of desktop resources was undertaken to determine the nature of the proposed project area, the presence of watercourses in the vicinity and the significance of the proposed sites in terms of biodiversity planning. The following desktop resources were consulted:

- Topographical information from the National Geographical Information Service (NGI)
- The South African Atlas of Climatology and Agrohydrology (1997, 2007 and 2009)
- Geological information from the Council for Geoscience
- The SANBI (2018) National Vegetation Map (NVM)
- The South African National Biodiversity Institute National Wetlands Map 5 (NWM5 – CSIR 2018)
- The National Freshwater Ecological Priority Areas (NFEPA – CSIR, 2011) wetland, wetland vegetation group classification, river and FEPA datasets
- The Chief Directorate: National Geo-spatial Information (DRDLR) River's dataset
- The Western Cape Biodiversity Spatial Plan (WCBSP 2017)

Wetland Delineation

The wetland boundaries were delineated at the outer edge of the wetland temporary zone using the method described in the DWAF, (2008) Manual for the Identification and Delineation of Wetlands and Riparian Areas. This method is the accepted best practice method for delineating wetlands in South Africa and its use is required by GN 509. The method makes use of four key field indicators to guide the delineation process (refer to **Box 1**):

Box 1 Four indicators of wetland presence as described in DWAF (2008):

1. The **position in the landscape** – Identifies parts of the landscape where wetlands are more likely to occur.
2. The **soil form** – Wetlands are generally associated with certain soil types.
3. The presence of **aquatic vegetation communities**.
4. The presence of **hydromorphic soil features**, which are morphological signatures that appear in soils with prolonged periods of saturation (associated with anaerobic conditions). Key hydromorphic features include:
    a. Mottling – Formation of clumps of iron oxide within the soil matrix in the form of orange, yellow, black or reddish-brown speckling. Mottling occurs in moist soils and reaches maximum density in the centre of the seasonal zone with sparse mottling in the temporary zone and no mottling in the permanent zone.
    b. Gleying – Shift in soil colour from the terrestrial baseline towards a blue, green or grey colour and an overall reduction in soil chroma. This phenomenon is normally difficult to identify in the temporary zone, noticeable in the seasonal zone and most significant in the permanent zone.
    c. Organic Surface Layers – surface layers with very high organic content that typically occur in the wetland seasonal and permanent zones.
    d. Organic Streaking – Streaks of organic matter within the soil column which may be present in all zones, but particularly the temporary and seasonal zones.

Soil samples were taken for inspection by hand augering to determine soil form and presence of redoximorphic soil features using a hand auger. While characteristic aquatic vegetation communities were absent from the onsite wetland, predominant indigenous tree species present within the onsite wetland were identified using various desktop resources. Plant species that occur in wetlands are classified as follows:

- Obligate species (occurring in wetlands >99% of the time – usually in permanent or seasonal zone)
- Facultative Positive species (67 to 99% of the population occurs within wetlands – typically in the seasonal and temporary zones with remaining 1 to 33% in the adjacent area on the wetland periphery)
- Facultative Species (33 – 67% of the population occurs within wetlands – usually in seasonal or temporary zones with remaining 67 – 33% in the adjacent area on the wetland periphery)
- Facultative Negative Species (1 – 33% of the population occurs within wetlands – usually in the temporary zone with remaining 99 to 67% in the adjacent area on the wetland periphery)
- Wetland Cosmopolitan Species (No specific affinity for wetlands and colonise wetland and terrestrial areas)

Watercourse Classification

The (Ollis *et al.*, 2013) Classification System for Wetlands and Other Aquatic Ecosystems in South Africa, as used in this assessment, is a tiered structured classification system that provides a

uniform description of wetland types based on their hydrogeomorphic characteristics. This classification system categorises wetlands into 7 distinct hydrogeomorphic units described in **Figure 3-1**.

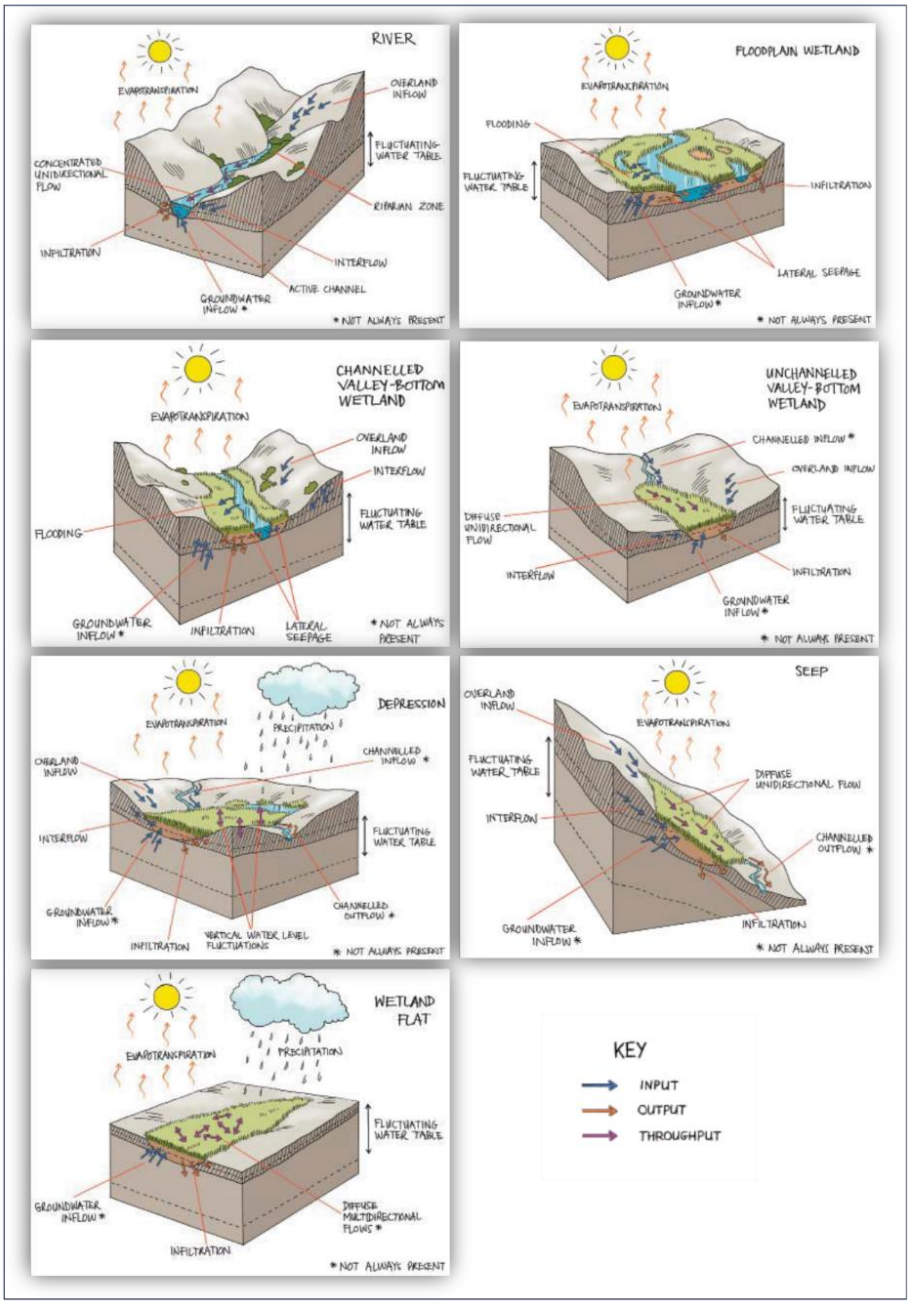

Figure 3-1: Wetland Hydrogeomorphic Types as defined in the Classification System for Wetlands and Other Aquatic Ecosystems in South Africa (Ollis *et al.*, 2013).

4. Desktop Assessment

A brief review of desktop resources was undertaken during the aquatic biodiversity screening. A summary of key desktop information relevant to this assessment is provided below.

Biophysical & Biodiversity Planning Context

The proposed site has relatively shallow soils, underlain by mudstone, siltstone, shale and feldspathic sandstone (**Table 4-1**) which predisposes the site to the formation of perched flat/depressional and hillslope seep wetlands under the right conditions. Rainfall is moderately low for the Overstrand area however, which will limit the formation of wetlands to a degree. The terrestrial vegetation within the site is predominantly Critically Endangered, Poorly Protected Agulhas Limestone Fynbos, although the northern corner is indicated as Endangered, Poorly Protected Elim Ferricrete Fynbos (**Figure 4-1**). Wetlands within these terrestrial vegetation types are associated with the Engdangered, Poorly Protected South Coast Fynbos and the Vulnerable, Well Protected Southwest Fynbos wetland vegetation types, respectively.

In terms of the Western Cape Biodiversity Spatial Plan (WCBSP 2017), the Mill Stream corridor is designated partly as ESA1 (Aquatic) and partly as ESA2 (Degraded) which could be aquatic or terrestrial. The catchment has not been designated as significant in terms of the National Freshwater Ecosystem Priority Areas (NFEPA 2011) designations.

The general characteristics of the proposed site is summarised in **Table 4-1**.

Table 4-1: General characteristics of the proposed site.

Site attribute	Description	Data source
Eco-region	Southern Coastal Belt	Department of Water Affairs Level 1 Ecoregions (Department of Water and Sanitation, 2011)
Terrestrial Vegetation Type(s)	1) Agulhas Limestone Fynbos (CR-PP) 2) Elim Ferricrete Fynbos (EN-PP)	National Vegetation Map of South Africa, 2018 (SANBI, 2018)
Dominant Geology and Soils	Mudstone, siltstone, shale and feldspathic sandstone of the Gydo Formation, Bokkeveld Group, partly covered by alluvial and colluvial sand.	Soil descriptions for the Western Cape. (ENPAT, 2021)
Soil Erodibility Factor (K)	0.63 (High Erodibility)	SA Atlas of Climatology and Agrohydrology (Schultz, 2009)
Soil depth and clay %	>= 450 mm and < 750 mm & <15%	Soil types and descriptions for the Western Cape, Department of Agriculture,

		Forestry and Fisheries (DAFF, 2021)
Mean Annual Precipitation (mm)	545 mm	SA Atlas of Climatology and Agrohydrology (Schultz, 2009)
Rainfall seasonality	Winter rainfall	
Mean Annual Temperature (°C)	17 °C	
Water Management Area	Breede WMA	Water Management Areas (DWAF, 2011)
Quaternary Catchment	G40L	South African Quaternary Catchments Database (Schulze et al., 2007)
Wetland Vegetation Group (for wetlands within the applicable terrestrial vegetation type)	1) South Coast Fynbos (EN – PP) 2) Southwest Fynbos (VU – WP)	NFEPA Wetland Vegetation Types (SANBI, 2011)

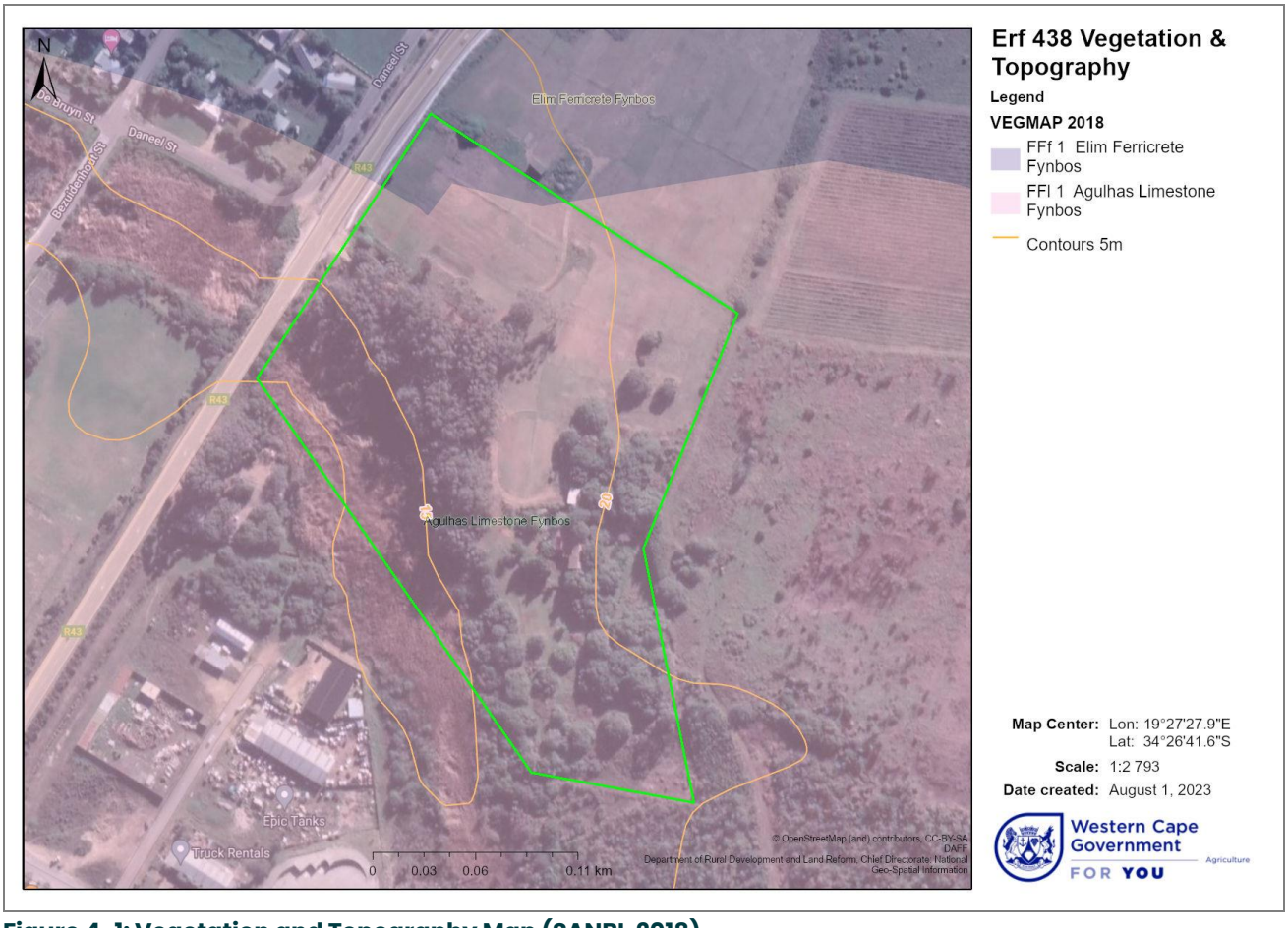

Figure 4-1: Vegetation and Topography Map (SANBI, 2018).

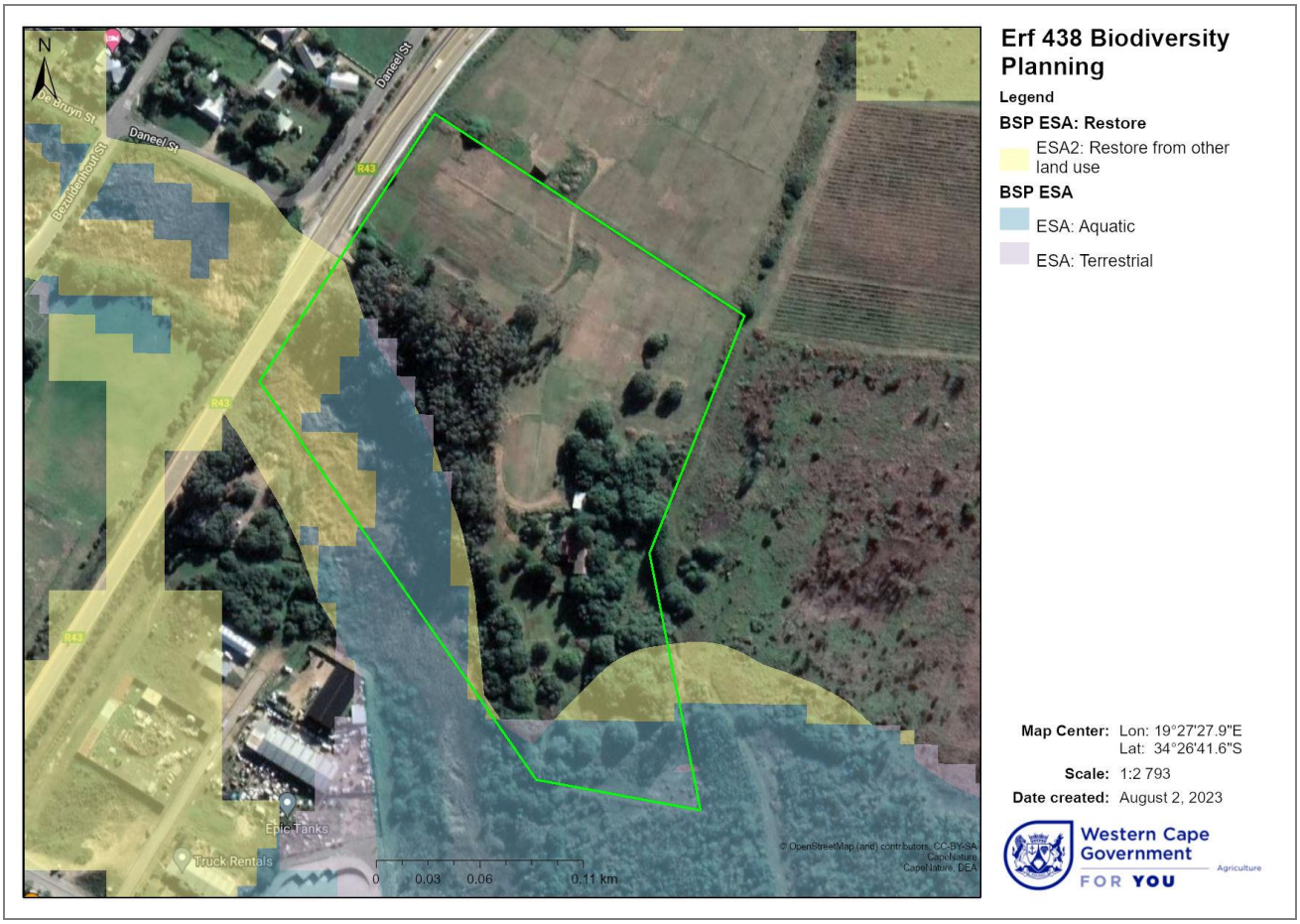

Figure 4-2: Southern and western portions of the site, have been designated as Ecological Support Areas (ESAs), mainly of the ESA1 (Aquatic) and ESA2 (Degraded) designation.

Water Resources

The proposed site is underlain by the Overberg Regional Aquifer. The Department of Rural Development and Land Reform (DRDLR) National Geo-spatial Information (NGI) river line vector data indicates two non-perennial drainage lines that intersect the proposed site across the southern and western corners and confluence just south of the site (**Figure 4-3**). The NFEPA (2011) and NWM5 (2018) wetland layers indicate floodplain wetlands largely coinciding with the non-perennial drainage lines (**Figure 4-3**). Both aquatic systems extend across the 500 m regulated proximity of the erf, but no other watercourses were noted in this area (**Figure 4-4**).

Figure 4-3: Regional Drainage Map (NGI Rivers, NWM5 Wetlands and NFEPA Wetlands)

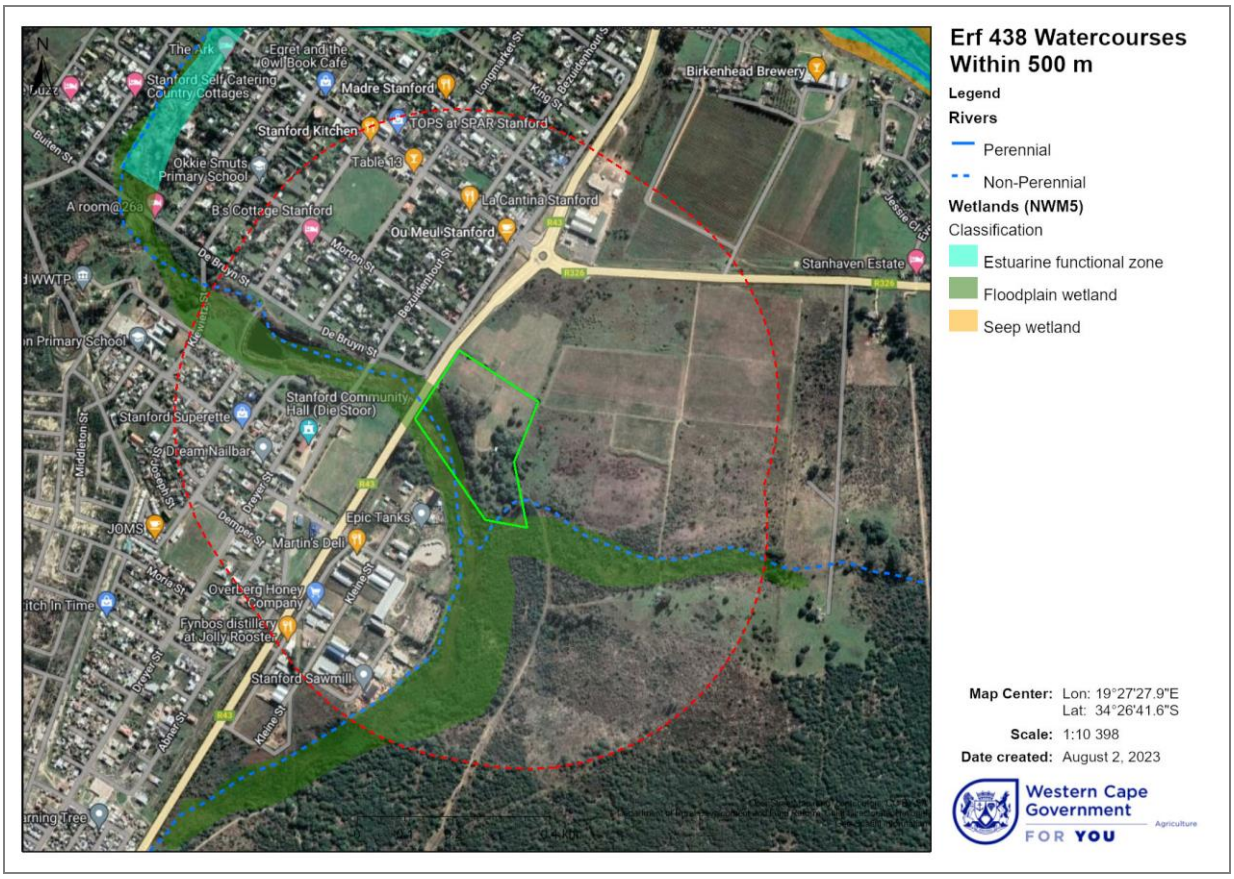

Figure 4-4: CBAs and ESAs (WCBSP, 2017)

5. Site Description

A site visit was undertaken on the 25th of July 2023 during the winter season. Rainfall prior to the site assessment had been unusually heavy for over a month beforehand, and an exceptionally heavy rainfall event had occurred less than a week prior. The following are the findings of the site assessment.

Infrastructure is clustered in a node just east of the centre of the site and included a single farm dwelling adjacent to a small nursery/operational area and equipment store for agricultural operations. A single gravel access road connects the infrastructure node with the adjacent R43 road along a north-westerly axis.

The northeastern portion of the site is used to grow grass for sale as roll-on lawn. Much of the area has been compacted to promote surface-water retention and non-native soil has been introduced in some areas, either to promote compaction or as a by-product of historical road construction. The lawn areas are heavily irrigated in the dry months and this, combined with compaction, has created artificial wetland soil indicators and vegetation communities (along with surface water during fieldwork) which made wetland delineation in this area difficult. Furthermore, the agricultural activities (lawn and vineyards) on the upslope adjacent farms to the north and northeast likely produce substantial artificial increases in runoff of both irrigation and rainwater. Wetland delineation therefore required a combination of field-based methods (with particular focus on the uncompacted margins and pockets) and analysis of historical satellite imagery.

The southeastern portion of the site was dominated by mature *Sideroxylon inerme subsp. inerme* (milkwood) thicket with *Olea Europaea subsp. africana* also present in significant numbers. The Mill Stream wetland along the western edge of the site was dominated by *Phragmites australis* and *Typha capensis* reedbeds. The small tributary wetland that crosses the southern corner of the site exhibited a moderately diverse wetland community dominated by *Carex clavata*, *Ficinia elatior*, *Orphium frutescence* and *Stenotaphrum secundatum*. The wetland has been recently cleared of alien invasive species (*Acacia saligna*) and is recovering well. The adjacent property is still densely invaded and the species will remain in the seedbank for many years.

The Mill Stream wetland is classed by desktop resources as a floodplain wetland. However, no defined stream channel was noted during the assessment, so overtopping is unlikely to be a significant water source. Lateral flow from the adjacent shallow slopes (particularly subsurface flow) is likely to make up a large portion of the hydrological supply, which is more consistent with the unchanneled valley bottom (UVB) wetland classification. The Mill Stream wetland exhibits primarily permanent and temporary zone hydrology. The area between the Mill Stream wetland and the adjacent access road is occupied primarily by mature alien *Eucalyptus* trees.

The small tributary wetland also did not have a channel and was consistent with the UVB wetland classification. It exhibited primarily seasonal and temporary zonation.

Terrestrial soils were a damp uniform brown sandy loam, while wetland soils were waterlogged and exhibited gleying. Limited mottling was noted due partially to the high concentration of quarzitic sand in the soil matrix which does not contain significant iron, and partly because the seasonal zone was entirely waterlogged to the degree that soils could not be held in the auger for photography. Only occasional temporary zone mottles were noted.

In the agricultural area, the artificially compacted soils often exhibited surface water from the recent rain, but deeper augering revealed dry soils just under the surface with no redoximorphic or other hydromorphic soil features. Some areas were noted however where the soil was waterlogged throughout, that exhibited hydromorphic soil features and that were associated with disturbance-tolerant wetland vegetation and a substantial hillslope seep system of natural origins was identified.

Of the three wetland systems, the small tributary was in the best condition and the most sensitive, followed by the Mill Stream that was less sensitive and exhibited greater impact, but with substantial importance for the local community. The hillslope seep that was delineated in the agricultural area was by far the most impacted and of the least value. It exhibited little It exhibited little wetland habitat and seriously impacted hydrology and geomorphology.

Figures 5-1 to **5-8** provide an overview of the site and its vegetation and soils, and the resulting wetland delineation is provided in **Figure 5-9**.

Figure 5-1: Compacted areas used for growing roll-on lawn.

Figure 5-2: A portion of the hillslope seep where it flows onto the compacted lawn area.

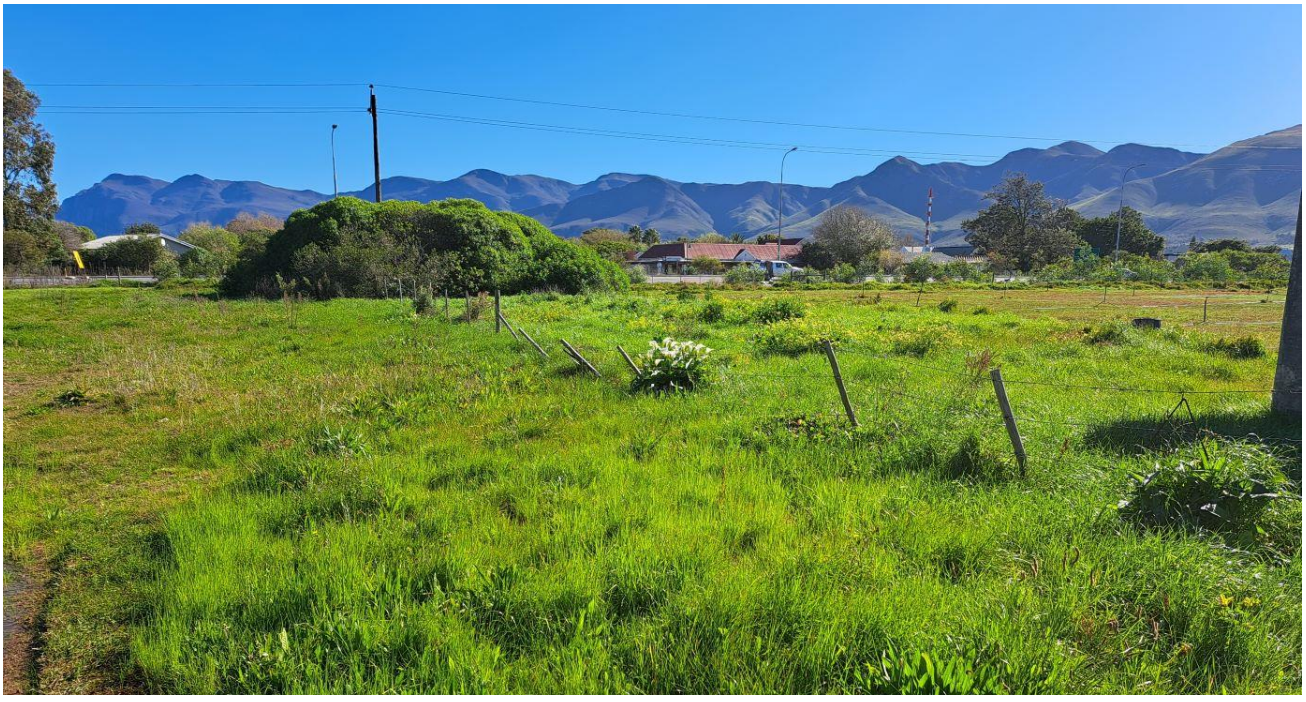

Figure 5-3: A portion of the hillslope seep near the R43.

Figure 5-4: A portion of the hillslope seep near the access road and Mill Stream wetland.

Figure 5-5: Tributary wetland flowing left to right across the track. Note the brush pile to the right from recent invasive species clearing.

Figure 5-6: Vegetation typical of the tributary wetland.

Figure 5-7: Brown, uniform soils typical of the terrestrial parts of the site.

Figure 5-8: Wetland soils exhibiting gleying.

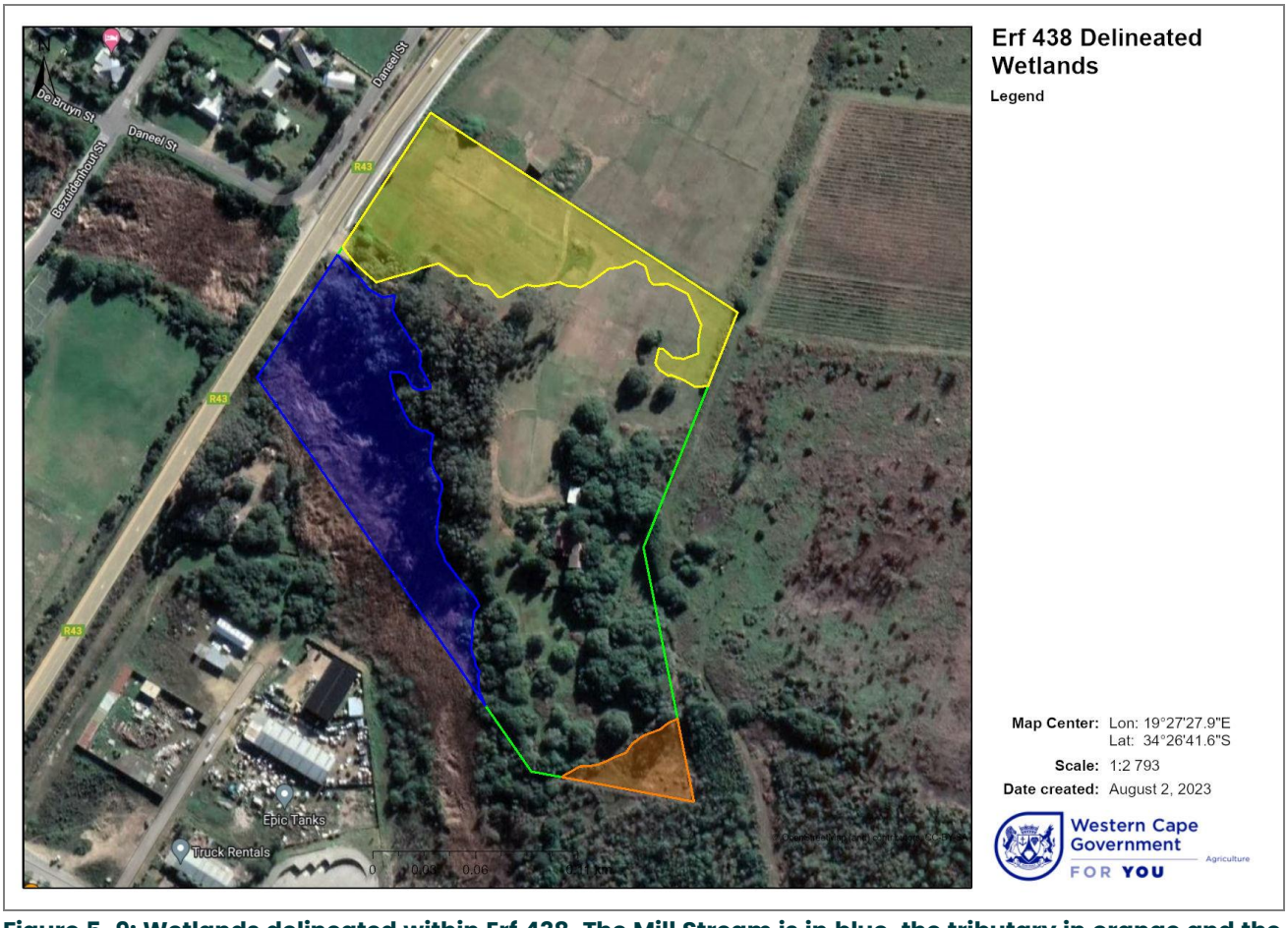

Figure 5-9: Wetlands delineated within Erf 438. The Mill Stream is in blue, the tributary in orange and the hillslope seep is in yellow.

6. Conclusions and Recommendations

This report sets out the results from a desktop analysis, as well as a field assessment conducted on the 25th of July 2023 to clarify aquatic biodiversity constraints associated with the proposed development of a residential eco-estate on Erf 438, Standford, Western Cape. Three wetlands were identified within the proposed site, including the Mill Stream wetland (classified as a UVB), a small tributary thereof (also a UVB) and a hillslope seep wetland in the farmed area.

In terms of the National Environmental Management Act (NEMA – Act 107 of 1998) and its regulations, any construction of 100 m^2 or more, or that involves movement of 10 m^3 or more of soil or other substances within 32 m of any of the wetlands delineated will require application for an Environmental Authorisation via the Basic Assessment process. Given the "Very High" sensitivity of the site, a full Aquatic Biodiversity Assessment will be required to support the application.

In terms of the National Water Act (NWA – Act 36 of 1998) and its regulations, a water use authorisation will be required for any development within 500 m of the wetlands that is deemed to alter the bed, banks, flow or characteristics of any wetland. These terms are used broadly and the resulting mild catchment hardening and water quality impacts that are likely to occur from the proposed development will certainly require application for a water use authorisation.

An aquatic risk assessment will need to be undertaken for the proposed development using the risk assessment matrix prescribed in GN509 of 2016 promulgated under the NWA. If the outcome is "Low Risk", the water use authorisation will take the form of a General Authorisation (GA). If the outcome is "Medium Risk", it will take the form of a Water Use Licence Application (WULA). "High Risk" proposals also require a WULA, but are only approved under certain circumstances.

The key determining factors in resulting risk class will be:

1. Whether wetland encroachment can be avoided;
2. Whether a buffer zone (ideally 32 m wide) between the wetlands and the can be incorporated into the layout design;
3. The mechanism of sewage disposal;
4. The nature of stormwater management.
5. The nature of the water source for the dwellings.

It should be noted that the Department of Human Settlement, Water and Sanitation who administer the NWA apply a "no net loss" policy to wetlands. Wetland encroachment resulting in a loss of wetland habitat and function usually results in a "High Risk" rating and typically requires an offset to stand a reasonable chance of securing the Water Use Licence (WUL).

Offsets involve rehabilitation and management of wetlands in perpetuity, which can be costly. Wetland encroachment should therefore be avoided if at all possible. If the project is not viable without wetland encroachment, then this should be restricted to the heavily impacted hillslope seep wetland. There is a chance that the requirement for an offset could be waived given the highly degraded nature of this wetland, but if not, there is ample scope for onsite wetland rehabilitation and conservation offsets should wetland loss be unavoidable.

The key recommendations therefore are:

- Avoid encroachment into the 32 m NEMA regulated zone around each wetland if possible.
- Avoid wetland encroachment if at all possible. If wetland encroachment is unavoidable, restrict it to only the hillslope seep wetland and minimise it as far as possible.
- Tie into mainline sewage if at all possible, or use fully contained conservancy tanks serviced by truck. No sewage treatment, irrigation or soak-aways should be contemplated.
- Allowance must be made for stormwater to be treated in a vegetated detention pond and/or a substantial vegetated swale before release into any wetland.
- Municipal water supply should be used if possible. If not, groundwater abstraction would be preferable to wetland abstraction.

We are of the opinion that a reasonable layout will stand a high chance of being granted the necessary Environmental and/or Water Use authorisations. Please don't hesitate to contact us should you have any questions or comments. We are available to guide you through this process.

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